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CORNELL
UNIVERSITY

Courses of Study

1999–2000

Cornell University Calendar

Fall Semester	1999-2000	2000-01
Residence halls open	Friday, August 20	Friday, August 18
Freshman orientation begins	Friday, August 20	Friday, August 18
New-student orientation begins	Friday, August 20	Friday, August 18
Registration–course exchange	Tuesday–Wednesday, August 24–25	Tuesday–Wednesday, August 22–23
Instruction begins	Thursday, August 26	Thursday, August 24
Physical education classes begin	Monday, September 6	TBA
Fall break: instruction suspended	Saturday, October 9	Saturday, October 7
Instruction resumes	Wednesday, October 13	Wednesday, October 11
Pre-course enrollment for spring	TBA	TBA
Family Weekend	October 29–31	November 3–5
Homecoming	November 5–7	September 22–24
Thanksgiving recess: instruction suspended, 1:10 p.m.	Wednesday, November 24	Wednesday, November 22
Instruction resumes	Monday, November 29	Monday, November 27
Instruction ends	Saturday, December 4	Saturday, December 2
Study period	Sunday–Wednesday, December 5–8	Sunday–Wednesday, December 3–6
Final examinations begin	Thursday, December 9	Thursday, December 7
Final examinations end	Friday, December 17	Friday, December 15
Residence halls close	Saturday, December 18	Saturday, December 16
Winter Session Period Begins	Monday, December 27	Tuesday, December 26
Three-week classes begin	Monday, January 3	Tuesday, January 2
Winter session period ends	Friday, January 21	Saturday, January 20
Spring Semester		
Residence halls open	Tuesday, January 18	Tuesday, January 16
Registration–course exchange	Thursday–Friday, January 20–21	Thursday–Friday, January 18–19
Instruction begins	Monday, January 24	Monday, January 22
Physical education classes begin	Monday, February 7	TBA
Spring break: instruction suspended	Saturday, March 18	Saturday, March 17
Instruction resumes	Monday, March 27	Monday, March 26
Pre-course enrollment for fall	TBA	TBA
Instruction ends	Saturday, May 6	Saturday, May 5
Study period	Sunday–Wednesday, May 5–10	Sunday–Wednesday, May 6–9
Final examinations begin	Thursday, May 11	Thursday, May 10
Final examinations end	Friday, May 19	Friday, May 18
Residence halls close (students who are graduating may stay through Commencement Day)	Saturday, May 20	Saturday, May 19
Senior Week	Sunday–Saturday, May 21–27	Sunday–Saturday, May 20–26
Commencement	Sunday, May 28	Sunday, May 27
Summer Session		
Three-week session	Wednesday, May 31	Wednesday, May 30
Eight-week session	Monday, June 12	Monday, June 11
Six-week session	Monday, June 26	Monday, June 25

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

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

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

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

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

This catalog was produced by Media and Technology Services at Cornell University.

CORNELL
UNIVERSITY

Courses of Study

1999–2000

Cornell University
(USPS 132-860)

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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 the Office of Equal Opportunity, Cornell University, 234 Day Hall, Ithaca, New York 14853–2801 (telephone: 607 255–3976).

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 calling or writing to the Office of Equal Opportunity, Cornell University, 234 Day Hall, Ithaca, New York 14853–2801. (Telephone: 607 255–3976; Telecommunications Device for the Deaf (TDD): 607 255–7665). Other questions or requests for special assistance may also be directed to that office.

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To obtain a copy of this catalog, please follow these guidelines:

If you are a prospective undergraduate student, please contact the Undergraduate Admissions Office, Cornell University, 410 Thurston Ave., Ithaca, NY 14850–2488, 607–255–5241.

If you are a prospective graduate student, please consult the listing of the course catalog on the Web (see above for address).

If you are a currently enrolled student, please contact your college registrar.

All others please contact the Office of the Vice President for Student and Academic Services, Cornell University, 311 Day Hall, Ithaca, NY 14853–2801, 607–255–7595, e-mail: dsy1@cornell.edu

Corrections or suggestions for changes in this catalog may be sent to

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Abbreviations and symbols used in this catalog:

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

Courses with names and descriptions enclosed in brackets—[ ]—are not offered fall 1999 and spring 2000.

CORNELL UNIVERSITY—GENERAL INFORMATION

INTRODUCTION

Courses of study (http://cuinfo.cornell.edu/Academic/Courses/), a catalogue of Cornell University's many academic programs and resources, contains information about colleges and departments, interdisciplinary programs, undergraduate and graduate course offerings and procedures. Additionally, a student handbook, distributed to all incoming students, describes life at Cornell. *The Policy Notebook* (http://www.unvco.cornell.edu/policy/library.html), also distributed to each new student, summarizes pertinent university policies, including the campus Code of Conduct and the Code of Academic Integrity. Students should consult with their college's advising office for specific information on their college's academic policies and procedures, degree programs and requirements.

All these publications are also available for viewing on CUINFO the university's electronic information system, and in print at the various university libraries, the Office of the Dean of Students, the Office of the Dean of the University Faculty, the Office of University Counsel, the Office of the Judicial Administrator, and the college offices.

Not included in this publication is information concerning the Medical College and the Graduate School of Medical Sciences, located in New York City.

The following are offices and sources of information about admission to Cornell University.

Undergraduate Admissions Office, 410 Thurston Avenue, Ithaca, NY 14850–2488, 607–255–5241.

Graduate School, B2 Caldwell Hall, Ithaca, NY 14853–2602, 607–255–4884.

Law School, Myron Taylor Hall, Ithaca, NY 14853–4901, 607–255–5141.

Samuel Curtis Johnson Graduate School of Management, Office of Admissions, Sage Hall, Ithaca, NY 14853–4201, 607–255–4526.

College of Veterinary Medicine. Admissions Office, Schurman Hall, Cornell University, Ithaca, NY 14853–6401, 607–253–7000.

Medical College and Graduate School of Medical Sciences. Office of Admissions, 1300 York Avenue, New York, NY 10021, 212–746–1067.

CUINFO ON THE WORLD WIDE WEB

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*, published each semester by the Office of the University Registrar. You may access CUINFO through the World Wide Web. The URL is: http://www.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

Engineering

Hotel Administration

Human Ecology

Industrial and Labor Relations

Nutritional Sciences

Officer Education

Group 2: Graduate professional divisions

Law

Management

Veterinary Medicine

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

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

ACCREDITATION

Cornell University is accredited by the Middle States Association of Colleges and Schools. A copy of the most recent reaffirmation of Cornell's accreditation can be found at http://www.ipr.cornell.edu/Accreditation/Status. Requests to review additional documentation supporting Cornell's accreditation should be addressed to the Michael Matier, Director, Institutional Research and Planning, Cornell University, 440 Day Hall, Ithaca, NY 14853–2801, mwm5@cornell.edu.

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 from the Advanced Placement Examinations (AP exams) from the College Entrance Examination Board (CEEB) in Princeton, NJ. The requisite scores, which vary by subject, are determined by the relevant departments at Cornell and are listed on page 7. Some departments at Cornell offer departmental exams (usually during orientation), for placement and advanced placement credit.

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, qualify by taking an appropriate exam as described 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 in its subject, 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 want to receive credit toward their Cornell degree should send transcripts and course descriptions to their college or school office (see the list at the end of this section). The award of credit or placement for such courses is determined by the appropriate departments according to individual school and college guidelines. Because policy for using advanced placement credit varies according to each college's or school's professional and academic goals, students should consult their college or school office to determine how they may use such credit.

International credentials. Information regarding Cornell's advanced standing policy for international credentials may be obtained by contacting the Associate Director of International Admissions, Cornell University, 410 Thurston Avenue, Ithaca, New York 14850–2488, U.S.A.

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

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

College of Agriculture and Life Sciences
140 Roberts Hall

College of Architecture, Art, and Planning
B30 West Sibley Hall

College of Arts and Sciences
61 Goldwin Smith Hall

College of Engineering
158 Olin Hall

School of Hotel Administration
174B Statler Hall

College of Human Ecology
N145 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 Office of Undergraduate Studies in Biology 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 BIO G 101–102, 101/103, 102/104, or 103–104 or 105 or 106 (Biological Sciences, Lectures and Laboratory). These students should consult information available in the BIO G 101–104 course office (1140 Comstock Hall) and in the Behrman Biology Center (216 Stimson Hall) to determine which semester to complete the introductory biology requirement. For students in doubt, BIO G 101/103 is advised. These students will receive a total of eight introductory biology credits (four advanced placement credits plus four course credits).

Chemistry

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

Freshmen may qualify for advanced placement and advanced standing credits in chemistry by satisfactory performance on the CEEB Advanced Placement Examination in chemistry or by passing an advanced standing examination offered by the department. A score of 5 on the CEEB examination entitles a student to four credits. A student may earn four or eight credits by suitable performance on the departmental examination. To take the departmental examination students must sign up beforehand 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 adviser, and the professors teaching the courses. Questions may also be directed to Dr. Stanley Marcus, associate director of undergraduate studies, in 138 Baker Laboratory. 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 or Dr. Stanley Marcus.

Classics

For advanced placement and credit in Latin and Greek, students should consult the Department of Classics, 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 part of the distribution requirement in science and quantitative reasoning 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.

English

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

Summary of Credit and Placement

Subject	*Score*	*Advanced Placement Credit*	*Placement*
Arabic	Department of Near Eastern Studies determines credit and placement based on departmental examination.		
Biology	5 (majors)	8 credits or 4 credits	Placement out of all introductory courses. Students may choose to accept only 4 credits and follow the guidelines for majors with a score of 4.
	4 (majors)	4 credits	4 AP credits awarded after completion of any combination of 4 credits from 101–104 or 105 or 106. Consult department to determine which semester to take to complete introductory biology.
	5 (nonmajors)	8 credits	Placement out of all introductory courses.
	4 (nonmajors)	6 credits	Placement out of 109–110. Does not always satisfy the prerequisite for second- and third-level courses in biology.
Chemistry	5	4 credits	Department determines placement. No advanced placement credit for students who take 206, 207, or 211, but students may choose to accept 4 AP credits if they take 215. Department offers placement exam during fall orientation.
Computer science	4,5	4 credits	Placement out of C.S. 100.
Economics, micro	4,5	3 credits	Placement out of Economics 101.
Economics, macro	4,5	3 credits	Placement out of Economics 102.
English	5	3 credits	Placement out of one Freshman Writing Seminar
(all except A&S)	4	3 credits	
French language	4,5	3 credits	Department of Romance Studies determines placement. Students may earn additional credit by taking CASE examination.†
French literature	4,5	3 credits (and proficiency)	Department of Romance Studies determines placement.
German	4,5	3 credits (and proficiency)	Department of German Studies determines placement. Students may earn additional credit by taking the CASE examination.†
Government and politics, U.S.	4,5	3 credits	Placement out of Government 111.
Government and politics, comparative	4,5	3 credits	Placement out of Government 131.
Greek, Ancient and Modern	Department of Classics determines credit and placement based on departmental examination.		
Hebrew	4,5	3 credits	Department of Near Eastern Studies determines placement based on departmental examination.
American history	4,5	4 credits	
European history	4,5	4 credits	
History of art	4,5	3 credits	
Italian language	4,5	3 credits	Department of Romance Studies determines placement. Students may earn additional credit by taking the CASE examination.†
Italian literature	4,5	3 credits (and proficiency)	Department of Romance Studies determines placement.
Latin	Department of Classics determines credit and placement based on departmental examination.		
Mathematics BC *(excluding engineering students see following page for more details)*	4,5	8 credits	Placement out of all 1st- and 2nd-semester calculus courses (Math 106, 111–112, 121–122, 191–192, 193). Permission to take any 3rd-semester calculus course (Math 221, 223, 293, or 213).
	2 or 3	4 credits	Placement out of all 1st-semester calculus courses (Math 106, 111, 121, 191, 193). Permission to take any 2nd-semester calculus course (Math 112, 122, or 192).
Mathematics AB *(excluding engineering students see following page for more details)*	3,4,5	4 credits	Placement out of all 1st-semester calculus courses (Math 106, 111, 121, 191, 193). Permission to take any 2nd-semester calculus course (Math 112, 122, or 192).
	2	none	Students are strongly urged to take the mathematics placement examination.
Music	Department determines credit and placement based on departmental examination.		
Persian	Department of Near Eastern Studies determines credit and placement based on departmental examination.		
Physics B	5	8 credits	Placement out of Physics 101–102. Students with a score of 4 or 5 on Mathematics BC may choose placement out of Physics 112 or 207 (4 credits).
	4	8 credits	Placement out of Physics 101–102.
	3	4 credits	Placement out of Physics 101.
Physics C–Mechanics	4,5	4 credits	Student may choose placement out of Physics 112 or 207, or placement into Physics 116 with no AP credit. For more information, contact department representative.
Physics C–Electricity/Magnetism	5	4 credits	Placement out of Physics 213.
Psychology	4,5	3 credits	Placement out of Psychology 101.
Sociology	Department determines credit and placement.		
Spanish language	4,5	3 credits	Department of Romance Studies determines placement. Students may earn additional credit by taking the CASE examination.†
Spanish literature	4,5	3 credits (and proficiency)	Department of Romance Studies determines placement.
Statistics *(excluding engineering students)*	4,5	3 credits	Placement out of Biometry 200, ILRST 210 or Mathematics 171.
Turkish	Department of Near Eastern Studies determines credit and placement based on departmental examination.		

†Cornell Advanced Standing Examination. Contact Callean Hile, 203 Morrill Hall.

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.

Mathematics and Statistics

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.

Students who have been awarded Advanced Placement credit by their colleges for calculus or statistics may not also receive academic credit at Cornell for similar courses. In particular, students who have been awarded AP credit for 1 semester of calculus (4 academic credits) may not also receive academic credit for any 1st-semester calculus course (Math 106, 111, 121, 191, 193). Students who have been awarded AP credit for 2 semesters of calculus (8 academic credits) may not also receive academic credit for any 1st-semester calculus course (Math 106, 111, 121, 191, 193) or any 2nd-semester calculus course (Math 112, 122, 192). Finally, students who have been awarded AP credit for statistics (3 academic credits) may not also receive academic credit for any of the introductory statistics courses Biometry 200, ILRST 210, or Math 171.

The following rules apply to students being admitted to all colleges except the College of Engineering.

Students with a grade of 4 or 5 on the BC examination may take the appropriate third-semester course (Mathematics 213, 221, 223 or 293), but students entering Mathematics 293 may have to make up some material on partial differentiation. Students with a 2 or 3 on the BC examination or a 3, 4 or 5 on the AB examination may take the appropriate second-semester course (Mathematics 112, 122, or 192). However, students who receive the borderline passing scores of 2 on the BC examination or 3 on the AB examination are strongly advised to take 112 rather than the more demanding courses 122 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 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) believe that the placement assigned on the strength of the CEEB Advanced Placement Examination is not high enough in their case.

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

The College of Engineering will give credit for MATH 191 (4 credits) for a score of 3 or 4 on the BC examination or a score of 4 or 5 on the AB examination. Credit for MATH 191 AND MATH 192 (8 credits) will be given to Engineering students who scored a 5 on the BC examination.

Modern Languages

Students who have studied a language for two or more years and want to continue study in that language at Cornell must present the results of a placement test. See "Placement Tests and Advanced Placement credit" under "Foreign Language Requirements" in the Arts and Sciences section of this catalog. Students who have had a year of formal study or substantial informal study since they last took a placement test should take the examination again during orientation week if they plan to continue course work.

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

1) Students with a score of 4 or 5 on the language Advanced Placement Examination of the CEEB, earn three credits, and are eligible to take Cornell's Advanced Standing Examination (CASE). Outstanding performance on this examination can result in a maximum of six credits.
2) Students who achieve a minimum score of 65 on the Cornell language placement test given during orientation week are eligible to take Cornell's Advanced Standing Examination (CASE). Oustanding performance on this examination can result in a maximum of six credits.
3) For formal language work at an accredited college, credit is considered by the department on submission of a transcript and may be entered on the student's Cornell record.
4) Native speakers of languages other than English may, on examination by the appropriate professor, be granted a maximum of six credits if they can demonstrate proficiency equivalent to course work on the 200 level or above at Cornell. Additional credit will be considered only for those who pursue advanced work in their native language. Students may not receive both advanced placement credit for competence in their native language and Cornell credit for English as a second language.

Information about times and places to take placement tests is available in the orientation booklet and from Academic and Career Counseling Services on the Web at http://dml.cornell.edu/html/place/testschedule.html. For more information, see the College of Arts and Sciences section on language course placement, or contact Callean Hile, 203 Morrill Hall.

Music

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

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 J. T. Rogers, 101 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 receive four credits for Physics 213.

A student planning a major in Physics or Applied and Engineering Physics and who is eligible for AP credit should 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 J. T. Rogers, 101 Clark Hall, or from the Department of Physics, 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 international 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 in order to receive credit. The following

overseas examinations are recognized by Cornell as equivalent in standard to GCE "A" Levels:

- Matriculation examination of the University of Hong Kong (Advanced Level)
- Advanced Level examination of the University of Hong Kong
- 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:

Subject	*Marks*	*Credit*
Biology	A or B	8 credits
Chemistry	A	8 credits (Chem 207 and 208)
	B	4 credits (Chem 207)
Economics	A	6 credits (Econ 101 and 102)
English Literature	A	6 credits
	B	3 credits
Geography		subject to departmental review
History	A, B, or C	4 credits
Mathematics	A or B	8 credits (Math 111 and 112)
	C	4 credits (Math 111)
Music		subject to departmental review
Philosophy	A or B	3 credits
Physics	A or B	4 credits for Physics 101, 112, or 207 4 additional credits for Physics 213 are granted for a combination of grades of A or B and a minimum of 8 Advanced Placement or Advanced Standing credits in Mathematics. Students planning to major in physics are encouraged to enroll in Physics 116.

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.

Subject	*Marks*	*Credit*
Anthropology		subject to departmental review
Biology	7	8 credits
	6	6 credits
Chemistry	6 or 7	4 credits (Chem 207)
Economics	6 or 7	6 credits
English Literature	7	6 credits and placement out of one freshman writing seminar
	6	3 credits
Geography		subject to departmental review
Mathematics	6 or 7	8 credits (prospective math, science, and engineering majors must consult with math department to determine prerequisite for placement in third-semester math courses)
Music		subject to departmental review
Philosophy	7	3 credits
Physical Science	6 or 7	8 credits (4 credits, Chemistry 103; 4 credits, Physics 101)
Physics	6 or 7	4 credits (Phys 101, 112, or 207)

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.

University Registration

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

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

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

- complete course enrollment according to individual college requirements;
- 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 posted in school and college offices. Students are 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 may be 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.

Late Course Enrollment and Late Add/Drop/Change Fees

Academic Unit	*Late Course Enrollment Fee*	*Late Course Add/Drop/Change Fee*
Continuing Education and Summer Sessions	†	†
Johnson Graduate School of Management	$100	$100
Law School	No fee	No fee
Physical education	$30	$20*
Veterinary medicine	$30*	$30*

*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 1999-2000

Endowed Divisions

Undergraduate

Architecture, Art, and Planning Arts and Sciences Engineering Hotel Administration	$23,760

Graduate

Graduate School (with major chair in an endowed division)	23,760

Professional

Law School	25,500
Management	25,600

Statutory Divisions

Undergraduate

Agriculture and Life Sciences Human Ecology Industrial and Labor Relations	
New York resident*	10,330
Nonresident*	19, 830

Graduate

Graduate School (with major chair in agriculture, human ecology, or industrial and labor relations)	$12,100
Graduate School—Veterinary Medicine	12,400

Professional

Veterinary Medicine	
New York resident*	14,900
Nonresident*	20,100

Summer Session (1999)

Per credit	600 (estimated)

Other Tuition and Fees

In absentia fees

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

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

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

Fees and Expenses

Undergraduate applicants to Cornell pay a nonrefundable $65 application fee when submitting an application for admission. The graduate application fee is $65. Application to the Johnson Graduate School of Management costs $90 (domestic), $120 (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 1999 and Spring 2000

Previously Matriculated Students

Percent	Fall 1999	Spring 2000
No charge	8/24–8/29	1/20–1/25
10% charge	8/30	1/26
20% charge	8/31–9/6	1/27–2/2
30% charge	9/7–9/13	2/3–2/9
40% charge	9/14–9/20	2/10–2/16
60% charge	9/21–9/27	2/17–2/23
80% charge	9/28–10/4	2/24–3/2
100% charge	10/5/99	3/3/00

First-Time Matriculated Students

Percent	Fall 1999	Spring 2000
No charge	8/24–8/29	1/20–1/25
10% charge	8/30	1/26
20% charge	8/31–9/13	1/27–2/9
30% charge	9/14–9/20	2/10–2/16
40% charge	9/21–10/4	2/17–3/2
50% charge	10/5–10/11	3/3–3/9
60% charge	10/12–10/25	3/10–3/23
100% charge	10/26/99	3/24/00

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 registration day. All

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

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

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

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

Payments

An individual who has outstanding indebtedness to the university will not be allowed to register* or reregister in the university, receive a transcript of record, have academic credits certified, be granted a leave of absence, or have a degree conferred. University policy precludes the use of any current financial aid for payment of past-due charges.

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

For further information, students should contact the Office of the Bursar, Cornell University, 260 Day Hall, Ithaca, New York 14853–2801 (telephone: 607/255–2336; fax: 607/255–6442). E-Mail UCO-Bursar@cornell.edu

*For specific exceptions, see "Bursar and Cornellcard Procedures," published by the Office of the Bursar, 260 Day Hall, or visit our website at: http://www.univco.cornell.edu/bursar/home.html.

STUDENT HEALTH INSURANCE

Because of the high cost of medical care, it is Cornell University policy that every full-time registered student (including students registered *in absentia* and non-degree students) must have health insurance coverage. You have two options:

1. enroll in the Student Health Insurance Plan (SHIP); or
2. waive the SHIP and purchase comparable health insurance.

The Student Health Insurance Plan is developed especially for Cornell students and provides extensive coverage at a reasonable cost for most on- or off-campus medical care. Complete and current details of the SHIP, its cost, and an enrollment/waiver form will be mailed to each student with the July bursar bill.

To ensure that all students are covered by an active health insurance plan, each year *you will be enrolled automatically* in the SHIP *unless* you submit a waiver form that affirms you have other insurance (from the day you become a registered student) and agree to maintain that coverage while a student at Cornell. If you have adequate health insurance coverage and plan to waive the Student Health Insurance Plan, *you must submit the waiver form each year* by the deadline to avoid a charge.

Fall entrants: you will receive an enrollment/waiver form for the SHIP with your July bursar bill that you must return by 8/27/99.

Spring entrants: you will receive the form after you arrive at Cornell; deadline is 2/26/00.

Late registrants: the form is due no later than 30 days after the initial bill for the insurance charge.

The Student Health Insurance Plan provides coverage twenty-four hours a day, 365 days a year, anywhere in the world. Students graduating mid-year may be eligible to purchase a 5-month plan. Students enrolled in the SHIP may enroll their eligible dependents for an additional cost (fall deadline: September 30). Graduate and Professional students who prefer to pay monthly must enroll in the installment payment plan no later than September 30. Because of policy restrictions, the plan is nonrefundable (except for dependents who no longer meet eligibility requirements and students who withdraw from Cornell within the first 30 days of the academic year).

For more information, contact the:

Student Insurance Office

Gannett Health Center
10 Central Avenue
Ithaca, NY 14853–3101, USA
Telephone: 607/255–6363
E-mail: SICU@cornell.edu
Web: http://www.uhs.cornell.edu/student_insurance

Class Attendance, Meeting Times, and Examinations

CLASS ATTENDANCE AND ABSENCES

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

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

Monday/Wednesday

	Start Times	End Times
50 MIN	08:00 AM	08:50 AM
75 MIN	08:40 AM	09:55 AM
50 MIN	09:05 AM	09:55 AM
50 MIN	10:10 AM	11:00 AM
50 MIN	11:15 AM	12:05 PM
50 MIN	12:20 PM	01:10 PM
50 MIN	01:25 PM	02:15 PM
50 MIN	02:30 PM	03:20 PM
75 MIN	02:55 PM	04:10 PM
50 MIN	03:35 PM	04:25 PM
50 MIN	07:30 PM	08:20 PM
50 MIN	08:35 PM	09:25 PM

Tuesday/Thursday

50 MIN	08:00 AM	08:50 AM
75 MIN	08:40 AM	09:55 AM
50 MIN	09:05 AM	09:55 AM
50 MIN	10:10 AM	11:00 AM
75 MIN	10:10 AM	11:25 AM
50 MIN	11:15 AM	12:05 PM
75 MIN	11:40 AM	12:55 PM
50 MIN	12:20 PM	01:10 PM
50 MIN	01:25 PM	02:15 PM
75 MIN	01:25 PM	02:40 PM
50 MIN	02:30 PM	03:20 PM
75 MIN	02:55 PM	04:10 PM
50 MIN	03:35 PM	04:25 PM

NO EVENING CLASSES

Friday

50 MIN	08:00 AM	08:50 AM
50 MIN	09:05 AM	09:55 AM
50 MIN	10:10 AM	11:00 AM
50 MIN	11:15 AM	12:05 PM
50 MIN	12:20 PM	01:10 PM
50 MIN	01:25 PM	02:15 PM
50 MIN	02:30 PM	03:20 PM
50 MIN	03:35 PM	04:25 PM

NO EVENING CLASSES

Laboratories and similar exercises

1 HR 55 MIN	08:00 AM	09:55 AM
	10:10 AM	12:05 PM
	12:20 PM	02:15 PM
	02:30 PM	04:25 PM
	07:30 PM	09:25 PM
2 HR 25 MIN	07:30 AM	09:55 AM
	10:10 AM	12:35 PM
	02:00 PM	04:25 PM
	07:30 PM	09:55 PM
3 HR	08:00 AM	11:00 AM
	10:10 AM	01:10 PM
	01:25 PM	04:25 PM
	07:30 PM	10:30 PM

No classes or laboratory exercises are to be held between the hours of 4:25 p.m. and 7:30 p.m. Monday through Thursday, after 4:25 p.m. on Friday, after 12:20 p.m. on Saturday, and all day Sunday.

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 rosters 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 each semester. 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.

EVENING PRELIMINARY EXAMINATIONS

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

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

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

Grading Guidelines

The official university grading system 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:

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

This is how a term average is computed:

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

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

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

S-U GRADES

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

"Resolved, that:

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

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

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

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

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

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

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

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

Engineering. (a) May take one Humanities and Social Sciences, Approved, or Free Elective per term after completing first semester. (b) This option may be elected during Pre–Course Enrollment or with the written permission of the instructor and adviser on an add/drop form in the first 3 weeks of classes. (c) Decision 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 19 hours required outside the major in Human Ecology courses. (c) Not part of 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) Freshmen enrolled in English 137 and 138, which are only offered for S-U credit, are permitted to apply these courses to the freshman seminar requirements. (f) Total of 12 credits in S-U courses (not counting PE) may be counted towards degree requirements during a student's college career.

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

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

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

INCOMPLETE

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

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

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

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

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

CHANGES IN GRADES

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

OFFICIAL TRANSCRIPTS

An official transcript is one that bears the official 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, B7 Day Hall. There is a $2.00 fee per transcript.

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. For transfer students the requirement is reduced by the number of terms satisfactorily completed, not necessarily including physical education, in a college of recognized standing before entering Cornell.

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

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

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

Swim Test

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 information may be released unless the student indicates otherwise at the time of registration. Students who wish no release of their directory information must inform the office of the university registrar in writing within 10 days of the date of official university registration. Students may rescind their no release request at any time in writing to the office of the university registrar.

**"Cornell University Policy on Access to and Release of Student Education Records" is available on the World Wide Web at URL: http://WWW.UNIVCO.CORNELL.EDU/policy/ASI.html.

POLICY ON POSTING OF STUDENT INFORMATION

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

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

Student social security number

Student identification number

Courses 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* on the World Wide Web at URL: http://WWW.UNIVCO.CORNELL.EDU/policy/ASI.html.

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 (255–2945). The guidelines are also available at the World Wide Web address www.osp.cornell.edu

USE OF ANIMALS FOR COURSES

Vertebrate animals serve as an invaluable aid in instruction. It is recognized, however, that some students have ethical objections to the use of vertebrate animals in this manner. Courses that use vertebrate animals are identified as such in the course descriptions. Students who have concerns about the use of animals in these courses should consult the course instructor for more information about the precise ways in which the animals are used. A set of University guidelines on the use of vertebrate animals in teaching for faculty and students is printed below and is available from departments in which the courses are offered.

Guidelines for Faculty and Students With Respect to the Use of Animals in Instruction

Background: On December 8, 1987, the Cornell University Institutional Animal Care and Use Committee approved a series of guidelines recommended to them by the University Animal Welfare Committee. These guidelines were prepared by a subcommittee of faculty members, after they had the opportunity to evaluate the use of animals in undergraduate teaching (and student concerns for the same) from a representative sample of instructors.

Guidelines

1. For demonstrating certain principles and procedures the use of animals in teaching is recognized as an invaluable, often essential, pedagogical device.
2. For courses in which vertebrate animals are to be used in dissection, surgery or in other experimental procedures, the course description that appears in the Announcement "Courses of Study" should alert students to this fact.
3. A detailed description of the intended use of vertebrate animals should be available to students upon request to the instructor in each course.
4. Faculty members are encouraged to explain their reasons and need for using vertebrate animals and should indicate to students the availability of the procedures described in item 8 below.
5. Students are encouraged to discuss their concerns about the instructional use of vertebrate animals with the instructor in the course.
6. When consistent with pedagogical objectives, faculty members are encouraged to consider adopting alternative methods and procedures that do not involve the use of live animals.
7. When students object on ethical or other valid grounds, to participating in an exercise using vertebrate animals, instructors are encouraged to provide alternative means when consistent with pedagogical objectives, for learning the same material.
8. A student who is reluctant to voice his or her concerns about animal use in a particular course or who thinks these concerns have not received proper attention may seek assistance from the Director of the Cornell Center for Research Animal Resources (253–3520).

Interdisciplinary Centers, Programs, and Studies

ANDREW D. WHITE PROFESSORS-AT-LARGE

726 University Avenue (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 2000

Berry, Michael, physicist

Term Ending in 2001

Pingree, David, historian of science

Term Ending in 2002

Chartier, Roger, cultural historian
Ernst, Richard R., physical chemist
Goodall, Jane, primatologist
Tobias, Phillip V., paleoanthropologist

Term Ending in 2003

Morrison, Toni, novelist
Rabinovich, Itamar, historian of the Middle East, diplomat

Term Ending in 2004

Bal, Mieke, cultural analyst
Cleese, John, writer and actor
MacDonald, David W., mamalogist and behavioral ecologist
Silajdzic, Haris, political leader, historian of the Middle East

Term Ending in 2005

Jemison, Mae, astronaut
McDonough, William, architect
O'Brien, Stephen J., geneticist
Schechner, Richard, director of performance studies

CENTER FOR APPLIED MATHEMATICS

657 Frank H. T. Rhodes Hall (255–4335)

The Center for Applied Mathematics administers a broadly based interdepartmental graduate program that provides opportunities for study and research over a wide range of the mathematical sciences. Each student develops a solid foundation in analysis, algebra, and methods of applied mathematics. The remainder of the graduate student's program is designed by the student and his or her Special Committee. For detailed information on opportunities for graduate study in applied mathematics, students should contact the director of the Center for Applied Mathematics, 657 Frank H. T. Rhodes Hall.

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

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

Selected Applied Mathematics Courses

Basic Graduate Courses in Mathematics and Applied Mathematics

Math 413–414 Introduction to Analysis
Math 433–434 Introduction to Algebra
Math 436 Applications of Abstract Algebra
Math 611–612 Real and Complex Analysis
Math 615–616 Mathematical Methods in Physics
Math 621 Measure Theory and Lebesgue Integration
Math 622 Applied Functional Analysis
Math 631–632 Algebra
Math 651 Introductory Algebraic Topology
T&AM 612–613 Methods of Applied Mathematics
T&AM 614–615 Topics in Applied Mathematics

Analysis (and Differential Equations)

Math 427 Introduction to Ordinary Differential Equations
MATH 428 Introduction to Partial Differential Equations
Math 617 Dynamical Systems
Math 618 Smooth Ergodic Theory
Math 619–620 Partial Differential Equations
Math 652 Differentiable Manifolds
Math 711–712 Seminar in Analysis
Math 713 Functional Analysis
Math 715 Fourier Analysis
Math 722 Riemann Surfaces
Math 728 Seminar in Partial Differential Equations

Logic and Theory of Computing

CS 618 Principles of Distributed Computing
CS 671 Introduction to Automated Reasoning
CS 677 Reasoning about Knowledge
CS 682 Theory of Computing
CS 715 Seminar in Programming Refinement Logics
Math 486 Applied Logic I
Math 681 Logic
Math 781–782 Seminar in Logic
Math 783 Model Theory
Math 784 Recursion Theory
Math 787 Set Theory
Math 788 Topics in Applied Logic

Numerical Mathematics and Operations Research

CS 522 Software for Scientific Computing
CS 621 Matrix Computations
CS 622 Numerical Optimization and Nonlinear Algebraic Equations
CS 624 Numerical Methods for Differential Equations
CS 664 Machine Vision
CS 681 Analysis of Algorithms
CS 721–722 Advanced Topics in Numerical Analysis
CS 729 Seminar in Numerical Analysis
EE 423 Computer Methods in Digital Signal Processing
Math 425 Numerical Solution of Differential Equations
Math 728 Seminar in Partial Differential Equations
OR&IE 625 Scheduling Theory
OR&IE 630 Mathematical Programming
OR&IE 632 Nonlinear Programming
OR&IE 635 Interior-Point Methods for Mathematical Programming

Discrete Mathematics and Geometry

Math 441–442 Introduction to Combinatorics
Math 455 Applicable Geometry
OR&IE 633 Graph Theory and Network Flows
OR&IE 634 Combinatorial Optimization
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 467–468 Communication Systems I and II
EE 471/MAE 478 Feedback Control Systems
EE 472 Digital Control
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 561 Error Control Codes
EE 562 Fundamental Information Theory
EE 563 Communication Networks
EE 564 Decision Making and Estimation
EE 567 Digital Communication
EE 577 Artificial Neural Networks
MAE 677 Robust and Optimal Control

Mathematical Biology

Bio S 662 Mathematical Ecology
Stat & Biom 451 Mathematical Modeling of Populations
Stat & Biom 651 Mathematical Population Studies and Modeling
Stat 697 & Biom 760 Special Topics in Theoretical and Computational Biology

Mathematical Economics

Econ 619 Econometrics I
Econ 620 Econometrics II
Econ 710 Stochastic Economics: Concepts and Techniques
Econ 717–718 Mathematical Economics
Econ 719–720 Advanced Topics in Econometrics

Mechanics and Dynamics

Chem E 731 Advanced Fluid Mechanics and Heat Transfer
Chem E 732 Diffusion and Mass Transfer
Chem E 751 Mathematical Methods of Chemical Engineering Analysis
Chem E 753 Applied Analysis of Nonlinear Systems: Studies in Stability and Bifurcation
EE 681 (also A&EP 761) Kinetic Theory
M&AE 601 Foundations of Fluid Dynamics and Aerodynamics
M&AE 602 Fluid Dynamics at High Reynolds Numbers
M&AE 732 Analysis of Turbulent Flows
M&AE 733 Stability of Fluid Flow
M&AE 734 Turbulence and Turbulent Flow
M&AE 736 Computational Aerodynamics
M&AE 737 Computational Fluid Mechanics and Heat Transfer
T&AM 570 Intermediate Dynamics
T&AM 578 Nonlinear Dynamics and Chaos

T&AM 579 Vibrations 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 566 Queuing Networks
EE 664 Foundations of Inference and Decision Making
Math 671–672 Probability Theory
Math 674 Introduction to Mathematical Statistics
Math 777–778 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 670 Statistical Principles
OR&IE 671 Intermediate Applied Statistics
OR&IE 676 Statistical Analysis of Life Data
STBTRY 408 Theory of Probability
STBTRY 409 Theory of Statistics

Robotics and Vision

CS 664 Machine Vision
EE 547 Computer Vision
EE 548 Digital Image Processing

CORNELL CENTER FOR THE ENVIRONMENT

Rice Hall (255–7535)

The Cornell Center for the Environment (CfE) coordinates interdisciplinary research, teaching, and outreach programs on environmental issues. CfE's overarching goal is to continuously advance an intellectual community for the environment at Cornell, with the objective of promoting a sustainable future. To meet this goal CfE:

- initiates environmental courses and curricula at both the graduate and undergraduate levels;
- facilitates interdisciplinary environmental research;
- coordinates outreach programs that assist federal, state and local government, international agencies, private organizations, businesses, and individuals in analyzing and solving environmental problems;
- organizes environmental events, lectures, festivals and seminars; and
- serves as a clearinghouse for environmental information.

The CfE web page (http://www.cfe.cornell.edu) is the principal source of environmental information for the Cornell students, faculty, and staff. Check it frequently for the latest updates on funding, seminars, courses, lectures, events, research opportunities, and new educational programs.

EDUCATION

Undergraduates and graduates can study the environment through programs in Cornell departments, centers, and institutes. Cornell has a strong tradition in environmental studies, with over 200 faculty across campus from the natural, biological, and social sciences.

Undergraduate Education

For undergraduate students, a listing of environmental course offerings is posted on the CfE web page (http://www.cfe.cornell.edu). Undergraduates with an interest in the environment most often major in one of the following areas:

- Agricultural and Biological Engineering
- Agricultural, Resource, and Managerial Engineering
- Architecture
- Biological Sciences
- City and Regional Planning
- Civil and Environmental Engineering
- Design and Environmental Analysis
- Geological Sciences
- Rural Sociology
- Ecology and Evolutionary Biology
- Natural Resources
- Plant Sciences
- Science and Technology Studies
- Soil, Crop and Atmospheric Sciences.

In addition to departmental programs, Cornell offers two interdisciplinary environmental majors. The Department of Science and Technology Studies offers the Biology and Society major that is available to students in the Colleges of Arts and Sciences and Human Ecology. Similarly, students in the College of Agriculture and Life Sciences can develop an approved sequence of courses from the Biology and Society curriculum. The Science of Earth Systems major is available to students in the Colleges of Agriculture and Life Sciences, Arts and Sciences, and Engineering. The CfE web page (http://www.cfe.cornell.edu) maintains a listing of these and other possible majors for students interested in the environment.

Graduate Study

Graduate level environmental concentrations are found in many Cornell "fields of study," from Agricultural and Biological Engineering to Zoology. Similarly, there are opportunities for minor concentrations in an environmental field. CfE assists in the administration of the Master of Professional Studies—Environmental Management Concentration, the Environmental Toxicology Graduate Field, and the Conservation and Sustainable Development minor.

Master of Professional Studies—Environmental Management Concentration (MPS-EM Concentration). Resolving complex environmental problems requires more than technological solutions and technical expertise. Environmental professionals also need broad-based administrative, analytical, and managerial skills to make cost effective decisions, perform impact analyses, effectively engage stakeholders, and work within a fluctuating legal, political, and regulatory arena. The MPS-EM Concentration is organized with these demands in mind. The program prepares graduates to work as multidisciplinary team members in the environmental management professions. The concentration is offered through five fields of study:

- Agricultural and Biological Engineering
- Agricultural Economics
- Development Sociology
- Natural Resources
- Soil, Crop, and Atmospheric Sciences.

Students take common core courses including: Science and Technology of Environmental Management (ABEN 425); Managing Local Environmental Systems: Social Perspectives and Research Bases (Rural Sociology 560); Legal Aspects of Environmental Management (CRP 551 or NTRES 408); and Environmental and Resource Economics (ARME 651). An interdisciplinary problem-solving project and 12–15 additional credit hours round out the program. For more information, contact CfE's education coordinator (607/255–7535 or cucfe@cornell.edu).

Environmental Toxicology. CfE is the administrative home of the Environmental Toxicology Graduate Field. The field offers a multidisciplinary science program leading to an M.S. or Ph.D. degree. The three major areas of concentration in the program are cellular and molecular toxicology; food and nutritional toxicology; and ecotoxicology and environmental chemistry. The graduate program prepares students for professional opportunities in academia, industry, private research institutes, and governmental agencies.

Conservation and Sustainable Development Minor (CSD). The minor was formed in response to the challenges facing society to provide for the health, safety, and welfare of people while maintaining the ecological integrity of natural ecosystems and the long-term sustainability of food, forage, and fiber production systems. Solutions to today's conservation and sustainable development problems will continue to elude a single disciplinary approach. These challenges must be met by a new kind of specialist that has holistic perspectives and is capable of working on interdisciplinary research and development teams. Hence, the Conservation and Sustainable Development Minor is oriented to graduate students desiring interdisciplinary approaches to real world problems.

Requirements for the minor include: (1) taking for credit the CSD core course, Critical Issues in Conservation and Sustainable Development (NTRES 618); (2) taking for credit at least two electives in subject areas outside the student's primary academic focus; and (3) an interdisciplinary problem-solving research or development project. Elective courses are chosen in consultation with the student's graduate

committee that includes one representative from the CSD minor.

RESEARCH AND OUTREACH

CfE is home for several environmental programs offering students opportunities for study, project work, research, and outreach. These programs are focused on a variety of issues from watershed management to sustainable economic development to environmental risks. CfE programs include:

- Water Resources Institute (WRI)
- Institute for Comparative and Environmental Toxicology (ICET)
- Waste Management Institute (WMI)
- Institute for Resource Information Systems (Cornell IRIS)
- Program for Environment and Community (PEC)
- Program on Breast Cancer and Environmental Risk Factors in New York State (BCERF)
- Work and Environment Initiative (WEI)
- Environmental Inquiry (EI)
- Environmental Risk Analysis Program (ERAP)
- CfE Watersheds Program.

Several other programs affiliated with the Center include:

- Superfund Basic Research and Education Program (SBREP)
- Ocean Resources and Ecosystems Program (OREP)
- Cornell Institute for Research in Chemical Ecology (CIRCE)
- Program in Biogeochemistry and Environmental Change (PBEC)
- Environmental Outreach Council.

For more information on CfE's programs and institutes review the Center's web page (http://www.cfe.cornell.edu), or contact the Center by phone (607/255–7535) or e-mail (cucfe@cornell.edu).

BEYOND THE CLASSROOM

Students interested in the environment will find many organizations, resources, and activities beyond the classroom setting. CfE sponsors guest lectures and co-hosts conferences with groups from across the campus. In addition, CfE organizes the annual Cornell Environmental Film Festival and the Jill and Ken Iscol Distinguished Environmental Lectures.

For additional information about the environment at Cornell contact:

Center for the Environment
Cornell University
Rice Hall
Ithaca, NY 14853–5601
Tel: 607/255–7535
Fax: 607/255–0238
Email: cucfe@cornell.edu
WWW: http://www.cfe.cornell.edu
Listserv: Environment-L@cornell.edu

THE MARIO EINAUDI CENTER FOR INTERNATIONAL STUDIES

170 Uris Hall (255–6370)

The Mario Einaudi Center for International Studies was established in 1961 to encourage, coordinate, and support comparative and interdisciplinary research on international subjects and was named for its founder in 1991. It is one of the largest and most diverse centers in the United States. Currently, it oversees four Title VI National Resource Centers (East Asia, Latin American Studies, South Asia and Southeast Asia) as well as sixteen topical programs and the university study-abroad program. More than 500 faculty members voluntarily collaborate in the center's programs and well over 300 graduate students are involved directly in its international programs. Undergraduate concentrations in International Relations and Modern European Societies serve 285 students.

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

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

In addition, the Einaudi Center has responsibility for the design and expansion of foreign study options for Cornellians through the Cornell Abroad Program and encourages international research and travel by graduate students through its annual Travel Grant Program. The center is also responsible for the International Students and Scholars Office.

Although the center has both an endowment and an appropriation from the university to support interdisciplinary international studies, Cornell monies are only a fraction of the total funds involved in international studies at Cornell. Programs seek funding from foundations, the federal government, alumni, and international agencies, a process that the center assists with as necessary. When particular programs are in a low budget cycle, the center continues to support ones that show promise so that faculty have time to seek new outside funding.

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

The Mario Einaudi Center for International Studies
Cornell University
170 Uris Hall
Ithaca, NY 14853–7601
USA 607/255–6370
FAX 607/254–5000

The Einaudi Center Area Programs and Topical Studies Programs

Center Administration:
Ron Herring, director
David Lelyveld, executive director
170 Uris Hall
(607)255–6370

East Asia Program (formerly China-Japan Program):
Vivienne B. Shue, director
140 Uris Hall

Latin American Studies Program:
Debra Castillo, director
190 Uris Hall

South Asia Program:
Christopher Minkowski, director
170 Uris Hall

Southeast Asia Program:
Thak Chalomitiarana, director
180 Uris Hall

Institute for African Development:
David Lewis, director
170 Uris Hall

Institute for European Studies:
—Slavic and East European Studies Program
—Western Societies Program
Jonas Pontusson, director
120 Uris Hall

International Agriculture:
Norman Uphoff, director
B31 Warren Hall

Berger International Legal Studies:
John Barceló, director
309 Myron Taylor Hall

International Political Economy:
Philip McMichael, director
436 Warren Hall

Population and Development Program:
Douglas Gurak, director
200 West Sibley Hall

Peace Studies Program:
Barry Strauss, director
Matthew Evangelista, acting director
130 Uris Hall

Program in International Nutrition:
Jere Haas, co-director
Jean Pierre Habicht, co-director
218 Savage Hall

Program on Comparative Economic Development:
Erik Thorbecke, director
458 Uris Hall

Cornell International Institute for Food, Agriculture, and Development:
Norman Uphoff, director
B31 Warren Hall

Cornell Food and Nutrition Policy Program:
David Sahn, director
308 Savage Hall

Current programs coordinated by the Einaudi Center include the following:

Master of Professional Studies in International Development:
Norman Uphoff, field representative
B31 Warren Hall

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

Program on International Relations:
Matthew Evangelista, director
160 Uris Hall

Undergraduates interested in an international relations concentration should see Professor Evangelista or the International Relations advisor (to be announced).

Cornell Abroad:
Richard Gaulton, director
474 Uris Hall

International Students and Scholars:
Brendan O'Brien, director
B50 Caldwell Hall

COGNITIVE STUDIES

235 Uris Hall (255–6431) (cogst@cornell.edu)

Cognitive Studies focuses on the nature and representation of knowledge. It approaches the study of perception, action, language, and thinking from several perspectives—theory, experiment, and computation—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 draws primarily from the disciplines of computer science, linguistics, neuroscience, philosophy, and psychology. The field of cognitive studies is primarily represented by faculty in the following departments: Psychology, Economics, Linguistics, and Philosophy, as well as Modern Languages and Mathematics (College of Arts & Sciences), Computer Science (College of Arts & Sciences and College of Engineering), Human Development and Design and Analysis (College of Human Ecology), Neurobiology & Behavior (Division of Biological Sciences), Education (College of Agriculture and Life Sciences), and 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 Mary Wright (255–6431 or cogst@cornell.edu).

Graduate Programs

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 individual, fosters interdisciplinary committees. It is the norm for students interested in cognitive studies to combine faculty members from such fields as Philosophy, Computer Science, Linguistics, or Psychology on common committees. For further information on the graduate Field of Cognitive Studies, contact Carol Rosen, director of graduate studies, 311 Morrill Hall, (255–0722; cgrl@cornell.edu), or Mary Wright, Administrative Assistant, 235 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: CUAbroad@cornell.edu
WWW home page: http://
www.einaudi.cornell.edu/cuabroad

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 wide 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 programs chosen frequently by students with college approval; those locations preceded by an asterisk (*) are programs run directly by Cornell.

AFRICA

Botswana, Cameroon, Kenya, Madagascar, Tanzania, Uganda: School for International Training;

Ghana: University of Ghana (through the Council of International Educational Exchange, CIEE);

Kenya: Wildlife Management (School for Field Studies); Kenya Semester Program (St. Lawrence University);

ASIA

China: Chinese University of Hong Kong; Inter-University Program for Chinese Language Studies at Tsinghua, Peking, and Nanjing Universities (CIEE); International Chinese Language Program at National Taiwan University;

India: School for International Training;

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

Japan: *Kyoto Center for Japanese Studies; various 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

Australian National University, Canberra; University of Sydney; University of Melbourne; University of New South Wales, Sydney; University of New England, Armidale; University of Queensland, Brisbane; University of Wollongong; University of Western Australia, Perth; School for International Training; Sydney Internship (Boston University);

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 Studies Program at the University of Paris (CIEE); Paris Intership (Boston University);

Germany: various university-based study abroad programs including the Berlin Consortium for German Studies at the Free University of Berlin; Wayne State University in Munich and Freiburg;

Greece: College Year in Athens;

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

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

Netherlands: Leiden University; University of Maastricht, Center for European Studies;

Russia: St. Petersburg University (CIEE); Moscow International University and other universities (American Council of Teachers of Russian)

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

Sweden: *Swedish Child Care and Family Policy Internship at the University of Göteborg; Agricultural College of Sweden, Uppsala; The Swedish Program at the University of Stockholm;

United Kingdom: *Direct enrollment at: University of Bristol; Cambridge University; University of East Anglia; University of Edinburgh; University of Glasgow; University of Manchester; University of Nottingham; Oxford University; University of Reading; University of St. Andrews; University of Sussex; University of Warwick; University of London: King's College, University College, Imperial College of Science and Technology, and the London School of Economics and Political Science, School of Oriental and African Studies, School of Slavonic and East European Studies.

Students studying at these 18 British universities enjoy admissions, advising, and counseling services, as well as an array of cultural activities, provided by the Cornell-Brown-Penn UK Centre. Externally sponsored programs in the UK include the British American Drama Academy, the Boston and Rochester University interships, and the Marymount College Program at the London College of Fashion.

LATIN AMERICA, CENTRAL AMERICA, AND THE CARIBBEAN

Argentina and Chile: various university-based study abroad programs through the University of Illinois or SUNY College at Plattsburgh;

Belize, Brazil, Chile: School of International Training;

Costa Rica: Organization for Tropical Studies (OTS) Undergraduate Semester Abroad in tropical biology; School for Field Study; Universidad National (Heredía);

Ecuador and Jamaica: Partnership for Service Learning;

Honduras: Escuela Agrícola Panamericana (Zamorano);

Mexico: Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM); Universidad de las Americas-Puebla (UDLA); Universidad Iberoamericana; School for Field Studies in Baja California;

MIDDLE EAST

Egypt: American University in Cairo;

Israel: Ben-Gurion University; Haifa University; Hebrew University of Jerusalem; Tel Aviv University;

Morocco: School for International Training

Other Locations

Cornell students are by no means limited to the locations listed above. In recent years, they have also studied in Austria, Czech Republic, Dominican Republic, India, New Zealand, the Philippines, Poland, Portugal, Switzerland, Turkey, Venezuela, and elsewhere.

Who Studies Abroad

Students from all seven undergraduate colleges and from all major fields study abroad; they are generally expected to have a cumulative grade point average of 3.0 or above. More than 500 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 are usually unable to 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. 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—are available at Cornell Abroad, 474 Uris Hall, where students are encouraged to consult the library of study abroad materials, ask questions of the staff, and meet with the associate director to gather information. The Cornell Abroad website is a good place to browse through program offerings and to explore links to universities worldwide. 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 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. Arts and Sciences, Human Ecology, and Industrial and Labor Relations students submit applications to their college for forwarding to Cornell Abroad; Agriculture and Life Sciences, Architecture, Art and Planning, Engineering and Hotel Administration students submit applications directly to Cornell Abroad. Cornell Abroad reviews all applications and forwards them to programs and universities as necessary. *All students who wish to receive academic credit for study abroad must apply through Cornell Abroad and their undergraduate college.*

The application *deadline* for study abroad in the spring 2000 semester is October 1, 1999, for all programs *except* Oxford and Cambridge, for which the deadline to study at those universities for the full year in 2000–01 is November 1. For study abroad during the fall semester and academic year, the deadline is February 15. Many universities and programs admit on a rolling basis after these dates. Students planning to study abroad in the spring semester should consider initiating the application process during the preceding spring. In all cases, it is a good idea to check with Cornell Abroad.

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 to 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 grades received, and the total credits earned for each semester. *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 study abroad programs are increasingly available outside universities in non-English-speaking countries—for example, Belgium, Denmark, Egypt, France, Hong Kong, Indonesia, Italy, Japan, Korea, Netherlands, People's Republic of China, and Sweden. Cornell students who participate in such non-university enrollment programs in a non-English-speaking country with English-language course work are required to take at least one language course as part of their program of study and are strongly encouraged to take more. Students are advised to consult with their college study abroad advisers about relevant language preparation, and students in the College of Arts and Sciences should note that they are required to have studied the host country language, if taught at Cornell, prior to study abroad.

Housing Arrangements

Study abroad programs generally provide housing in the homes of local residents, in university halls of residence, or in rental 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 Copenhagen, Gotëberg, Nepal, Paris, Seville, and the United Kingdom in 1999–2000 pay a uniform study abroad tuition of $14,650 per semester, which covers, tuition, housing, orientation, some field trips and excursions. Meals and airfare may also be included. The study abroad tuition for the Kyoto Center for Japanese studies is $17,250, covering the same expenses.

Students studying abroad on all other programs in 1999–2000 pay the tuitions and other costs charged by their programs, and a Cornell international program tuition of $3,400 per semester. The international program tuition covers the direct and indirect costs of study abroad to the university, including financial aid for all study abroad students.

Financial Aid

Students who are accepted for study abroad during the academic year or semester, having applied through Cornell Abroad, are eligible for financial aid, consistent with general university policy; this applies to all programs, whether run directly by Cornell or not. Students who have transferred into Cornell

with 60 or more credit hours are not likely to receive aid for study abroad assuming they would thereby need more than eight semesters to earn the undergraduate degree.

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, associate director, and staff stay in regular 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 when 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 based on prorated formulas.

Sources of Information and Advice Concerning Study Abroad

Cornell Abroad (474 Uris Hall): Richard Gaulton Ph.D., director; Beatrice B. Szekely Ph.D., associate director; Elizabeth R. Okihiro, student services coordinator; Kathy Lynch, financial services coordinator. The Cornell Abroad library contains an extensive collection of university catalogs and study abroad program brochures, files of course syllabi and evaluations, books, videotapes, and some information on travel, summer study, and work abroad. Comprehensive information is provided on the Cornell Abroad website which incorporates linkages to universities, programs and resources worldwide. In the early weeks of every semester, faculty, students, and staff discuss programs in a series of information meetings announced in the Cornell Daily Sun and on the Cornell Abroad World Wide Web home page (http://www.einaudi.cornell.edu/cuabroad).

College Study Abroad Advisers

Agriculture and Life Sciences: Bonnie Shelley, 140 Roberts Hall; *Architecture, Art, and Planning:* Donna Kuhar, 129 Sibley; *Arts and Sciences:* Dr. Rob Chametzky, 55 Goldwin Smith Hall; *Engineering:* Dan Maloney Hahn, 167 Olin Hall; *Hotel Administration:* Cheryl Farrell, 174B Statler Hall; *Human Ecology:* Paul Fisher, 172 Martha Van Rensselaer; *Industrial and Labor Relations:* Laura Lewis, 101 Ives Hall.

CORNELL-IN-WASHINGTON PROGRAM

471 Hollister Hall (255–4090)

Cornell-in-Washington is a 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 aim of the program is 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 adminstrative space is located on the first floor and twenty-seven residential units for approximately sixty 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 enroll in one core course, which involves 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, 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, arts and research institutions, and other organizations involved in public policy and American culture.

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. 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 471 Hollister Hall. Applications should be submitted the semester prior to participation.

Information

The Cornell-in-Washington website is located at http://www.info.cornell.edu/ciw/ciw.html. 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 471 Hollister 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

473 Hollister Hall (255–8018)

The Cornell Institute for Public Affairs (CIPA) is a university-wide two-year graduate professional program leading to a Master of Public Administration degree. Its mission is to develop professionals who can be effective, ethical, and creative leaders in government and in the private sector's interface with government.

CIPA emphasizes the interactions between public and private interests for the benefit of all sectors of society. We use Cornell's cutting-edge strengths as a major research university to understand rapidly evolving public interests, technological opportunities, ecological constraints, individual aspirations, and political possibilities. Examples of Cornell's extraordinary breadth of policy-related specialities include science and technology; health, education, and social services administration; agricultural policy; nutrition; international relations; economic development; environmental studies; infrastructure management; peace studies; human resources and labor relations; city and regional planning; and ethics in public life. These areas of expertise provide a diverse base for the CIPA Fellows (our students) to pursue the study of public affairs. Thus, CIPA Fellows take courses and work with faculty from all of Cornell's colleges as well as the Cornell Law School, with whom a joint M.P.A./J.D. degree is offered, and the Johnson Graduate School of Management, where a dual MPA/MBA degree is available.

The CIPA program is designed to offer both a sound foundation in the principles, tools, and techniques for a career and leadership in public affairs and the flexibility to accommodate and encourage the special policy-related interests of its students.

The curriculum is structured into three parts: four required core courses (two of three methodology courses) taken by all CIPA Fellows; area requirements focused on developing the wide variety of skills necessary for the public policy professional; and sectoral specialties, focused on the particular interest of the Fellow and leading to a thesis.

The Core Courses

These courses have been developed specially for CIPA Fellows to provide a common, hands-on experience in employing the latest analytical techniques to guide the formulation of programs, their supporting institutions, and their effective administration. They will also provide strategies for implementing change in complex heterogeneous societies.

CIPA I: Quantitative Techniques for Policy Analysis and Program Management (CRP 720) This course is designed to give students the basic management tools essential for the contemporary career in public affairs. It includes hands-on practice with formal management techniques, including investment analysis and linear and dynamic programming.

CIPA II: Public Political Economy (ECON 639 or CEE 528) Techniques of economic analysis are used to understand the need for various public programs, to estimate the value of new programs and policies, to forge desirable institutional structures for service delivery, and to anticipate and evaluate outcomes.

CIPA III: Administration, Politics, and Public Affairs (GOVT 621) This course is focused on the processes and institutional context of public affairs and analyzes the political and administrative structure and dynamics of policy development and implementation.

CIPA IV: Social Policy (SOC 526) This course incorporates the study of analytic methods, especially the use of statistics and simulation models, to study the structure of public programs and to assess their consequences.

CIPA V: Models and Quantitative Methods (CEE 729) Demonstrates the use and limits of models and quantitative techniques in forming and administering policy.

The Area Requirements

In addition to the four core courses, Fellows must also complete satisfactorily a series of foundation subject or area requirements that are essential to the training of public policy professionals. These areas are: methodologies, politics and policy, economics, math and statistics, finance, regulation, ethics, and public law.

The Sectoral Specialty

At least three courses taken by individual Fellows will be in their sectoral specialty or "concentration." These are widely divergent and depend on the unique interests and background of the individual student.

The CIPA Thesis

Each Fellow must complete a thesis that applies the conceptual tools, theories, and analytical techniques to a problem in the Fellow's area of sectoral expertise. As the culmination of each M.P.A. course of study, this thesis must be both critical and creative, reflecting the Fellow's ability to identify, analyze, and generate supportable solutions to important public policy questions.

Additional Requirements

All M.P.A. candidates must spend four semesters in residence to complete the degree.

The Faculty

In addition to our five core faculty members (Richard E. Schuler, director, economics and civil and environmental engineering; Steven Caldwell, sociology; Arch Dotson, government; and David Lewis, city and regional planning; and Peter Stein, physics) who offer the five core courses and advise the Fellows in the development on their programs of study, more than one hundred faculty members from nearly all colleges at Cornell participate in the graduate field of public affairs and policy, and they are available to supervise the theses of individual Fellows whose policy interests coincide with faculty expertise.

Special Programs

The combined four-year MPA/JD and MPA/MBA degree programs are available. For selected Cornell undergraduates who are accepted by the end of their junior year, a combined five-year bachelors/MPA program can be arranged.

Application. Applicants are required to submit GRE general test scores. CIPA has a policy of rolling admissions. Students requesting aid, however, must submit applications by March 1 for consideration. For an application or more information, contact Cornell Institute for Public Affairs, 472 Hollister Hall (phone: 607–255–8018; fax: 607–255–5240; e-mail: cipa@cornell.edu; web site: www.cipa.cornell.edu).

Financial Support. As a professional program, the financial aid resources of CIPA are extremely limited. Students of unusual merit and documented need will be considered for support, but CIPA is unable to provide any one student full support. Therefore, applicants are encouraged to explore and exploit all available sources of external funding.

For an application or more information, contact Cornell Institute for Public Affairs, 472 Hollister Hall (phone: 607–255–8018; fax: 607–255–5240; e-mail: cipa@cornell.edu).

CORNELL PLANTATIONS

One Plantations Road (255–3020)
Internet Home Page: http://www.plantations.cornell.edu
e-mail: plantations@cornell.edu

A place of exceptional diversity and learning opportunities, Cornell Plantations comprises the university's botanical garden, arboretum, and natural areas. Its 3,000+ acres include the woodlands and gorges on and around campus, as well as specialized gardens and a 150-acre arboretum that features a field flower meadow and trees and shrubs hardy in central New York State. Cornell Plantations provides unique outdoor laboratories and plant collections for Cornell's academic programs and research in disciplines such as ecology and systematics, floriculture, ornamental horticulture, and bioengineering. While many 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, vernal ponds, and meadows. Arrangements to use these areas for classes and research can be made by calling Cornell Plantations.

Cornell Plantations also offers relaxation, rejuvenation, and inspiration. The vast open spaces provide room to breathe; while the intimate gardens provide respite from the busy campus. Visitors always discover surprises and learn something new in the gardens, which feature herbs, flowers, vegetables, international crops, rock garden plants, peonies, poisonous plants, ground covers, rhododendrons, and wildflowers.

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 Building at the botanical garden. Non-credit courses in horticulture, landscape design, botanical arts and natural history are offered throughout the year. A one-credit seminar series (HORT 480) is offered each fall; a three-credit Public Garden Management course, (HORT 485) is offered every other spring semester; and a two-credit Horticultural Practicum (HORT 494) is offered each fall.

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

EPL does not intend to create either an undergraduate major or a graduate field in Ethics and Public Life. On the contrary, we seek to enhance and facilitate the discussion of ethical issues by students whose central educational interests lie elsewhere, but whose work and lives will nevertheless confront them with dilemmas and responsibilities for which a university education should prepare them. EPL aims to enrich existing departments with courses that are intellectually and practically fruitful at the same time. It offers a concentration in Law and Society (see separate listing under "Special Programs and Interdisciplinary Studies").

EPL Core Courses

PHIL 194/GOVT 294 Global Thinking @
PHIL 246 Ethics and the World Environment
PHIL 247 Ethics and Public Life
PHIL 342 Law, Society, and Morality

PHIL 343 Political Obligation and Civil Disobedience
GOVT 469/Phil 369 Limiting War: The Morality of Modern State Violence
GOVT 412 Voting and Political Participation
GOVT 466/Womns 466/Law 648 Feminism and Gender Discrimination
GOVT 468/Phil 368 Global Climate and Global Justice
GOVT 491/691 Normative Elements of International Relations

Related Courses

B&SOC 206/S&TS 206 Ethics and the Environment
CEH 356 Economics of Welfare Policy
CRP 549 Ethics and Practical Judgment in Planning Practice
ENGR 360/S&TS 360 Engineering Ethics
GOVT 474/PHIL 446 Topics in Social and Political Philosophy
HSS 658 Ethics, Public Policy, and American Society
ILRHR 366 Women at Work
ILRCB 401 My Brother's Keeper
ILRCB 482 Ethics at Work
ILRCB 488 Liberty and Justice For All
ILRCB 604 Theories of Equality and Their Application in the Workplace
LAW 655 International Human Rights
LAW 667 Law and Ethics of Lawyering
LAW 718 Ethnic Conflict and International Law
NBA 578 Business Ethics
NTRES 407 Religion, Ethics, and the Environment
NTRES 411 Seminar in Environmental Ethics
PHIL 145 Contemporary Moral Issues
PHIL 241 Ethics
PHIL 245 Ethics and Health Care
PHIL 246 Ethics and the Environment
PHIL 341 Ethical Theory
PHIL 344 History of Ethics: Ancient and Medieval #
PHIL 345 History of Ethics: Modern #
PHIL 346 Modern Political Philosophy

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

PROGRAM IN REAL ESTATE

114 West Sibley Hall (255–7110)

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* is a committee of faculty members from several different colleges 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 62 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, 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. Many concentration options are possible and may be structured from the hundreds of related courses taught at Cornell University (e.g., an international real estate concentration).

Admissions

Admissions procedures for the MPS (Real Estate) program are supervised by the Graduate School and Real Estate Field. Applicants to the program must have completed a bachelor's degree with a good academic record. They must achieve Graduate Management Admission Test (GMAT) or Graduate Record Examination (GRE) scores that are at the level required in other Cornell graduate professional degree programs; and at least two letters of recommendation from undergraduate college faculty members (and if appropriate, from employers) familiar with the student's academic and professional work must be submitted. There is no work experience requirement for admission (although work experience is preferred). Foreign students, for whom English is a second language, will need to achieve acceptable TOEFL scores.

For more information, contact C. Bradley Olson, director of the Program in Real Estate (607–255–7110) or Professor Richard Booth, director of graduate studies (607–255–4025) or E-mail real_estate@cornell.edu.

SCIENCE OF EARTH SYSTEMS: AN INTER-COLLEGE PROGRAM

During the past several decades, with the increasing concern about air and water pollution, nuclear waste disposal, the ozone hole, and global climate change, the scientific community has gained considerable insight into how the biosphere, hydrosphere, atmosphere, and lithosphere systems interact. It has become evident that we cannot understand and solve environmental problems by studying these individual systems in isolation. The interconnectedness of these systems is a fundamental attribute of the Earth system, and understanding their various interactions is crucial for understanding our environment.

A Science of Earth Systems (SES) major is available for students in the Colleges of Agriculture and Life Sciences, and Arts and Sciences. The SES program of study emphasizes the rigorous and 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. Within this program, Cornell's strengths across a broad range of earth and environmental sciences have been coalesced to provide students with the tools to engage in what will be the primary challenge of the twenty-first century.

Students can enter the major in the College of Agriculture and Life Sciences and in the College of Arts and Sciences. In the College of Engineering, the SES program is one of two options in the Geological Sciences major. It is also an option in Agricultural and Biological Engineering.

The SES Curriculum

The SES curriculum emphasizes strong preparation in mathematics, physics, chemistry, and biology during the freshman and sophomore years. In addition, students take a 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 math and science sequences.

The SES program provides strong preparation for graduate school in any one of the Earth systems sciences and related engineering fields. The major can also serve as excellent preparation for an advanced degree in environmental law or policy, a teaching degree, or for employment in one of many environmentally oriented careers with the B.S. degree.

The requirements for the major are summarized as follows:

1. MATH 191, 192 (or MATH 111, 112);
2. Two calculus-based physics courses: (e.g., PHYS 207–208);
3. Two introductory chemistry courses: (e.g., CHEM 207–208);
4. Two biology courses: (e.g., BIO G 101/103–102/104 or BIO G 109–110);
5. Three additional courses in higher mathematics and/or basic sciences. One of these courses must be either GEOL 201 or BIOES 261;
6. An introductory course in the Science of Earth Systems;
7. Three core courses in the Science of Earth Systems (SES 301, 302, and 321);
8. 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 can 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.

The SES Core Courses

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 301 Climate Dynamics (enroll in ASTRO 331 or SCAS 331)
Fall. 4 credits. Prerequisite: Math 112 or 192 or equivalent. Lecs, M W F 1:25; rec, W 2:50. K. Cook.

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 (enroll in GEOL 302 or SCAS 332)
Spring. 4 credits. Prerequisites: Math 112 or 192 and Chem 207 or equivalent, or instructor's approval. Lecs, M W F 11:15; recitation TBA. W. White, B. Isacks, W. Allmon, K. Cook.
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, ice ages, and our own emergence during the past ten million years. Introduction to methods of interpreting the paleontological, geochemical, and tectonic information preserved in the rock record. (http://www.geo.cornell.edu/geology/classes/ses302.html)

SES 321 Biogeochemistry (enroll in GEOL 321 or NTRES 321)
Fall. 4 credits. Prerequisites: college-level biology and chemistry. Lecs T R 12:20–2:15. L. Derry and J. Yavitt.
The cycling of elements at the earth's surface through biologically governed processes and fluxes. Topics include weathering and acid-base chemistry, nutrient limitation and recycling in terrestrial and marine systems, anthropogenic pollution, iostopic tracers, and mathematical modeling of element fluxes.

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 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 a list of advisors and more information on the SES program and classes, see the Web page (http://www.geo.cornell.edu/ses/SES_home.html) and contact:

College of Agriculture and Life Sciences: K. H. Cook (Soil, Crop, and Atmospheric Sciences), R. W. Howarth (Ecology and Systematics), J. Parlange (Agricultural and Biological Engineering);
College of Arts and Sciences: L. Hedin (Ecology and Systematics), P. Gierasch (Astronomy), B. L. Isacks or R. Kay (Geological Sciences);
College of Engineering: W. Brutsaert (Civil and Environmental Engineering), B. L. Isacks or R. Kay (Geological Sciences), M. Kelley (Electrical Engineering), J. Parlange (Agricultural and Biological Engineering).

DEPARTMENT OF STATISTICAL SCIENCE

301 Malott Hall (255–8066)

C. E. McCulloch (chair); M. Wells (director of graduate studies); S. Schwager (undergraduate coordinator, CALS only; Warren 424, 255–1644); N. Altman, T. Berger, J. Bunge, G. Casella, C. Castillo-Chavez, Z. Q. Chen, M. Contreras, T. DiCiccio, R. Durrett, E. Dynkin, R. Farrell, T. Fine, A. Hadi, D. Heath, Y. Hong, J. T. G. Hwang, H. Kesten, N. Kiefer, S. Resnick, D. Ruppert, G. Samorodnitsky, Elizabeth Slate, B. Turnbull, V. Veeravalli, P. Velleman, T. Vogelsang.

The university-wide Department of Statistical Science at Cornell coordinates activities in statistics and probability at the undergraduate, graduate, and research levels.

Students interested in graduate study in statistics and probability can apply to the Graduate 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, students should contact the Director of Graduate Studies, 301 Malott Hall.

The department also offers an undergraduate program through the Biometrics Unit in the College of Agriculture and Life Sciences and an Engineering Statistics minor in the College of Engineering. Undergraduate majors and certificate programs are currently under development for other colleges. For information, contact the Undergraduate Coordinator, Professor Steven Schwager (424 Warren Hall, 255–1644). Statistics courses offered by the department listed below will fill distribution requirements in many of the colleges.

A free consulting service is offered through the Biometrics Unit in the College of Agriculture and Life Sciences. Statistical computing consulting is available through a separate organization, the Office of Statistical Consulting, B21 Savage Hall, 255–1926.

The department is organized into four Units; Biometrics, Engineering Statistics, Mathematical Statistics and Probability, and Social Statistics. The areas covered include agricultural statistics; biostatistics; economic and social statistics; epidemiology; manufacturing statistics, quality control and reliability; probability theory; sampling theory; statistical computing; statistical design; statistical theory; and stochastic processes and their applications.

Course designations

The following course identifiers are used to designate the courses offered by the separate units: Biometrics Unit (CALS), STBTRY; Engineering Statistics Unit (ENGR), STENGR; Mathematical Statistics Unit (ARTS), STMATH; Social Statistics Unit (ILR), STSOC. To enroll in one of the courses see the listing for the appropriate college.

Descriptions of undergraduate and graduate courses are listed below.

Biometrics Unit

STBTRY 100 Statistics and the World We Live In (enroll in BTRY 100)
Fall. 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.

STBTRY 261 Statistical Methods I (enroll in BTRY 261)
Fall. 4 credits. Letter only. Prerequisite: STBTRY 100 [formally 200] or prior experience in data collection and interpretation. Limited to undergraduates.
Statistical methods are developed and used to analyze data arising from a wide variety of applications. Topics include: descriptive statistics, point and interval estimation, hypotheses testing, inference for a single population, comparisons between two populations, one and two-way analysis of variance, 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. The lectures may co-meet with STBTRY 601. Sections, homeworks, and exams are administered separately.

STBTRY 302 Statistical Methods II (enroll in BTRY 302)
Spring. 4 credits. Letter only. Prerequisite: STBRY 261 or STBTRY 601. Limited to undergraduates.
A continuation of STBTRY 261. Emphasis is on the use of multiple regression analysis, analysis of variance and related techniques to analyze data in a variety on situations. Topics include 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; comparing two or more regression lines; analysis of covariance. Emphasis is on the appropriate application and interpretation of statistical techniques. For practical applications, computing is done using the SAS statistical package. The lectures co-meet with STBTRY 602. Sections, homeworks, and exams are administered separately.

STBTRY 400 Biometry Seminar (enroll in BTRY 400)
Fall or spring. 1 credit. S-U grades only. Prerequisite: STBTRY 409 or STBTRY 602 or by permission of the instructor.
Students will attend weekly seminar, the Biometrics Unit Discussion Series. Can be taken concurrently with STBTRY 600 only with permission of instructor. Students can only take course twice.

STBTRY 408 Theory of Probability (enroll in BTRY 408)
Fall. 4 credits. Prerequisite: STMATH 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 either a one-semester introduction to probability or a foundation for a course in the theory of statistics.

STBTRY 409 Theory of Statistics (enroll in BTRY 409)
Spring. 4 credits. Prerequisite: STBTRY 408 or equivalent.
The concepts developed in STBTRY 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.

STBTRY 494 Undergraduate Special Topics in Biometry and Statistics (enroll in BTRY 494)
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.

STBTRY 495 Statistical Consulting (enroll in BTRY 495)
Spring. 2 credits. S-U grades only. Limited to undergraduates. Prerequisites or co-requisites: STBTRY 302 and 409 or 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.

STBTRY 497 Undergraduate Individual Study in Biometry and Statistics (enroll in BTRY 497)
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.

STBTRY 498 Undergraduate Supervised Teaching (enroll in BTRY 498)
Fall or spring. 2 credits. S-U grades optional. 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.

STBTRY 499 Undergraduate Research (enroll in BTRY 499)
Fall or spring. 1–3 credits. S-U grades optional. 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).

STBTRY 600 Statistics Seminar (enroll in BTRY 600)
Fall or spring. 1 credit. S-U grades only. Prerequisite or corequisite: STBTRY 409 or permission of instructor.

STBTRY 601 Statistical Methods I (enroll in BTRY 601)
Fall or summer. 4 credits. Limited to gradate 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.

STBTRY 602 Statistical Methods II (enroll in BTRY 602)
Spring. 4 credits. Limited to graduate students; others by permission of instructor. Prerequisite: STBTRY 601 or equivalent.
A continuation of STBTRY 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.

[STBTRY 603 Statistical Methods III (enroll in BTRY 603)
Spring. 3 credits. Prerequisite: STBTRY 601 and 602 or permission of instructor. Offered alternate years. Not offered spring 2000.
Categorical data analysis, including logistic regression, loglinear models, stratified tables, matched pairs analysis, polytomous response and ordinal data. Applications in biomedical and social sciences.]

STBTRY 604 Statistical Methods IV: Applied Design (enroll in BTRY 604)
Spring. 3 credits. Prerequisites: STBTRY 601 and 602 or permission of instructor. Offered alternate years.
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.

STBTRY 639 Epidemiology Seminar (enroll in BTRY 639)
Spring. 1 credit, variable. S-U grades only. Permission of instructor.
This course will develop skills in the preparation and interpretation of epidemiological data by discussing current research topics and issues.

STBTRY 662 Mathematical Ecology (enroll in BTRY 662)
Fall. 3 credits. S-U grades optional. Prerequisites: a year of calculus and a course in statistics.
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.

STBTRY 672 Topics in Environmental Statistics (BTRY 672)
Fall and spring. 2 credits. S-U grades optional. Prerequisite: STBTRY 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.

STBTRY 682 Statistical Methods for Molecular Biology (enroll in BTRY 682)
Fall. 2 credits. S-U only. Prerequisite: permission of instructor.
Statistical and mathematical topics of current interest in molecular biology: genetic mapping, physical mapping, DNA sequence analysis, phylogenetic inference, population modeling. Topics may vary. The course may be repeated for credit.

STBTRY 694 Graduate Special Topics in Biometry and Statistics (enroll in BTRY 694)
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.

STBTRY 697 Individual Graduate Study in Biometry and Statistics (enroll in BTRY 697)
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.

[STBTRY 717 Linear and Generalized Linear Models (enroll in BTRY 717)
Spring. 3 credits. S-U grades optional. Prerequisites: STBTRY 409, BTRY 417 and 602 or equivalents. Offered alternate years. Not offered spring 2000.
Statistical modelling and inference using linear models and generalized linear models. Estimation by least squares, maximum likelihood, quasi-likelihood, and generalized estimating equations. The use of link functions and generalized linear models to accommodate nonlinear models and non-normally distributed data. The use of random effects to accommodate correlation structures in both linear mixed models and generalized models and to model longitudinal data. Some use of software packages and illustrative examples.]

STBTRY 795 Statistical Consulting (enroll in BTRY 795)
Fall or spring. 2 credits. S-U grades only. Limited to graduate students. Participation in the Department of Biometrics 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.

STBTRY 798 Graduate Supervised Teaching (enroll in BTRY 798)
Fall and spring. 2–4 credits. S-U only. Permission of instructor and chair of special committee plus at least 2 advanced courses in statistics and biometry.

Engineering Statistics Unit

STENGR 270 Basic Engineering Probability and Statistics (enroll in ENGRD 270 or OR&IE 270)
Fall, spring, or summer. 3 credits. Pre- or co-requisite: MATH 293.
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.

STENGR 310 Introduction to Probability and Random Signals (enroll in ELE E 310)
Spring. 4 credits. Prerequisite: STMATH 294. This course may be used in place of STENGR 270 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, and making estimates, inferences, and decisions in the presence of chance and uncertainty. Applications will be given in such areas as communications, and device modeling, probability, characteristic functions; nonlinear transformations of data; expectation, correlation; and the central limit theorem.

STENGR 360 Engineering Probability and Statistics II (enroll in OR&IE 360)
Fall. 4 credits. Prerequisite: STENGR or 270 or equivalent.
This second course in probability and statistics provides a rigorous foundation in theory 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. Specific topics include random variables, probability distributions, density functions, expectation and variance, multidimensional random variables, and important distributions including normal, Poisson, exponential, hypothesis testing, confidence intervals, and point estimation using maximum likelihood and the method of moments.

STENGR 361 Introductory Engineering Stochastic Processes I (enroll in OR&IE 361)
Spring. 4 credits. Prerequisite: STENGR 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.

STENGR 411 Random Signals in Communications and Signal Processing (enroll in ELE E 411)
Fall. 3 credits. Prerequisite: STENGR 301 and 310 or equivalent.
Introduction to models for random signals in discrete and continuous time, Markov chains, Poisson process, queuing processes, power spectral densities, Gaussian random process. Response of linear systems to random signals. Elements of estimation and inference as they arise in communications and digital signal processing systems.

STENGR 467 Telecommunication Systems I (enroll in ELE E 467)
Fall. 4 credits. Prerequisites: ELE E 301 and STENGR 310. Suggest co-requisite: STENGR 411.
An introduction to analog and digital modulation and demodulation techniques. Topics include: analog signal representation and filtering; analog amplitude modulation (AM) and frequency modulation (PAM); digital transmission via carrier modulation; amplitude-shift keying (ASK), phase-shift keying (PSK), quadrature amplitude modulation white Gaussian noise; effect of noise on analog modulation techniques; error probabilities for digital transmission through additive white Gaussian noise (AWGN) channels.

STENGR 473 Empirical research Methods in Financial Engineering (enroll in OR&IE 473)
Fall. 3 credits. Prerequisite: STENGR 270, 360, and 361 or their equivalents.
This course represents an advanced study of empirical research methods in financial economics. We focus on the empirical techniques used most often in the analysis of financial markets and how they are applied to actual market data.

STENGR 476 Applied Linear Statistical Models (enroll in ORIE 476)
Spring. First half of term. 2 credits. Prerequisite: STENGR or ENGRD 270.
Multiple linear regression, diagnostics, model selection, inference, one and two factor analysis of variance. Theory and applications both treated. Use of MINITAB.

STENGR 512 Fundamental Information Theory (enroll in ELE E 562)
Fall. 4 credits. Prerequisite: STENGR 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.

STENGR 517 Artificial Neural Networks (enroll in ELE E 577)
Fall. 4 credits. Prerequisites: STENGR 310; STENGR 411 recommended.
Artificial neural networks are brainlike in being formed out of many highly interconnected nonlinear memoryless elements. Probability theory will provide our primary analytical approach to design and analysis of neural networks. The course will cover mathematical and computer-based design capabilities of feed-forward nets (multilayer perceptrons) that can serve as pattern classifiers.

STENGR 523 Introductory Engineering Stochastic Process I (enroll in OR&IE 523)
Spring. 4 credits. Prerequisite: STENGR 360 or equivalent.
Basic concepts and techniques of random processes ares 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.

STENGR 560 Engineering Probability and Statistics II (enroll in OR&IE 560)
Fall. 4 credits. Prerequisite: STENGR or ENGRD 270 or equivalent.
This second course in probability and statistics provides a rigorous foundation in theory 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. Specific topics include random variables, probability distributions, density functions, expectation and variance, multidimensional random variables, and important distributions including normal, Poisson, exponential, hypothesis testing, confidence intervals, and point estimation using maximum likelihood and the method of moments.

[STENGR 561 Queuing Theory and Its Applications (enroll in OR&IE 561)
Spring. 3 credits. Prerequisite: STENGR 361 or permission of instructor. Not offered 1999–2000.
Basic queuing models. Delay and loss systems. Finite source finite capacity, balking, reneging. Systems in series and in parallel. FCFS versus LCFS. Busy period problems. Output. Design and control problems. Priority systems. Queuing networks. The product formula. Time Sharing. Server vacations. Applications to equipment maintenance, computer operations, and flexible manufacturing systems. This year I am introducing a new topic: applications of simulation to models of current interest.]

STENGR 577 Quality Control (enroll in OR&IE 577)
Fall. 3 credits. Prerequisite: STENGR or ENGRD 270.
Concepts and methods for process and acceptance control. Control charts for variables and attributes. Process capability analysis. Acceptance sampling. Continuous sampling plans. Life tests. Use of experimental design and Taguchi methods for off-line control.

STENGR 581 Simulation Modeling
Fall. 2 credits. Prerequisites: programming experience and STENGR 360 (Engineering Probability and Statistics II) or permission of the instructor. STENGR may be taken concurrently.
Models and digital computer programs to simulate the behavior of complex stochastic systems in time. Modeling time and random-

ness, simulation languages, generation of stochastic inputs (scalers and processes).

STENGR 582 Simulation Analysis
Fall. 2 credits. Prerequisites: programming experience and STENGR 360 (Engineering Probability and Statistics II) or permission of the instructor. STENGR may be taken concurrently.
Probabilistic and statistical methods for design of computer simulation experiments and analysis of their inputs. Initialization issues, analysis of simulation outputs, variance reduction methods, optimization through simulation.

STENGR 650 Applied Stochastic Processes (enroll in OR&IE 650)
Fall. 4 credits. Prerequisite: a one-semester calculus-based probability course.
An introduction to stochastic processes that presents the basic theory together with a variety of applications. Topics include Markov processes, renewal theory, random walks, branching processes, Brownian motion, stationary processes, martingales, and point processes.

STENGR 651 Probability (enroll in OR&IE 651)
Spring. 4 credits. Prerequisite: real analysis at the level of STMATH 413 and a previous one-semester course in calculus-based probability.
Sample spaces, events, sigma fields, probability measures, set induction, independence, random variables, expectation, review of important distributions and transformation techniques, convergence concepts, laws of large numbers and asymptotic normality, conditioning.

STENGR 670 Statistical Principles (enroll in OR&IE 670)
Fall. 4 credits. Co-requisite: STENGR 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.

STENGR 671 Intermediate Applied Statistics (enroll in OR&IE 671)
Spring. 3 credits. Prerequisite: STENGR 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.

STENGR 768 Selected Topics in Applied Probability (enroll in OR&IE 768)
Fall. Credit to be arranged.
Topics are chosen from current literature and research areas of the staff.

STENGR 769 Selected Topics in Applied Probability (enroll in OR&IE 769)
Spring. Credit to be arranged.
Topics are chosen from current literature and research areas of the staff.

Mathematical Statistics and Probability Unit

STMATH 171 Statistical Theory and Application in the Real World (enroll in MATH 171)
Fall or spring. 4 credits. Prerequisite: high school mathematics.
This introductory statistics course will discuss techniques for analyzing data occurring in the real world and the mathematical and philosophical justification for these techniques. Topics include population and sample distributions, central limit theorem, and statistical theories of point estimation, confidence intervals, and testing hypotheses, the linear model, and the least squares estimator. The course concludes with a discussion of tests and estimates for regression and analysis of variance (if time permits). The computer will be used to demonstrate some aspects of the theory, such as sampling distributions and the Central Limit Theorem. In the lab portion of the course, students will learn and use computer-based methods for implementing the statistical methodology presented in the lectures. (No previous familiarity with the computer is presumed).

STMATH 411 Introduction to Analysis (enroll in MATH 411)
Fall. 4 credits. Prerequisite: Mathematics 222 or 293–294. Students who need measure theory and Lebesque integration for advanced probability courses should take Mathematics 413–414 or audit the first few weeks of STMATH 621. Undergraduates who plan to attend graduate school in mathematics should take 413–414.
An introduction to the theory of functions of real variables, stressing concepts and a logical development of the subject rather than applications. Topics include: Euclidean spaces, the real number system, continuous and differentiable functions, uniform convergence and approximation theorems, and the Riemann integral. Students who wish to continue study of theoretical analysis upon completion of Mathematics 411, students may take Mathematics 418.

STMATH 471 Basic Probability (enroll in MATH 471)
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.

STMATH 472 Statistics (enroll in MATH 472)
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.

[STMATH 474 Basic Stochastic Processes (enroll in MATH 474)
Spring. 4 credits. Prerequisites: Mathematics 471 or equivalent and knowledge of linear algebra such as taught in Mathematics 221. Not offered 1999–2000.
This is a second-semester undergraduate course on probability. It covers topics from renewal theory, martingales, discrete and continuous time Markov chains, Brownian motion and related diffusion processes, and applications to queuing theory and finance. Theoretical as well as applied aspects of the subject will be emphasized.]

STMATH 621 Measure Theory and Lebsque Integration (enroll in MATH 621)
Fall. 4 credits.
Measure theory, integration, and Lp spaces.

STMATH 671–672 Probability Theory (enroll in MATH 671–672)
671 fall; 672 spring. 4 credits each. Prerequisite: a knowledge of Lebesgue integration theory, at least on the real line. Students can learn this material by taking parts of Mathematics 413–414 or 521. Prerequisite for Mathematics 672; Mathematics 671.
Properties and examples of probability spaces. Sample space, random variables, and distribution functions. Expectation and moments. Independence Borel-Cantelli lemma, zero-one law. Convergence of random variables, probability measures, and characteristic functions. Law of large numbers. Selected limit theorems for sums of independent random variables. Markov chains, recurrent events. Ergodic and renewal theorems. Martingale theory. Brownian motion and processes with independent increments.

STMATH 674 Introduction to Mathematical Statistics (enroll in MATH 674)
Spring. 4 credits. Prerequisite: Mathematics 671 or permission of instructor.
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.

STMATH 771–772 Seminar in Probability and Statistics (enroll in MATH 771–772)
771 fall; and 772 spring. 4 credits each.

STMATH 777–778 Stochastic Processes (enroll in MATH 777–778)
777 fall; and 778 spring. 4 credits each.

Social Statistics Unit

STSOC 210 Statistical Reasoning I (enroll in ILRST 210)
Fall, spring or summer 1999, 2000.
3 credits. Attendance at weekly discussion section is required.
An introduction to the basic concepts of statistics and data analysis. Descriptive methods, normal theory 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 single population mean and proportion, the difference in two population means and

proportions, 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.

STSOC 211 Statistical Reasoning II (enroll in ILRST 211)

Fall, spring or summer 1999, 2000. 3 credits. Prerequisite: STSOC 210 or suitable introductory statistics course.

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; logistic regression; and analysis of variance. Computer packages are used throughout the course.

STSOC 310 Statistical Sampling (enroll in ILRST 310)

Spring. 3 credits. Prerequisite: two terms of statistics.

Theory and application of statistical sampling, especially in regard to sample design, cost, estimation of population quantities, and error estimation. Assessment of nonsampling errors. Discussion of applications to social and biological sciences and to business problems. Course includes an applied project.

STSOC 311 Practical Matrix Algebra (enroll in ILRST 311)

Fall. 3 credits.

Matrix algebra is a necessary tool for statistics courses such as regression and 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.

STSOC 312 Applied Regression Methods (enroll in ILRST 312)

Fall. 3 credits. Prerequisite: STSOC 112, 211 or equivalent courses.

Matrix algebra necessary to analyze regression models is reviewed. 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.

[STSOC 313 Design and Analysis of Experiments (enroll in ILRST 313)

3 credits. Prerequisite: STSOC 211 or equivalent. Not offered 1999–2000.

The statistical design and analysis of comparative experiments including completely randomized, factorials, randomized block, latin squares and split-unit designs including crossover and repeated measures. Application of statistical design to research problems. Analyses to compare treatment groups including ANOVA, ANCOVA, contrasts and multiple comparison procedures. Computer packages are used.]

[STSOC 314 Graphical Methods for Data Analysis (enroll in ILRST 314)

3 credits. Prerequisite: STSOC 211 or equivalent. Not offered 1999–2000.

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.]

STSOC 315 Statistical Analysis of Legal Data (enroll in ILRST 315)

Fall. 3 credits. Prerequisite: STSOC 211.

The course presents a survey of some of the tools from the social and statistical sciences that have been applied to the proof of facts in the classroom and to the study of questions if legal importance. We will review various probability models, design issues, and statistical methodologies. The approach taken is based on the determination of the probability of the evidence under two competing hypotheses. Topics include: the role of uncertainty in legal settings, prosecutor's and defender's fallacies; controlled, observational, and epidemiological studies; sampling and surveys; the likelihood ratio approach for evaluation under conflicting hypotheses; p-values and Bayesian assessment; analysis various types of transfer evidence, including blood grouping and DNA profiling.

STSOC 410 Techniques of Multivariate Analysis (enroll in ILRST 410)

Spring. 3 credits. Prerequisite: STSOC 312 or equivalent.

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.

[STSOC 411 Statistical Analysis of Qualitative Data (enroll in ILRST 411)

3 credits. Prerequisite: two statistics courses or permission of instructor. Not offered 1999–2000.

An advanced undergraduate and beginning graduate course. Includes treatment of association between qualitative variates; contingency tables; log-linear models; binary ordinal, and multinomial regression models; limit dependent variables.]

STSOC 499 Directed Studies (undergraduate) (enroll in ILRST 499)

For description, see the section, Collective Bargaining, Labor Law, and Labor History.

STSOC 510 Statistical Methods for the Social Sciences I (enroll in ILRST 510)

Fall, spring and summer. 3 credits.

A first course in statistics for graduate students in the social sciences. Descriptive statistics, probability and sampling distributions, estimation, hypothesis testing, simple linear regression and correlation. Students are instructed on the use of a statistics computer package at the beginning of the term and use it for weekly assignments.

STSOC 511 Statistical Methods for the Social Sciences II (enroll in ILRST 511)

Fall, spring and summer. 3 credits. Prerequisite: STSOC 510 or equivalent introductory statistics course.

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.

STSOC 610 Seminar in Modern Data Analysis (enroll in ILRST 610)

Fall. 3 credits. Prerequisite: two statistics courses or permission of instructor.

An advanced survey of modern data analysis methods. Topics include exploratory data analysis, data reexpression, 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.

[STSOC 611 Statistical Consulting (enroll in ILRST 611)

3 credits. Prerequisite: linear algebra, knowledge of a programming language, and statistics at least through multiple regression. Not offered 1999–2000.

A survey of new aspects of statistical computing. Topics 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 gradate students in the statistical sciences and related fields interested in new advances. Students may be asked to write programs in a programming language of their choice.]

STSOC 612 Statistical Classification Methods (enroll in ILRST 612)

Fall. 3 credits. Prerequisite: STSOC 312 or equivalent, or permission of instructor.

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.

[STSOC 613 Bayesian and Conditional Inference (enroll in ILRST 613)

3 credits. Prerequisites: graduate level courses equivalent to STENGR 670, 651 or permission of instructor. Not offered 1999–2000.

This course covers the following topics: loss functions and utility theory, prior information and subjective probability, coherency, basic Bayesian inference, empirical Bayesian inference, robust Bayesian inference, Bayesian computations, ancilliarity, conditional properties of statistical procedures, and Barndorff-Nielsen's exact likelihood theory.]

[STSOC 614 Structural Equations with Latent Variables (enroll in ILRST 614)

3 credits. Prerequisites: STSOC 210, 211, 510, 511 or equivalent. Not offered 1999–2000.

Provides a comprehensive introduction to the general structural equation system, commonly known as the "LISREL 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.]

[STSOC 615 Expert Systems and Probabilistic Network Models (enroll in ILRST 615)

3 credits. S-U only. Prerequisite: STENGR 560 or an equivalent course in probability and statistics. Not offered in 1999–2000.

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, probability-based expert systems, 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.]

STSOC 630 Econometrics II (enroll in ECON 620)

Spring. 4 credits. Prerequisite: Economics 619.

This course is a continuation of Economics 619 (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.

STSOC 639 Econometrics I (enroll in Econ 619)

Fall. 4 credits. Prerequisites: Economics 319–320 or permission of instructor.

This course gives the probabilistic and statistical background for meaningful application of econometric techniques. Topics to be covered are (1) probability theory; probability spaces, random variables, distributions, moments, transformations, conditional distributions, distributions theory and the multivariate normal distribution, convergence concepts, laws of large numbers, central limit theorems, Monte Carlo simulation; (2) statistics; sample statistics, sufficiency, exponential families of distributions. Further topics in statistics will be considered in Economics 620.

[STSOC 711 Robust Regression Diagnostics (enroll in ILRST 711)

3 credits. S-U or letter grade. Prerequisite: STSOC 312 or equivalent, or permission of instructor. Not offered 1999–2000.

Regression models are simplifications of reality; we rarely expect the model to be exactly true. In many applications of regression, however, small changes in a model, a model assumption, or a data point, can have very large effects on the results. Regression analysis is viewed in this course as a cyclical process, which takes inputs and produces outputs in an iterative or cyclical way; a way in which the outputs can be used to diagnose, validate, criticize, and possibly alter the inputs. As such, this course is an attempt to narrow the gap between the theory and practice of regression analysis. In this course we discuss classical methods as well as a recently-developed general framework for assessing the sensitivity of the outputs to small changes in the input. Students are expected to be able to perform through analyses of real-life data using computer packages. Topics to be discussed include: role of variables in a regression equation, regression outliers and influential observations, robust regression, alternatives to least squares (e.g., LMS, LAV, IRLS), error-in-variables models, and generalized linear models.]

STSOC 712 Theory of Sampling (enroll in ILRST 712)

Spring. 3 credits. Prerequisite: calculus and at least one semester of mathematical statistics.

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 process in the field.

[STSOC 713 Counting Processes with Statistical Applications (enroll in ILRST 713)

3 credits. Prerequisite: a course at the technical level of STMATH 572, 574 or permission of instructor. Not offered in 1999–2000.

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.]

[STSOC 714 Topics in Modern Statistical Distribution Theory (enroll in ILRST 714)

3 credits. Prerequisite: courses equivalent to STENGR 651 or STMATH 571, and STBTRY 409 or STENGR 670. Not offered in 1999–2000.

Recent research has revealed vast territories of distribution theory that are unfamiliar to most statisticians. Provides an introduction to three topics underlining this "modern" theory: infinite divisibility, decomposability, and stability; characterization of distributions; extensions of univariate distributions to multivariate distributions.]

[STSOC 715 Likelihood Inference (enroll in ILRST 715)

3 credits. Prerequisite: graduate courses equivalent to STENGR 670. Not offered 1999–2000.

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.]

[STSOC 716 Statistical Consulting (enroll in ILRST 716)

2 credits. Prerequisites: limited to graduate students. S-U grades only. Not offered in 1999–2000.

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.]

STSOC 717 The Analysis of Discrete Data (enroll in ILRST 717)

Spring. 3 credits. Prerequisites: graduate courses equivalent to STENG 670 or permission of instructor.

This course concerns statistical models and methods for analyzing categorical data. The key models to be covered are log-linear models for contingency tables and logistic regression models for binary-reponse and multinomial data. Asymptotic distribution theory necessary for inference in these models will be emphasized. Other topics include conditional inference and connections with generalized linear models. Computer packages will be used for analyses in practical examples.

STSOC 730 Advanced Topics in Econometrics II (enroll in ECON 720)

Spring. 4 credits. Prerequisites: Economics 519–520 or permission of instructor.

Advanced topics in econometrics, such as asymptotic estimation and test theory, robust estimation, Bayesian inference, advanced topics in time-series analysis, errors in variable and latent variable models, qualitative and limited dependent variables, aggregation, panel data, and duration models.

STSOC 731 Time Series Econometrics (enroll in ECON 721)

Fall. 4 credits. Prerequisites: Economics 519–520 or permission of instructor.

This course covers traditional and current time series techniques that are widely used in econometrics. Topics include the theory of stationary stochastic processes including univariate ARMA (p,q) models, spectral density analysis, and vector autoregressive models; parametric and semi-parametric estimation; current developments in distributional theory; estimation and testing in models with integrated regressors including, unit root tests, cointegration, and permanent vs. transitory components.

STSOC 739 Advanced Topics in Economics I (enroll in ECON 719)

Fall. 4 credits. Prerequisites: Economics 519–520 or permission of instructor.

Advanced topics in econometrics, such as asymptotic estimation and test theory, robust estimation. Bayesian inference, advanced topics in time-series analysis, errors in variable and latent variable models, qualitative and limited dependent variables, aggregation, panel data, and duration models.

STSOC 799 Directed Studies (Graduate) (enroll in ILRST 799)

Related Courses in Other Departments

ARME 410 Business Statistics

ARME 411 Introduction to Econometrics

ARME 710 Econometric I

ANSCI 720 Advanced Quantitative Genetics

BTRY 90 Introduction to Biomathematics

BTRY 101 Introduction to Biometry I

BTRY 102 Introduction to Biometry II

BTRY 417 Matrix Algebra

[BTRY 451 Mathematical Modeling of Populations]

CEE 597 Risk Analysis and Management

CEH 307 Introduction to Econometrics

GOVT 602 Field Seminar in Political Methodology

NCC 501 Quantitative Methods for Management

NS 641 Applied Regression

PSYCH 472 Multiple Regression

PSYCH 473 General Linear Model

RUR SOC 619 Research Design II

SOC 301 Evaluating Statistical Evidence

SOC 506 Research Methods in Sociology

T&AM 310 Advanced Engineering Analysis I

VET MED 664 Introduction to Epidemiology

VET MED 665 Epidemiologic Study Design

PROGRAM IN COMPARATIVE AND ENVIRONMENTAL TOXICOLOGY

213 Rice Hall (255–8008)

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 graduate Field of Environmental Toxicology provides training leading to the M.S. or Ph.D. degrees. There is both breadth and depth in many facets of 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. Concentrations include cellular and molecular toxicology; nutritional and food toxicology; ecotoxicology and environmental chemistry; and a minor concentration of risk assessment, management, and public policy. Research by the faculty associated with the program focuses on the interactions of drugs, pesticides, and other potentially hazardous environmental agents with a wide variety of living organisms (including humans) as well as the ecosystems with which these organisms are associated.

Courses

Courses in environmental toxicology are cosponsored by the university's academic departments and are open to all graduate students and to undergraduates who have permission of the instructor. The titles and numbers of these courses are listed below. Details of course content are provided in the catalog under the listings of the cosponsoring department. Further information concerning the program and the development of new courses may be obtained through the director of graduate studies, 213 Rice Hall, telephone: 255–8008, e-mail: envtox@cornell.edu.; www.cfe.cornell.edu/icet/.

Tox 320 Principles of Toxicology (Vet. Micro 320, Biological Sciences 320)
Tox 370 Pesticides and the Environment (Entomology 370)
Tox 437 Oncogenic Cancer Viruses (Biological Sciences 437)
Tox 490 Insect Toxicology and Insecticidal Chemistry (Entomology 690)
Tox 607 Ecotoxicology (Natural Resources 607)
Tox 610 Introductory Chemical and Environmental Toxicology (Natural Resources 610)
Tox 611 Molecular Toxicology
Tox 625 Nutritional Toxicology (Animal Science 625)
Tox 680 Hazardous Waste Toxicology
Tox 698 Current Topics in Environmental Toxicology (Nutritional Sciences 700, NatRes 698, Ag & Bio Eng 698)
Tox 702 Seminar in Toxicology
Tox 750 Cancer Cell Biology (Biological Sciences 750, Vet. Pathology 750)
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 Sb20A 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.

Students interested in pursuing visual studies as an area of study should propose an 'Independent Major in Visual Studies' following the same procedures as for any independent major in the school of Arts and Sciences. In addition to the courses listed below, which represent only a sampling of formal curricular offerings pertinent to visual studies, interested students should note the extensive offerings in Art, Architecture, Communications, Computer Science, History of Art, Design and Environmental Analysis, Theatre, Film & Dance, and the annual listings of courses in the Society for the Humanities.

Note also that the creation of a new Program in Visual Studies is currently under consideration by the College of Arts and Sciences. For additional information, contact Marilyn Rivchin (Theatre, Film & Dance).

Courses

Some of these courses may not be taught in 1999–2000. For information about availability consult the appropriate departmental listings.

An Introduction to Architecture (Architecture 132)
Art and Politics in Twentieth-Century Latin America (History 424)
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 (Africana Studies 303)
Chicanos and Film: Representations of La Raza (English 242)
Color, Form, Space (Art 110)
Contemporary French Culture Through Film (French 291)
Computer Graphics and Visualization (Architecture 374 and Computer Science 417)
Computer Mediated Communication: Theory and Practice (Communication 440)
Computer Vision (Electrical Engineering 547)
Design I and II (Design and Environmental Analysis 101–102)
Early Modernism in America (Seminar, Art History 462)
Electronic Art and Culture (English 434)
Electronic Imaging in Art (Art 171)
Ethics in Media (Communications 426)
Fiction and Film in France (French Literature 499)
Film and Performance (Theatre Arts 413)
Filming Other Cultures (Anthropology 291 and 691 and Theatre Arts 291)
Fundamentals of 16-mm Filmmaking (Theatre Arts 377)
Fundamentals of Theatre Design and Technology (Theatre Arts 250)
The Geometry of Tilings, Polyhedra and Structural Engineering (Mathematics 151)
German Film (German Studies 396 and Theatre Arts 396)
Graphic Design (Design and Environmental Analysis 349)
History and Theory of Commercial Narrative Film (Theatre Arts 375)
History and Theory of Documentary and Experimental Film (Theatre Arts 376)
The History of the Book (English 450)
Human Perception (Psychology 342)
Image Analysis I (Civil and Environmental Engineering 613–614)
Impact of Communication Technologies (Communication 626)
Impressionism and Society (Art History 362)
The Indian Example and the Visual Tradition in Culture (Architecture 448)
Interactive Multimedia (Communications 439)

Interpreting Hitchcock (English 263, Theatre 264)
Introduction to Film Analysis: Meaning and Value (Theatre Arts 274)
Introduction to Mass Media (Communication 120)
Introductory Photo I (Art 161 and Architecture 251)
Japanese and Asian Film (Asian Studies 313 and Theatre Arts 313)
Latin American and Latino Video (Romance Studies 402 and Theatre Arts 402)
Literature to Cinema (Italian 390)
Machine Vision (Computer Science 664)
Media Arts Studio I (Architecture 459/Art 391/ Theatre Arts 391)
Media Arts Studio II (Architecture 459/Art 392/ Theatre Arts 392)
The Medieval Illuminated Book (History of Art 337)
Modern Architecture on Film (Architecture 392)
Modern Experimental Optics (Physics 330)
Optical Methods of Biologists (Biological Sciences 450)
Perception (Psychology 205)
Photo Communication (Communication 234)
Political Theory and Cinema (German Studies 330 and Theatre Arts 329, Government 370, Comparative Literature 330)
Psychology of Television (Human Development and Family Studies 461)
Psychology of Visual Communications (Psychology 347)
Russian Film of the 1920s and French Film of the 1960s (Theatre Arts 378)
Scenic Design Studio (Theatre Arts 364)
Scientific Illustration (Freehand Drawing 417)
Seminar in Museum Issues (History of Art 407)
Social and Cultural Construction of Printed Pictures (History 381)
Spanish Film (Spanish 399)
Special Investigations in Visual Studies (Architecture 458)
Studies in Film Analysis (English 263)
Video: Art, Theory, Politics (English 395, Theatre Arts 395)
Video Communication (Communication 348)
Visual Anthropology (Anthropology 453)
Visual Communication (Communication 230)
Visual Culture and Social Theory (Art History 370, Comp. Lit. 368)
Visual Ideology (Comp. Lit 660, Theatre Arts 660)
Visual Perception (Psychology 305)
The Visual System (Neurobiology and Behavior 326)
Visualizing Science and Technology (Communication 225)

Business and Preprofessional Study

UNDERGRADUATE BUSINESS STUDY

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

The areas most often pursued include applied economics and business management (College of Agriculture and Life Sciences), economics (College of Arts and Sciences), engineering, hotel administration, policy analysis and management (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, marketing, and consulting. Areas of specialization include business management and marketing, food industry management, agribusiness management, and farm business management and finance.

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

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

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

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

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

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

SELECTED BUSINESS AND MANAGEMENT COURSES

Accounting

ARME 221 Financial Accounting
ARME 323 Managerial Accounting
ARME 327 Accounting for Entrepreneurs
H Adm 120 Survey of Financial Management
JGSM NBA 500 Intermediate Accounting
JGSM NBA 501 Advanced Accounting
JGSM NBA 505 Auditing
OR&IE 350 Cost Accounting Analysis and Control

Communications

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

Computing

ARME 412 Introduction to Mathematical Programming
ABEN 204 Introduction to Computer Uses
COMS 100 Introduction to Computer Programming
COMS 101 The Computer Age
COMS 102 Introduction to Microcomputer Applications
Educ 247 Instructional Applications of the Microcomputer
H Adm 174 Microcomputing
H Adm 374 End-User Business Computing Tools
H Adm 375 Hotel Computing Applications

Economics

ARME 415 Price Analysis (also ECON 415)
ARME 431 Food and Agricultural Policies
ARME 450 Resource Economics (also ECON 450)
ARME 451 Environmental Economics and Policy (also ECON 409)
ARME 464 Economics of Agricultural Development (also ECON 464)
CEE 321 Microeconomic Analysis
PAM 200 Intermediate Microeconomics
PAM 370 Wealth and Income (is cross-listed with CEH 233)
PAM 450 Economics of Health Behavior
Econ 101 Introductory Microeconomics
Econ 102 Introductory Macroeconomics
Econ 314 Intermediate Microeconomic Theory
Econ 317 Intermediate Mathematical Economics I
Econ 318 Intermediate Mathematical Economics II
Econ 351 Industrial Organization
ILRIC 240 Economics of Wages and Employment
ILRIC 340 Economic Security

Entrepreneurship

ARME 325 Personal Enterprise and Small Business Management
ARME 425 Small Business Management Workshop
PAM 424 Families in Business
JGSM NBA 300 Entrepreneurship and Enterprise

Finance

ARME 324 Financial Management
ARME 404 Advanced Agricultural Finance Seminar
ARME 405 Farm Finance
PAM 204 Applied Public Finance
PAM 326 Personal Financial Management (is cross-listed with CEH 315)
Econ 331 Money and Credit
Econ 333 Theory and Practice of Asset Markets
Econ 336 Public Finance: Resource Allocation
H Adm 125 Finance
H Adm 226 Financial Management
H Adm 322 Investment Management
H Adm 326 Corporate Finance
OR&IE 451 Economic Analysis of Engineering Systems

International Business

ARME 100 Economics for Business in a Global Economy
ARME 430 International Trade Policy (also ECON 263)
ARME 449 Global Marketing Strategy
Econ 102 Introductory Macroeconomics
Econ 313 Intermediate Macroeconomics Theory
Econ 325 Economic History of Latin America
Econ 366 The Economy of the Soviet Union
Econ 369 Selected Topics in Socialist Economies: China
Econ 661 International Trade Theory and Policy
Econ 362 International Monetary Theory and Policy

Law, Regulation, and Ethics

ARME 250 Environmental Economics
ARME 320 Business Law I
ARME 321 Business Law II
ARME 422 Estate Planning
Comm 428 Communication Law
Econ 302 The Impact and Control of Technological Change
Econ 304 Economics and the Law
Econ 308 Economic Analysis of Government (also Civil and Environmental Engineering 322)
Econ 354 Economics of Regulation
Econ 552 Public Regulation of Business
Educ 477 Law and Educational Policy
Govt 389 International Law
H Adm 422 Taxation and Management Decisions
I&LR 201 Labor Relations Law and Legislation
ILRIC 330 Comparative Industrial Relations Systems: Western Europe
ILRIC 331 Comparative Industrial Relations Systems: Non-Western Countries
PAM 341 Consumer Law & Protection

Management

ARME 220 Introduction to Business Management
ARME 302 Farm Business Management
ARME 328 Innovation and Dynamic Management (also H ADM 418)
ARME 402 Seminar in Farm Business Planning and Managerial Problem Solving
ARME 424 Strategic Management
ARME 426 Cooperative Management and Strategies
ARME 443 Food Industry Management
Econ 326 History of American Business Enterprise
H Adm 103 Principles of Management

Manufacturing

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

Marketing

ARME 240 Marketing
ARME 340 Futures and Options Trading
ARME 342 Marketing Management
ARME 346 Dairy Markets and Policy
ARME 347 Strategic Marketing for Horticultural Firms
ARME 448 Food Merchandising
PAM 223 Consumers in the Marketplace I
PAM 323 Consumers in the Marketplace II
H Adm 243 Principles of Marketing

Personnel and Human Resource Management

ARME 326 Human Resource Management in Small Businesses
Econ 381 Economics of Participation and Workers' Management
Econ 382 The Practice and Implementation of Self-Management
H Adm 211 The Management of Human Resources
H Adm 212 Human Relations Skills
H Adm 414 Organizational Behavior and Small-Group Processes
ILROB 120 Introduction to Macro Organizational Behavior and Analysis
ILROB 121 Introduction to Micro Organizational Behavior and Analysis
ILRPR 260 Personnel Management
ILRPR 360 Human Resource Economics and Public Policy
ILROB 370 The Study of Work Motivation
ILROB 373 Organizational Behavior Simulations
ILROB 374 Technology and the Worker
ILROB 420 Group Processes
ILROB 425 Sociology of Industrial Conflict
ILRPR 461 Human Resource Managment (I&LR 200 Collective Bargaining)

Quantitative Decisions and Decision Science

ARME 210 Introductory Statistics
ARME 410 Business Statistics
ARME 411 Introduction to Econometrics
ARME 416 Demographic Analysis in Business and Government (also RSOC 331)
ARME 417 Decision Models for Small and Large Businesses
CEE 304 Uncertainty Analysis in Engineering
CEE 323 Engineering Economics and Management
Econ 320 Introduction to Econometrics
Econ 520 Econometrics II
PAM 340 Economics of Consumer Policy (is cross-listed with CEH 330)
PAM 374 Urban Economics and Policy
ENG 270 Basic Engineering Probability and Statistics

Real Estate

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

Sociology

SOC 110 Introduction to Economy and Society
SOC 215 Organizations: An Introduction
SOC 222 Social Policy and Organization in Health, Education, and Welfare
SOC 245 Inequality in Industrial Societies
SOC 275 Women at Work
SOC 301 Evaluating Statistical Evidence
SOC 303 Design and Measurement
SOC 340 Health, Behavior, and Health Policy
SOC 345 Gender Inequality
SOC 351 Research Seminar on Organizations
SOC 354 Law and Social Order
SOC 366 Transitions from State Socialism
SOC 370 Different Walks of Life: Sociology of Careers
SOC 426 Social Policy

Transportation

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

PRELAW STUDY

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

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

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

It may be possible for exceptionally well-qualified students in other Cornell undergraduate colleges to arrange to enter the Law School after three years. The College of Human Ecology offers a program in which students spend their fourth year at the Law School. In addition, members of the Cornell Law School faculty 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 biochemistry, 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, 103 Barnes Hall, Ithaca, New York, 14853–1601.

PREVETERINARY STUDY

There is no specific preveterinary program at Cornell, and students interested in veterinary medicine as a career should select a major area for study that fits their interests while at the same time meeting the entrance requirements for veterinary college as listed below. Most preveterinary students at Cornell are enrolled in the College of Agriculture and Life Sciences, which offers several applied science majors, including animal science, that can lead to related careers if the student 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, *Admissions Information,* obtained by writing to the Office of DVM Admissions, College of Veterinary Medicine, Cornell University, S1–006 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.

[1] Adopted by the Faculty Council of Representatives, May 24, 1976, Records, pp. 4525–27C, Appendix A; March 11, 1981, Records pp. 5298–5303C; May 12, 1982, Records, pp. 5505–06C; April 10, 1985, Records pp. 5991–6002C and May 15, 1985, Records, pp. 6073–84.

[2] "Arbitrary and Capricious" describes actions which have not sound basis in law, facto, or reason are grounded solely in bad faith or personal desires. A determination is arbitrary and capricious only if it is one no reasonable mind could reach.

[3] "Clear and convincing" as a standard of proof refers to a quantum of evidence beyond a mere preponderance but below that characterized as "beyond a reasonable doubt" and such that it will produce in the mind of the trier of fact a firm belief as to the facts sought to be established.

[4] See the definition at section II.B.4.c.

COLLEGE OF AGRICULTURE AND LIFE SCIENCES

ADMINISTRATION

Daryl B. Lund, dean

Brian F. Chabot, associate dean

Kevin Mahaney, assistant dean for public affairs

H. Dean Sutphin, associate dean and director of academic programs

Donald R. Viands, associate director of academic programs

W. Ronnie Coffman, associate dean and director of research

Anthony M. Shelton, associate director of research

Daniel J. Decker, associate director of research

Rosemary Loria, associate director of research

D. Merrill Ewert, associate dean and director of cooperative extension

R. David Smith, associate director of cooperative extension

Margaret E. Smith Einarson, associate director of cooperative extension

Norman T. Uphoff, director of international agriculture

James E. Haldeman, associate director of international agriculture

Office of Academic Programs Staff

Counseling and advising: Lisa Ryan, Bonnie Shelley

Registrar: Mary Milks, Patricia Austic

Admissions: Randy Stewart, Laurie Gillespie, Jason Locke, Anne LaFave

Career development: William Alberta, Amy Benedict-Martin, Sheri Mahaney

Minority programs: Catherine Thompson

Department Chairs

Agricultural and biological engineering: M. F. Walter, Riley-Robb Hall

Agricultural, resource, and managerial economics: A. M. Novakovic, Warren Hall

Animal science: A. W. Bell, Morrison Hall

Biometrics Unit: N. S. Altman, Warren Hall

Communication: R. E. Ostman, Kennedy Hall

Education: D. H. Monk, Kennedy Hall

Entomology: D. A. Rutz, Comstock Hall

Floriculture and ornamental horticulture: T. C. Weiler, Plant Science Building

Food science: D. Miller, Stocking Hall

Fruit and vegetable science: H. C. Wien, Plant Science Building

Landscape Architecture: H. W. Gottfried, Kennedy Hall

Natural resources: J. P. Lassoie, Fernow Hall

Plant breeding: 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: J. M. Duxbury, Emerson Hall

Statistical sciences: C. E. McCulloch, Warren Hall

Note: the Biological Sciences department names and chairs were still under consideration at the time of printing.

College Focus

The College of Agriculture and Life Sciences provides educational programs that prepare men and women with technical, management, and leadership skills.

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)
- Biological Sciences
- Community, Human and Rural Resources
- Environment
- Food and Nutrition
- International

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 Counseling and Advising Office, the Office of Minority Programs, 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 directors of graduate studies are also listed.

Agriculture [M.P.S. (Agr.)]: H. D. Sutphin, Roberts Hall

Agricultural and Biological Engineering: J. A. Bartsch, Riley-Robb Hall

Agricultural Economics: R. N. Boisvert, Warren Hall

Animal Breeding: E. J. Pollak, Morrison Hall

Animal Science: R. L. Quaas, Morrison Hall

*Biochemistry, Molecular and Cell Biology: W. J. Brown, Biotechnology Building

Biometry: S. J. Schwager, Warren Hall

Communication: M. A. Shapiro, Kennedy Hall

Development Sociology: P. McMichael, Warren Hall

*Ecology and Evolutionary Biology: D. W. Winkler, Corson Hall

Education [also M.A.T.]: D. E. Hedlund, Kennedy Hall

Entomology: M. P. Hoffmann, Insectary

Environmental Toxicology: A. Yen, Rice Hall

Floriculture and Ornamental Horticulture: N. L. Bassuk, Plant Science Building

Food Science and Technology: S. S. Rizvi, Stocking Hall

*Genetics and Development: T. D. Fox, Biotechnology Building

International Agriculture and Rural Development [M.P.S. (Agr.)]: R. W. Blake, Morrison Hall

International Development: N. T. Uphoff, Caldwell Hall

Landscape Architecture [M.L.A.], R. T. Trancik, Kennedy Hall

*Microbiology, S. C. Winans, Wing Hall

Natural Resources, M. E. Krasny, Fernow Hall

*Neurobiology and Behavior, S. T. Emlen, Seeley-Mudd Hall

Nutritional Sciences, N. Noy, Savage Hall

*Physiology, S. S. Suarez, Vet Research Tower

*Plant Biology, T. G. Owens, Plant Science Building

Plant Breeding, M. E. Sorrells, Bradfield Hall

Plant Pathology, J. W. Lorbeer, Plant Science Building

Plant Protection [M.P.S. (Agr.)], W. E. Fry, Plant Science Building

Pomology, I. A. Merwin, Plant Science Building

Soil, Crop and Atmospheric Sciences, S. J. Colucci, Bradfield Hall

Statistics, M. T. Wells, Caldwell Hall

Vegetable Crops, D. W. Wolfe, Plant Science Building

*Zoology, J. W. Hermanson, Schurman Hall

**Office of Undergraduate Biology*

Bachelor of Science Degree

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

Agricultural and Biological Engineering: R. E. Pitt, 318 Riley-Robb Hall

Agricultural, Resource, and Managerial Economics: D. A. Grossman, 204 Warren Hall

Animal Sciences: E. J. Pollak, B-47 Morrison Hall

Atmospheric Sciences: D. S. Wilks, 1113 Bradfield Hall

Biological Sciences, Division of: J. J. Doyle, 200 Stimson Hall; B. E. Comella, 216 Stimson

Biometry and Statistics: S. J. Schwager, 424 Warren Hall

Communication: B. O. Earle, 332 Kennedy Hall

Education: G. J. Posner, 416 Kennedy Hall

Entomology: Q. D. Wheeler, 3136 Comstock Hall

Floriculture and Ornamental Horticulture: K. W. Mudge, 20 Plant Science Building

Food Science: J. M. Brown, 101 Stocking Hall

Landscape Architecture: P. J. Trowbridge, 442 Kennedy Hall

Natural Resources: T. J. Fahey, 12 Fernow Hall

Nutrition, Food, and Agriculture: C. A. Bisogni, 334 MVR Hall

Plant Science Units (Plant Biology, Genetics and Breeding, Pathology/Protection, Pomology, Vegetable Crops): D. R. Viands, 140 Roberts Hall

Rural Sociology: L. Williams, 220 Warren Hall

Science of Earth Systems: K. Cook, 1110 Bradfield Hall

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

Special Programs in Agriculture and Life Sciences: L. A. Ryan, 140 Roberts Hall

Summary of Basic College Requirements for Graduation

1. **Credit Hours**

a. Minimum: 120

Exception: Credit for tutorial courses (Math 109, EDUC 005, and 00 level) **increase** the number of credits required for graduation by the number of credits in the course. The credits **do** count toward the minimum 12 credits for full-time status.

b. Minimum at Cornell: **60**; Maximum transferred in (C- or higher): **60**

c. Minimum from College of Agriculture and Life Sciences: **55** (includes credit used in the distribution and appropriate transfer credit)

d. Maximum from endowed colleges (Arts and Sciences; Architecture, Art, and Planning; Engineering; and Hotel School) without additional charge: **55** (includes credit used in the distribution **AND** failed courses)

e. Minimum with letter grade: 100; Maximum with S/U grade: 20 (pro-rated for transfer students) with maximum of one course per semester.

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

g. Credit for physical education **does not** count toward the 120 credit or the minimum 12 credits for full-time status (see #6).

2. **Residence**

a. Students are entitled to enroll eight full-time semesters (prorated for transfer students). A full-time semester requires a minimum of 12 credits per semester, **not** counting physical education. Remedial courses (see #1A) **are** counted.

b. A minimum of seven semesters is required, with a GPA of 2.0 or greater.

c. Internal transfer students must be enrolled in CALS for at least two semesters, **not** including residency in Internal Transfer Division.

d. The final semester before graduation **must** be in residence at Cornell as a full-time student in good academic standing (see #3 B).

Exception: Students with 8 or fewer credits remaining for graduation and with circumstances that prevent full-time study, may petition for approval to complete remaining credits at another institution or part-time in CALS.

e. Students participating in the employee degree program may petition for part-time enrollment.

3. **Grade-point Average (GPA)**

a. Cumulative GPA: **1.70** or above must be maintained. Includes only grades earned at Cornell after matriculating into the college.

b. Final semester: **1.70** or above based on a minimum of 12 credits, or **2.00** or above if graduating in 7 semesters.

4. **Distribution**

The purpose of the distribution requirement is to provide a broad educational background and to ensure a minimum level of competency in particular skills. Through study of the physical sciences, students develop quantitative and analytic skills based on an understanding of the physical laws governing the universe and 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, 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, Mathematics 101 and 109)
Education 115
Soil, Crop and Atmospheric Sciences 131
Astronomy
Geology
Statistics and Biometry (including ARME 210, ILRST 210)

*The college mathematics requirement is described below.

Group B: Biological Sciences. 9 credits, to include 6 of introductory biological science (introductory courses include BIO G 101–104, 105, 106, 109, 110.)

Biological Sciences (excluding 160, 200 [unless permission of the director of Undergraduate Biology is obtained], 209, or 367)
Animal Sciences 100, 221, 300, 301
Entomology 212
Nutritional Sciences 262
Plant Breeding 201, 225
Plant Pathology 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
ARME 100, 416
CEH 110/CEH 111 (cannot receive credit for these courses and Econ 101/Econ 102)

Communication 116, 120, 410, 418, 420, 422
Economics (excluding all ARME courses)
Education 271, 311, 317, 370, 378
Government
HDFS 150 (cannot receive credit for this course and Soc 243)
LA/CRP 261, 360, 363
Psychology
S & TS 324, 350, 390, 391, 400, 401, 402, 406, 407, 412, 425, 427, 431, 442, 467, 483
Sociology (includes 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 (literature and history)
Classics (literature and history)
Comparative Literature
English (*literature only*)
French, German, Italian, Russian, and Spanish (*literature only*)
History
History of Art/History of Architecture
LA 282
Music and Theatre Arts (theory, literature, and history only)
Natural Resources 407, 411
Philosophy
Religious Studies
Rural Sociology 100, 175, 318, 442
S & TS 205, 206, 233, 250, 281, 282, 286, 292, 358, 360, 381, 384, 389, 433, 444, 447, 472, 481, 490
WOMNS/S&TS 444

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

Freshman Seminars
Communication 117, 201, 350, 352, 260 (was 360), 263 (was 363), 365
English 280–281, 288–289, 382–385, 388–389

Students scoring 4 ot 5 on the English advanced placement exam may be awarded 3 credits and are exempt from one freshman seminar course.

5. **Math Requirement**

Faculty legislation requires minimum competency in mathematics to complete a degree in the College of Agriculture and Life Sciences. As a measure of competency in mathematics, all entering undergraduates, including those with advanced placement or transfer credit in calculus, must take the college math proficiency exam (administered during orientation). The exam score determines the college math graduation requirement, and provides placement information.

The exam has two components. Cutoff scores divide students into three groups, each with specific graduation requirements.

Mathematics requirements and placement *suggestions*:

Group I Students in this group are considered proficient in math for college graduation requirements. If further math is needed for the major, placement score *suggests* calculus skill level (e.g., Math 111, 191, 193).

Group II Students in this group MUST complete a **math course at Cornell.***

Placement score *suggests* pre-calculus skill level (e.g., EDUC 115, Math 105, Biometry 101).

Group III Students in this group must take EDUC 005, basic review math in their first semester. Students must **ALSO** complete an additional **math course at Cornell.***

Transfer and AP math credit (up to 6) will be recorded in Group A of the college distribution requirements. Additional transfer credit in math will be recorded as general electives. Students scoring in Group II or Group III of the college math proficiency exam must take a **math course at Cornell***, *regardless* of transfer or AP math credit.

***Math courses at Cornell that may be used to fulfill math requirement:**

All courses in the Mathematics department (except 101 and 109)

EDUC 115

Biometry 101

6. **Physical Education**

a. Pass a required swim test, administered during orientation.

b. Two courses with a satisfactory grade (courses do **not** count toward 120 credits for graduation or the minimum 12 credits for full-time study).

c. Students are expected to complete the physical education requirement in their first two semesters at Cornell.

d. Transfer students are credited with one course of physical education for each semester previously enrolled **full-time** (12 or more credits) at another college.

Faculty Advising

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 of courses appropriate to the degree programs offered by the college.

b. Course enrollment each semester should be planned in consultation with the faculty adviser. Students pre-enroll for courses by computer through CoursEnroll, under courses, classes and exams on the Bear Access menu. Pre-enrollment by computer is not valid until the student's individual code is entered. This code, or adviser key, is provided to the student by the faculty adviser after approval of the choice of courses.

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

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 to return for the eighth semester. A student who wishes to continue study after graduation must apply for admission as a special student through the college admissions office, 177 Roberts Hall.

c. Application to graduate. Students who are planning to graduate must complete an "Application to Graduate" by February 15th (for May graduate) or September 15th (for January graduate). The adviser signs the application after verifying that the requirements for the major have been completed. The college registrar signs after verifying that the college requirements have been met.

Credit Earned While in High School

Transfer credit will *not* be accepted for the Syracuse Project Advance Program and similar 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 verfication may be necessary.

STUDENTS

Undergraduate enrollment is approximately 3,100, with about 56 percent in the upper division. Each year about 850 students are graduated, while 650 freshmen and 250 new transfer students are enrolled. Members of the faculty of the college serve as chairs of the special committees of roughly 1100 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 about 30 percent come from other parts of the United States or abroad. Slightly more than half of the undergraduates are women. Approximately 22 percent are identified as members of minority ethnic groups.

Transfer Students

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

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

Off-Campus Students

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

Off-Campus Courses

Students in CALS must be registered for at least twelve (12) credits 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 must be reviewed by the Committee on Academic Achievement and Petitions. Students must petition *before* enrolling for a course elsewhere. The committee may approve such petitions only when there are compelling circumstances such as severe scheduling problems or no equivalent course available at Cornell. Enrolling in a course at another college to avoid taking it at Cornell is not permitted.

Leave of Absence

A student wishing a break from studies in a future semester, or those who find it necessary to leave the university before the end of a semester, should submit a written petition for a leave of absence. Such action is necessary to clear the record for the semester and if not taken may adversely affect the student's subsequent readmission to the university.

An approved leave is considered a voluntary interruption in study and holds the student's place in the college without requiring reapplication to the university. Voluntary leaves are issued two ways: unrestricted for students in good academic standing (no restrictions placed on length of leave, activities pursued, and simple notification by student of intent to return), and restricted (length of leave and activities pursued may be specified, and a petition to return must be approved by the Petitions Committee).

A database is maintained by the Counseling and Advising Office to assist participation in pre-course enrollment the semester before a student's return.

Information and petition forms are available in the Counseling and Advising Office, 140 Roberts Hall.

Withdrawal

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

Graduation and Diplomas

Graduating seniors must complete the Application to Graduate (see the aforementioned details in Part c of "Progress toward the Degree"). Diplomas are distributed to those who have completed the degree requirements and have been approved by the college faculty. After the commencement ceremony at Schoellkopf Field in May, graduates return to the Ag Quad to obtain their diplomas. For January and August graduates, diplomas are mailed.

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 in college. They believe that personal contact is the best way to provide information and advice on both academic and personal matters; considering advising to be an important and integral part of the undergraduate program. Each student enrolled in the college is assigned to a faculty adviser in his or her major field of study for assistance and guidance in developing a program of study, and to enhance the student's academic experience.

The Counseling and Advising Office coordinates the faculty advising program, serves as the college's central undergraduate advising office, and offers personal counseling. Academic advising is available for students who are interested in international study, need to file petitions to waive college academic regulations, have disability concerns, are experiencing academic difficulties, or have requests for tutoring. The staff coordinates new student orientation, commencement activities, and the activities of two student organizations, Ho-Nun-De-Kah, the college's honor society, and SONet, the CALS Student Organization Network. Students seek counseling and advising on a variety of issues including academic problems, course problems and college procedures, graduation requirements, personal and family problems, stress management, and time management. Two counselors provide short-term counseling with an expertise in college policies and guidelines. Counseling is framed as appropriate to each student's academic circumstances.

The staff is available on a walk-in basis, as well as by appointment.

The Office of Minority Programs serves to recruit, admit, monitor and influence policy on behalf of all minority students within the College of Agriculture and Life Sciences. This population is defined as encompassing all African American, Latin American, Asian American, and Native American students. In the past academic year, this population represented approximately 20 percent of the college's undergraduate population. In addition, we are charged with monitoring and programming for the Educational Opportunity Program and Prehealth Collegiate Science and Technology Entry Program, and some involvement with the Academic Human Diversity and Resources Committee. The Educational Opportunity Program (EOP) and the Collegiate Science Technology Entry Program (CSTEP) are state-supported programs intended to assist New York State students who meet economic and academic criteria set by the college, State Programs Office, and New York State Board of Regents. For further information, please contact Catherine Thompson in 140 Roberts Hall.

Within the university, the Office of Minority Programs is charged with acting as the college liaison with the central Office of Minority Education Affairs, the Learning Skills Center, and the State Programs Office. Other university connections include the Undergraduate Admissions Office and the Office of Financial Aid regarding the concerns of the minority student population.

The duties of the Office of Minority Programs are primarily carried out by the director with an assistant, part-time support staff help, and 10 to 12 peer advisers. Together, the staff acts as a major advocacy and advising group, as well as informational and referral center. Its constituency includes students, faculty, and the public.

Given the college's policy on non-exclusionary programming, the Office of Minority Programs is also responsible for some functions that serve the college's entire population. Presently, that includes reviewing non-minority applicant folders, serving as the Prehealth Program adviser and liaison, and providing ongoing support at all levels for the Office of Counseling and Advising.

The Office of Career Development offers a variety of helpful services in a friendly environment 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.

The Career Library contains an extensive collection of current and useful material, including career information books, extensive

internship files, employer directories, and job listings. Alumni Career Link is a database of eight hundred college alumni who have offered to help students and alumni with their career development in a variety of ways. Job search talks on topics such as resume writing, cover letter writing, and interview skills are presented throughout the semester and are available on videotape. An active on-campus recruiting program brings more than 80 employers to campus each year to interview students for full-time and summer jobs. Additionally, the office provides information on hundreds of internships.

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

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

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 their submitted work, 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
   - submit the same work for two different courses without advance permission
   - 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 independently
   - 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 informal resolution of most perceived violations through a primary hearing between the faculty member, the student involved, and an independent witness. 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 counseling and advising, 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 Counseling and Advising office, 140 Roberts Hall.

ACADEMIC POLICIES AND PROCEDURES

Records

The college registrar maintains for each student a complete record of academic achievement. A permanent record is maintained for each matriculated student and updated as new information becomes available. Staff are available to consult with students regarding the assignment of credit toward meeting distribution and elective requirements as listed on the *Summary of Record* form.

The Committee on Academic Achievement and Petitions is a college committee of six faculty and two student members. On behalf of the faculty, the committee

- reviews, at the end of each semester and at other times as shall seem appropriate to the committee, the progress of students toward meeting graduation requirements
- receives and acts upon petitions from individual students asking for exceptions from particular academic regulations or requirements of the college, or for reconsideration of action previously taken by the committee
- acts upon readmission requests from persons whose previous enrollment was terminated by the committee
- notifies the petitioner in writing of the action taken by the committee

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

A petition for exemption from a college academic requirement or regulation may be filed by any student who has grounds for exemption. Forms are available in the Counseling and Advising office, 140 Roberts Hall. Counselors are available to assist with the process.

A petition is usually prepared with the assistance of a student's faculty adviser, whose signature is required. 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. Check-in materials are available in 140 Roberts Hall as announced each term by the University Registrar.

Course Enrollment Procedures

To enroll in courses, students will receive information from the university registrar; plan a schedule in consultation with their adviser; and pre-enroll by computer, through CoursEnroll in "Just the Facts" on the Bear Access menu. Pre-enrollment is not valid until the student enters the adviser key code into the computer. Adviser keys are provided by faculty advisers after a discussion of selections and requirements takes place. The key code changes each semester to ensure ongoing contact between student and faculty adviser.

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 should notify the Registrar's Office to ensure that proper registration will occur.

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. If a student retakes a course in which a passing grade was earned, the second time will be for no credit.

Students must *not* enroll again for a course in which they received an incomplete or NGR. Instead, work for that course should be completed without further enrollment. The instructor files a manual grade form to the college registrar when a grade has been assigned. An incomplete not made up by the end of two successive semesters of residence 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 R grade.

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 the official university course drop and add form.

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 change course enrollment.

Students may add courses during the first three weeks of the term and change grading options or credit hours where applicable 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. Petition forms are available in Counseling and Advising, 140 Roberts Hall. Requests for course changes are approved only when the members of the committee are convinced that unusual circumstances are clearly beyond the control of the student. The committee assumes that students should have been able to make decisions about course content, total work load, and scheduling prior to the end of the seventh week of the semester.

If a 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 semester are available on Just the Facts in January; grade reports for the spring semester are mailed by the Office of the University Registrar to students at their home addresses unless alternative addresses are reported to the college or university registrar by mid-May.

Academic Deficiency Policies

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

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 RESEARCH PROGRAM

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

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

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

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

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

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

Unless otherwise indicated in the following program area descriptions, the research report in the form of a thesis or journal article should be submitted to the honors committee no later than four weeks before the end of classes of the semester in which the student expects to graduate. Students in the College of Agriculture and Life Sciences wishing to participate in the honors program must be accepted in one of the program areas approved by the faculty. Students are not eligible for honors by participating in a program offered by another college or administrative unit.

Animal Sciences

Faculty committee: W. B. Currie, chair; Y. R. Boisclair, S. M. Quirk, P. A. Johnson

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

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

- Identify a potential honors project sponsor (i.e., a faculty member working in the animal sciences) and secure that faculty member's commitment to sponsor the student in the honors project. That should be accomplished early in the second semester of the junior year.
- Preregister during the spring semester for AS 496, Animal Sciences Honors Seminar, which is offered in the fall semester.
- Register for 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 Office of Undergraduate Biology, 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 variety, small size, and easy availability, are convenient subjects for study in a wide array of problems dealing with living systems. Short life cycles, unique physiologies and developmental patterns, and species with easily managed colony requirements and a wide range of behavioral traits provide the raw material for honors study. Cornell's diverse faculty interests and extensive collections and library in entomology are also major assets if a student selects entomology as the area for honors study.

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

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

Natural Resources

Faculty committee: M. E. Krasny, chair; B. A. Knuth, J. P. Lassoie, E. L. Mills

The honors program in natural resources provides an opportunity for undergraduates to pursue supervised independent research in the areas of (1) ecology and management of landscapes; (2) fish and wildlife biology and management; and (3) resource policy, management, human dimensions, and environmental education. The subject matter and nature of the research experience may be quite varied, but requires the guidance and supervision of a faculty member with substantial interest and expertise in the subject area chosen.

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

- Register for the honors program in the junior year or earlier.
- Select a faculty adviser who will help identify and formulate a research problem.
- Carry out an independent research effort that is original and separate from the work of others who may be investigating similar subjects.
- Describe and summarize the work in the format of a conventional master's thesis or 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. Kazarinoff

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 designated 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. Letters of invitation are sent to upcoming juniors during the summer.

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. 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.

Spring Semester Students register for NS 498 (1 credit, section 1). Additional faculty presentations of research opportunities are made, as well as orientation to supportive services available through DNS. 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 student's research.
4. **Last day of classes:** 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: S. S. H. Rizvi, chair; S. Colucci, C. E. McCulloch, J.-Y. Parlange

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

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

- Identify a thesis advisor and thesis topic before the end of junior year.
- Working with the thesis advisor, prepare a budget and application form (due by the third week of senior year).
- Enroll in the program for a minimum of two semesters.
- Enroll in the appropriate departmental Undergraduate Research course for a total of at least 6 credits.
- Submit an outline of the thesis to the chair of the committee by the end of January (for a May graduation).
- Submit a draft of the thesis to the thesis advisor with sufficient lead-time for a revision to be prepared.
- Submit three copies of the thesis and names of recommended reviewers to the chair of the honors committee by three weeks before the end of classes in the semester in which graduation is expected.

There is no required format but the thesis is usually written in the form of a research journal article or a master's thesis.

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

Plant Sciences

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

Students perform independent scientific research under the guidance of faculty members in fields of horticultural, agronomic, and soil sciences; plant biology; plant genetics and breeding; and plant pathology. For admission to the program, students must meet college 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 (justification 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 Associate 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.

Social Sciences

Faculty committee: R. D. Colle, chair; K. A. Strike, M. J. Pfeffer, W. H. Lesser

Students are accepted into the social sciences honors program of the College of Agriculture and Life Sciences after meeting all the criteria described above, after evaluation of the student's written application, and on approval of 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 junior year. The purpose of the proposal is twofold. First, it formalizes a plan of study and establishes a set of expectations between the student and his or her faculty adviser. Second, the Honors Committee reviews the proposal to determine whether it is consistent with honors thesis requirements, and to make suggestions for improvement.

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

- **Research Topic:** State the problem to be studied or the topic of interest. Review the relevant literature and the background of the problem or topic; include a more extensive bibliography.
- **Research Questions/Empirical Hypotheses:** Specify the questions to be answered or hypotheses to be empirically tested via collection of data and some mode of analysis accepted in the social sciences.
- **Research Methods:** Discuss the models to be constructed, data collection procedures (including survey instruments or experiments, if appropriate), and methods of analysis.
- **Expected Significance:** State what new knowledge or information is likely to be forthcoming and why it is important.

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

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

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

INTERCOLLEGE PROGRAMS

The College of Veterinary Medicine may accept students who are then permitted to double-register in their seventh and/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 may take management courses in their senior year if approved by their college faculty adviser as part of their undergraduate program. These courses count toward the endowed college credits (maximum 55 without additional tuition charge). Students may consult with the college registrar, 140 Roberts Hall, to verify degree requirements and endowed credits earned.

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 during the senior 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 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 graduate program is cosponsored by the Department of Landscape Architecture in the College of Agriculture and Life Sciences and by the College of Architecture, Art, and Planning.

The Division of Nutritional Sciences is an intercollege unit affiliated with the College of Human Ecology and the College of Agriculture and Life Sciences. The undergraduate nutrition major is based in the College of Human Ecology, and the nutrition, food, and agriculture major is based in the College of Agriculture and Life Sciences. Students 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 based in the College of Arts and Sciences that engages in teaching and research involving the interactions of science and technology with social and political institutions. The program draws its students, faculty, and research staff from the various divisions of the university. It offers an interdisciplinary undergraduate major in Biology and Society. Students in the College of Agriculture and Life Sciences may plan a general studies major in consultation with a faculty adviser to fulfill a biology and society program. Further information, including a list of courses, may be obtained from the Science and Technology Studies undergraduate office, 275 Clark Hall.

The American Indian Program (AIP) is a multidisciplinary intercollege program consisting of academic, research, extension, and student support components. Course work is intended to enhance students' understanding of the unique heritage of North American Indians and 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 possible. Core courses are supplemented by a variety of offerings in several different departments.

Research areas among faculty active in the program include Indian education, social and economic development, agriculture, environmental issues, history, literature and the arts, and cultural preservation. Their research topics, which are highly relevant to Indian communities, will be of interest to Indian and non-Indian graduate students. Extension and outreach efforts within the program seek to develop solutions to problems identified by Indian communities and to facilitate the application of institutional resources, research, and expertise to community needs.

The American Indian Program publishes its own multidisciplinary journal, *Native Americas*, and sponsors conferences, guest lectures, and forums on important local, national, and international issues. Akwe:kon, the American Indian Residence House, offers undergraduate students a living environment that promotes intercultural exchange.

The American Indian Program offers a concentration in American Indian Studies to undergraduate students in conjunction with their major defined elsewhere in the university. The concentration will be earned upon completion of five courses: Rural Sociology 100 (Indian America to 1890) and Rural Sociology 175 (Issues in Contemporary American Indian Societies), plus three other courses selected from the following course listing (ANTHR 230, ANTHR 665, ENGL 260, ENGL 269, ENGL 278, ENGL 659, ENGL 669, ENGL 687, HIST 209, HIST 276, HIST 277, HIST 370, HIST 429, HIST 624, R SOC 100, R SOC 175, R SOC 318, R SOC 440, R SOC 442), for a total of at least 15 credits. Students choosing a concentration in American Indian Studies should obtain application materials from the AIP office in 300 Caldwell.

AIP also offers a graduate minor. Students interested in choosing the minor should contact Daniel Usner, History Department, 255–6753.

Science of Earth Systems (SES) is a new program for students in the Colleges of Agriculture and Life Sciences, Arts and Sciences, and Engineering. The SES program emphasizes the 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 "Interdisciplinary Centers, Programs, and Studies" and the CALS "Interdepartmental and Intercollege Courses" sections, 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 SES curriculum includes a freshman/sophomore emphasis on strong preparation in mathematics, physics, chemistry, and biology, and an introduction to the breadth of the major. In the junior and senior years, students take a set of common SES core courses and an additional set of four advanced disciplinary or interdisciplinary courses that build on the basic sequences.

Several interdisciplinary tracks are available within the SES program, and these are chosen by the student according to interests and career goals. This tracking is accomplished through the selection of courses beyond the core sequence. These courses 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.

The SES courses are listed in the college's "Interdepartmental and Intercollege Courses" section. For more information, see the web site at http://www.geo.cornell.edu/ses/SES_home.html

The Comparative and Environmental Toxicology Program is an interdisciplinary intercollege program with research, teaching, and cooperative extension components coordinated by the Institute for Comparative and Environmental Toxicology (ICET). Courses are cosponsored by academic departments in several colleges of the university. A description of the program and general information is available from the director of the program through the ICET office, 213 Rice Hall or at http://www.cfe.cornell.edu/icet. See also the Interdisciplinary Centers, Programs, and Studies section at the front of this catalog.

The Cornell Institute for Resource Information Systems (Cornell IRIS) is an interdisciplinary, inter-college unit affiliated with the Center for the Environment. The mission of Cornell IRIS is to advance the development and use of spectral and spatial information science and technology to benefit the environment. The Institute is comprised of three program areas in environmental resource inventory, remote sensing, and geographic information systems. A description of these programs and general information is available from the Institute director through the Cornell IRIS office in 302 Rice 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.

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 additional 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.

Applications are collected and processed by the ALS Career Development Office, 177 Roberts Hall, in the term prior to assignments. Those accepted should plan a program of study in consultation with their faculty adviser. At least twelve credits must be carried to meet the residence requirement. Seniors should note that their last term average must be 1.7 or above.

All interns will audit the orientation sessions and meet participation requirements in at least two of the lecture-seminar sections. The paper required in each section constitutes an independent study project to be directed and

evaluated by a Cornell faculty member in an appropriate discipline. Normally a faculty member will not sponsor more than one of the independent study courses for any one student. To receive academic credit for the internship, students enroll in ALS 400, for an S-U grade only.

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

Cornell-in-Washington

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 and to carry out 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. 20, inquire at 471 Hollister Hall, 255–4090, or visit the Cornell-in-Washington website at http://www.info.cornell.edu/ciw/ciw.html.

SEA Semester

The Sea Education Association is a nonprofit educational institution offering ocean-focused academic programs and the opportunity to live, work, and study at sea. Science, the humanities, and practical seamanship are integrated in small, personal classes. The 17-credit program is twelve weeks in length. Six weeks are spent in Woods Hole, the following six weeks are spent on either one of SEA's two sailing vessels: the R/V Westward, or the R/V Corwith Cramer. For more information, students should contact the Cornell Marine Programs office, G14 Stimson Hall (607–255–3717). 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 the 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 Office of Undergraduate Biology, 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 evaluating student performance.

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

In cases where the work is not done at Cornell, the awarding of credits depends upon a prior contractual arrangement between a Cornell professor and the student. Specific terms for receiving credit and a grade should be recorded, using the Independent Study, Research, Teaching, or Internship form, available in the Registrar's Office, 140 Roberts Hall.

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

The College of Agriculture and Life Sciences does not offer a field study option. In general, a rather narrow view is taken toward awarding academic credit for work experience, "life" experience, or apprenticeships. Credit will only be assigned or accepted in cases where a professor is directly involved in determining both the course content and in evaluating a student's work. The awarding of credit will not be allowed in cases where a student brings to the college or to a professor a description of a past experience and requests credit. All students enrolling for an internship must file and Independent Study, Research, Teaching or Internship form with the Office of the College Registrar.

International Exchange Programs in The College of Agriculture and Life Sciences

Any student whose grade point average is 2.75 or above and has completed one year of continuous study in CALS may apply to one of seven international student exchange programs—the Instituto Technologico y de Estudios Superiores de Monterrey (ITESM) in Monterrey, Mexico, the Agricultural College of Sweden at Uppsala, Nanyang Technological University in Singapore, or the National University of Singapore (NUS), the University of Sydney in Australia, the University of Lausanne in Switzerland, or the University of Agricultural Sciences in Gödöllö, Hungary. (Please note that the Nanyang program is for Communication majors only, the NUS program for Plant Sciences majors only, and the Lausanne program for Food Science.) CALS students may take courses relevant to their major and graduation requirements by earning a maximum of 15 transfer credits per semester. There can be no duplication of credit, and grades received must be C- or better.

These undergraduate exchange opportunities are for **CALS students only**. Students who are interested in international study but not in one of the CALS programs must apply through **Cornell Abroad** in 474 Uris Hall. Please refer to the Cornell Abroad section of Courses of Study. For more information on programs and application process, see the CALS Study Abroad Adviser in 140 Roberts Hall or visit our web site http://oap.cals.cornell.edu/C&A/International.html.

MAJOR FIELDS OF STUDY

The college curriculum consists of 17 major program areas that 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

The Department of Agricultural and Biological Engineering is at the focus of three great challenges facing humanity today: ensuring an adequate and safe food supply in an era of expanding world population; protecting and remediating the world's natural resources, including water, soil, air, biodiversity, and energy; and developing engineering systems that monitor, replace, or intervene in the mechanisms of living organisms. The undergraduate engineering program in the Department of Agricultural and Biological Engineering has a unique focus on biological systems, including the environment, that is realized through a combination of fundamental engineering sciences, biology, applications courses, and liberal studies. The program leads to a joint Bachelor of Science degree from the Colleges of Engineering and Agriculture and Life Sciences, and is accredited by the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET).

Three concentrations in agricultural and biological engineering are offered: environmental systems engineering, biological engineering, and agricultural engineering. Students take courses in mathematics, computing, physics, chemistry, basic and advanced biology, fundamental engineering sciences (mechanics, thermodynamics, fluid mechanics, and transport processes), engineering applications, and design. Students select upper-level courses in the department in areas that include bioprocessing, soil and water management, bioenvironmental and facilities engineering, bioinstrumentation, engineering aspects of

animal physiology, environmental systems analysis, and waste treatment and disposal. Students select other courses in the College of Engineering that reflect their concentration, such as environmental engineering or biomedical engineering. Students planning for medical school also take organic chemistry. Throughout the curriculum, emphasis is placed on communications and teamwork skills. **Specific course requirements and other information for the Agricultural and Biological Engineering joint program are in the College of Engineering section of this publication.**

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

Many undergraduate students participate in teaching assistantships, research assistantships, design teams, Engineering Coop, and study abroad. Students should have a strong aptitude for the sciences and mathematics and an interest in the complex social issues that surround technology.

Career opportunities cover the spectrum of private industry, public agencies, educational institutions, and graduate programs in engineering, science, medicine, law, and other fields. In recent years graduates have developed careers in environmental consulting, biotechnology, the pharmaceutical industry, biomedical engineering, management consulting, and international development.

The living world is all around us and within us. The biological revolution of this century has given rise to a growing demand for engineers who have studied biology and the environment, who have strong math and science skills, who can communicate effectively, and who appreciate the challenges facing society. The Department of Agricultural and Biological Engineering is educating the next generation of engineers to meet these challenges.

Specific course distribution requirements for the academic programs in environmental systems technology and agricultural systems technology include (for the engineering program, see the College of Engineering section):

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

For further details on the Agricultural and Biological Engineering and Technology Programs, see the department's Undergraduate Programs brochure, available at 207 Riley-Robb Hall; contact the advising coordinator, Professor Ron Pitt, at 255–2492; or visit the department's web site at http://www.cals.cornell.edu/dept/aben

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 exotic animal species 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, 15 credits) students select production and advanced courses to fulfill an individually tailored program worked out in consultation with their advisers. In this way it is possible to concentrate by species as well as by subject matter (nutrition, physiology, growth biology, breeding, management). For each subject area, supporting courses in other departments are readily available and strongly encouraged. Many science-oriented students elect a program emphasizing supportive preparation in the physical and biological sciences appropriate to graduate, 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 economics and business in preparation for a career in the poultry, dairy, meat-animal, horse, feed, or meats industry. These are examples of the flexibility within these programs that can be developed to meet 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. Upperclass students whose academic records warrant it may, by arrangement with individual faculty members, engage in research (either for credit or for Honors) or assist with teaching (for credit). The Dairy Management Fellows Program offers 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 sectors.

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. This prepares students for careers in market analysis, sales, banking, merchandising, production management, and general business management.

Environmental and resource economics provides training for students interested in applying economic concepts to problems of the environment and resource use. This specialization is a good option for those wishing to take positions as analysts with agencies that have environmental responsibility or face environmental regulations.

Farm business management and finance is intended for students with farm experience who are interested in farming, farm management, or farm finance careers, in such positions 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 set of required and recommended courses, yet all the areas have enough flexibility to satisfy the interests and abilities of individual students.

Biological Sciences

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 is available to students enrolled in either the College of Agriculture and Life Sciences or the College of Arts and Sciences. Student services associated with the major, such as the Behrman Biology Center and the Office of Undergraduate Biology, 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, systematics and biotic diversity, 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 details about the biology curriculum see the section in this catalog on 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 rewarding and 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 a computer science course (e.g., Computer Science 100), mathematics courses (at least three semesters of calculus), and Biometry and Statistics 100, 101, 102, 261–302, 408–409, 417, and Industrial and Labor Relations 310, and Operations Research and Industrial Engineering 270. Experience gained through summer employment or work as an undergraduate teaching assistant is highly recommended. Students should contact Steven J. Schwager for information.

Communication

The single most important thing for you to learn in college is how to assess and manage constantly changing information. No longer are skills and knowledge enough. The amount of information the public receives and is expected to understand is increasing exponentially. Communication is taking a more central role in science, technology, business, and public policy. Increasingly, government, industry, and special interest groups rely on communication specialists to aid in managing information—collecting, sorting, interpreting or reinterpreting, summarizing, and making information understandable and accessible to the general public, to interest groups, and to decision-makers in organizations. Effective information management requires a thorough understanding of the communication process.

When you graduate from our department, you will be better at the basic communication skills of speaking, writing, and listening. Equally important, as a communication major you will also understand:

- communication processes, such as how communication influences attitudes, opinions, and behaviors
- how communication systems work in our society and in others
- how to apply your understanding of communication to solving problems in science, government, industry, health, and education.

The communication major is a program with a strong core (eight courses) of contemporary communication knowledge, theory, and practice. Required freshman courses are:

Fall semester:

Comm 120 Contemporary Mass Communication

Comm 121 Investigating Communication

Spring semester:

Comm 116 Communication in Social Relationships

Comm 117 Writing about Communication

This set of courses will provide you with a basic understanding of communication and the communication process. These courses also provide a unique opportunity to link practical application (such as writing and critical analysis) with up-to-date research and knowledge about communication.

During the sophomore year, you will take:

Fall semester:

Comm 201 Oral Communication

Comm 230 Visual Communication

Spring semester:

Comm 253 Information Gathering and Presentation

Comm 282 Communication Industry Research

After completing the eight courses in the core curriculum, all majors take an additional six courses (18 credits) in communication. You can choose to concentrate your advanced study in one of four focus areas:

- Communication in the Life Sciences. (Studies of the impact of communication on environmental, health, science and agricultural issues, as well as public perceptions of risk.)
- Communication Planning and Evaluation. (Development of communication plans to solve problems for individuals or for organizations and evaluating the success of these plans.)
- Communication as a Social Science. (Study of communication research and methods with emphasis on communication as a social science discipline.)
- Communication Systems and Technology. (Principles of how we use communication technologies and how we are influenced by these technologies.)

Detailed information on the distribution of courses is available from the department.

In designing the communication major, the faculty of the department has kept in mind the need for students to understand contemporary research-based knowledge about communication as well as their need to be competent communicators in the workplace and within society at large. Both are critical to successful careers and enlightened citizenship in the twenty-first century.

Education

The focus of the Department of Education is on the improvement of teaching and learning within school and other settings, as well as on the role of education in society. Students study concepts and develop competencies necessary to analyze educational situations critically and to plan, implement, and evaluate educational programs. Study at the undergraduate level is structured around a core curriculum:

- An introductory course in current educational issues (Education 101) (3 credits)
- Course work in the social, philosophical, psychological, and social foundations of education (e.g., Education 271, 311, 317, 370, 378, 472, 477) (12 credits)
- Supervised field experience (e.g., Education 240 for non-majors and Education 420 for majors) (1–4 credits)
- A capstone course to integrate the students' undergraduate experience (Education 495) (2 credits)

Three specializations and three certification programs are available within the department.

Agricultural, extension, and adult education. Agricultural, extension, and adult education is a program that combines preparation in both the agricultural and social sciences. The program prepares students for teaching careers in agriculture, science, and technology in public schools, the Cooperative Extension service, and extension and adult programs of agricultural businesses, government agencies, and a variety of private and not-for-profit organizations. Students take a college program that includes a balance of courses in education as well as courses in a technical area of agriculture/biotechnology, community/economic development, natural resources, human ecology, or communication. Education courses prepare students to succeed as educators in a broad range of careers. Courses are selected to develop professional

leadership and teaching competence. Students may elect to focus their study on one or more of these areas: agricultural education, extension education, or adult education. As an alternative, students may elect to major in one of the college's technical departments and develop a complementary program of study in one or more of the three areas of agricultural, extension, and adult education. Further information is available from the agricultural, extension, and adult education coordinator, Kennedy Hall (Tel: 607–255–7381).

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

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

Students interested in concentrating their studies in educational psychology complete a total of 20–25 hours in educational psychology and related courses. Working with a faculty adviser, a student may design a program in one of a variety of applied areas: Instructional Systems Design and Development; Human Relations; Individual and Social Development; or the Educational Psychology of Human Development.

Students interested in careers in educational psychology should apply for admission to the Department of Education. For more information regarding a concentration in educational psychology, contact: Coordinator, Educational Psychology Program, Education Department, Kennedy Hall (Tel: 607–255–9258).

General education. The concentration in general education is appropriate for students seeking a solid foundation in the disciplines underlying the education professions. Students take courses in areas such as the art of teaching, philosophy of education, social foundations of education, curriculum and instruction, and related areas. Graduates of the concentration in general education may continue their studies in various areas of education or pursue careers in educational and human resource areas in business and industry, the human services, or government agencies. There are growing opportunities for employment of education graduates in the human resource management areas of agribusiness firms. Further information about the general undergraduate education is available from the undergraduate coordinator (Tel: 607–255–9269).

Teacher Certification

Students at Cornell may pursue secondary, grade 7–12 teaching credentials in agricultural education or a technical field of agriculture, mathematics, biology, chemistry, physics, earth science, and general science. The New York State Board of Regents has approved significant changes in NYS teacher certification requirements, and all registered teacher education programs in New York will be applying for re-registration with the State. Currently, Cornell operates a registered program with the State, and the faculty is preparing its re-registration application.

Agriculture. Students completing the registered program as undergraduates in agriculture are eligible to teach agricultural subjects, introduction to occupations, occupational science or math, and introductory technology for grades 7 and 8. Passing scores on the National Teacher Examination (NTE) or New York State Teacher Certification Exam (NYSTCE) and one year of agricultural work experience are required for provisional certification, which is valid for five years. The master's degree required for permanent certification is offered through graduate study at Cornell. Students who complete the required course work may also be dual-certified to teach selected science subjects and work as a work experience coordinator through direct application to the State Education Department. For more information, contact the coordinator for teacher certification (Tel: 607–255–9255).

Science and Mathematics. Students completing the registered program in science and mathematics may pursue secondary teaching credentials in biology, chemistry, earth science, general science, mathematics, and physics. Students can begin the program as Cornell juniors or seniors by completing their undergraduate major in their subject matter and five courses in education. Students from all Cornell colleges may apply. In a year of graduate study, students take additional math and/or science courses and student teach. Students may begin their certification studies as graduate students and complete a Master of Arts in Teaching (M.A.T.) degree in three semesters. Students who choose to earn certification and do a research project can complete a Master of Science degree (M.S.) in a minimum of four semesters. Both the M.A.T. or the M.S. can be used to satisfy state requirements for permanent certification. Students who complete either graduate program option after passing the New York State Teacher Certification Exam (NYSTCE), are eligible for New York State Certification. For more information, contact the coordinator for teacher education 607–255–9255.

Administrator Certification

In the process of earning a Ph.D. in education, graduate students may also earn New York State certification as a school district administrator. This certificate is normally required of all candidates for a district-level position as a school administrator (e.g., superintendent, curriculum director, etc.). The certificate also makes its holder eligible for building-level positions as principal and vice principal. New York State certification as a school administrator is usually recognized in other states.

The program is unique in that it is specifically designed to prepare administrators for small and rural school districts. Course work, the internship, and the doctoral dissertation are all oriented toward addressing the practical problems that characterize such districts and preparing candidates to assume a leadership position within them. To earn certification, a student must complete at least one year of full-time, on-campus study followed by a one-year, half-time administrative internship in a cooperating school district. To be eligible for this program, students should possess the equivalent of a master's degree, have a satisfactory graduate and undergraduate record, and three years of teaching experience. For more information, contact the coordinator for Administrator Certification Program (Tel: 607–255–7758).

Entomology

The entomology curriculum provides students with a basic background in biological and environmental sciences, with a special emphasis on 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 basic or applied insect biology including integrated pest management, insect pathology, environmental assessment, medical or veterinary entomology, insect toxicology, apiculture, insect systematics, or insect ecology. Because of the diversity of career options, the major includes a common core of requirements allowing flexibility in electives selected by students in consultation with their advisers.

Specific requirements

Basic Sciences

- One year of college mathematics, including a course in calculus, may substitute statistics and biometry
- One semester of physics
- Chemistry 206–208 or 207–208
- Chemistry 257 (organic)

General Biology

- Introductory Biology
- Biological Sciences 281 (Genetics)
- Biological Sciences 387 (Evolutionary Biology)
- A choice of one: Biological Sciences 261 (Principles of Ecology) or Biological Sciences 330 or 331 (Principles of Biochemistry)

Entomology

- Entomology 212 (Insect Biology)
- A choice of two:
  - Entomology 322 (Insect Morphology)
  - Entomology 331 (Insect Systematics)
  - Entomology 483 (Insect Physiology)

Students must also enroll in at least two additional entomology courses offered at the 300–400 level on more specialized topics.

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 a safe, nutritious, affordable, and high quality food supply for people throughout New York State, the nation, and the world.

Students choose one of five specialization options: 1) Basic Food Science, 2) Food Engineering, 3) Food Processing, 4) Food Industry Operations and Management, 5) Food Biotechnology. 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 first two years of the program are focused on establishing a solid background in the physical and biological sciences, math, and communication. Required courses include chemistry (intro and organic), biology, microbiology, calculus, physics, freshman seminar, food science, and nutrition. The second two years emphasize the application of basic science and technology to the processing, storage, distribution, marketing, and final preparation of foods. Required courses include Food Engineering Principles, Unit Operations in Food Manufacturing, Food Safety Assurance, Food Chemistry, Sensory Evaluation of Foods, Food Microbiology, and Statistics. Students choose electives to satisfy college distribution requirements and individual interests.

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 summer breaks. Most faculty in the department have active research programs and welcome participation by undergraduate students. Students may receive academic credit or wages for faculty directed undergraduate research. 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 for training, research, and employment.

Landscape Architecture

Landscape Architecture focuses on the art of landscape design as an expression of cultural values combined with the natural processes of the ambient environment. The program's unique place within the university promotes interaction among the areas of horticulture, environmental science, architecture, and city and regional planning.

The course of study 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 and theory, plant materials, construction and engineering technology, 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 garden design, parks, housing, historic preservation, environmental rehabilitation and urban design.

Landscape Architecture 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 major in each degree is composed of several parts: core courses related to professional education in landscape architecture, a concentration in a subject related to the core courses, and free electives.

The department 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 core courses in the discipline and the development of concentrations in subject matter areas such as landscape history and theory, landscape ecology and urban horticulture, the cultural landscape, site/landscape and 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 and third year graduates 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: (Please note that each semester the studio classes require a supply and field trip fee and all landscape architecture majors are required to pay an annual technology fee.)

First Year

Fall Term	*Credits*
*LA 141, Grounding in Landscape Architecture	4
†Biological sciences elective	3
†Physical sciences elective	3
†Social sciences or humanities elective	3
†Written or oral expression elective	3
	16
Spring Term	
*LA 142, Grounding in Landscape Architecture	4
†Biological sciences elective	3
†Social sciences or humanities elective	3
†Written or oral expression elective	3
†Physical sciences elective	3
	16

Second Year

Fall Term	
*LA 491, Design and Plant Establishment in the Urban Environment	3
*LA 201, Medium of the Landscape	5
†Biological Sciences elective	3
†Social Sciences or Humanities elective	3
*HORT 335, Woody Plant Materials for Landscape Use	3
	17
Spring Term	
*LA 202, Medium of the Landscape	5
*LA 315, Site Engineering I (1st 7 weeks)	2
*Historical studies	3
†Written or oral expression elective	3
†Physical sciences elective	3
	16

Third Year

Fall Term	
*LA 301, Integrating Theory and Practice	5
*LA 316, Site Engineering II (2nd 7 weeks)	2
*LA 317, Site Construction I (1st 7 weeks)	2
*Historical studies	3
‡Free electives	3
	15
Spring Term	
*LA 302, Integrating Theory and Practice	5
**Concentration	6
‡Free elective	3
*LA 318, Site Construction II (2nd 7 weeks)	2
	16

Fourth Year

Fall Term	
**Concentration	6
†Social sciences or humanities elective	3
‡Free elective	3
(Optional landscape architecture study abroad semester in Denmark or Rome)	12
Spring Term	
*LA 402, Urban Design in Virtual Space	5
**Concentration	3
*LA 412, Professional Practice	1
‡Free elective	3
	12
Summary of credit requirements	
*Specialization requirements	54
†Distribution electives	39
‡Free electives	12
**Concentration	15
	120

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

Requirements of the three-year M.L.A. curriculum include 90 credits, 6 resident units of satisfactory completion of the core curriculum courses, and a thesis or a capstone studio. (Please note that each semester the studio classes require a supply and field trip fee and all landscape architecture majors are required to pay an annual technology fee.)

First Year

Fall Term	*Credits*
*LA 505, Graphic Communication I	3
‡Free electives	3
*LA 501, Composition and Theory	5
*HORT 335, Woody Plant Materials for Landscape Use	3
*LA 491, Design and Plant Establishment in the Urban Environment	3
	17

Spring Term	
*LA 502, Composition and Theory	5
*Historical Studies	3
**Concentration	3
*LA 615, Site Engineering I (1st 7 weeks)	2
*LA 590, Theory Seminar	3
	16

Second Year

Fall Term	
*LA 601, Integrating Theory and Practice	5
*LA 616, Site Engineering II (2nd 7 weeks)	2
*LA 617, Site Construction I (1st 7 weeks)	2
*Historical Studies	3
**Concentration	3
	15

Spring Term	
*LA 602, Integrating Theory and Practice	5
*LA 618, Site Construction II (2nd 7 weeks)	2
*Historical Studies	3
**Concentration	6
	16

Third Year

Fall Term	
‡Free electives	3
*LA 701, Urban Design and Planning	5
‡Free elective	3
**Concentration	3
	14

Spring Term	
*LA 800, Master's Thesis in Landscape Architecture	
or *LA 702, Advanced Design Studio	5
*LA 412, Professional Practice	1
‡Free elective(s)	6
	12 or 16

Summary of credit requirements	
*Specialization requirements	60 or 64
**Concentration	15
‡Free electives	15 or 11
	90

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. For landscape architects, this must include at least two advanced studios, a graduate seminar, a concentration, and a thesis. For architects the curriculum requires three advanced studios, two courses in plants and planting design, two courses in the history of landscape history, two courses in engineering, a seminar in design theory, a course in professional practice, a concentration, and electives.

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 four courses, two required and two electives. Students may petition to substitute one course in the electives list. Direct inquires to professors H. Gottfried or S. Baugher.

Required.

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 Grounding in Landscape Architecture (3 cr)

The Landscape

+LA 282 The American Landscape (3 cr)

Electives (choose two):

Arch 390 American Architecture and Building I (3 cr.)

Arch 391 American Architecture and Building II (3 cr.)

+LA 261 Urban Archaeology (3 cr)

+LA 262 Laboratory in Landscape Archaeology

+LA 360 Pre-Industrial Cities and Towns of North America (3 cr) offered alternate years [1999–2000]

LA 363 American Indians, Planners, and Public Policy (3 cr)

LANAR 525 History of American Landscape Architecture (3 cr)

LA 569 Archeology in Preservation Planning and Design (3 cr) offered alternative years

+Distribution Elective

Natural Resources

The undergraduate curriculum provides students with an integrated, broadly-based approach to understanding the relationships of organisms to their environment, and the ways in which humans affect these relationships. Natural resources are construed in the broad sense to include both the more traditional topics of renewable natural resources (e.g., wildlife, fisheries, forests) and the Earth's ecosystems of which these and other natural resources are a part. Students are encouraged to understand the scientific, ethical, and societal basis for protection and management of natural resources and environments through the application of ecological principles and knowledge of societal needs.

Required Core Curriculum

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

Group A—Physical Sciences	*Total Hours*
Mathematics—2 courses	6–8
Chemistry—2 courses	7–8
Group B—Biological Sciences	
Introductory biology (BIOG 101–104 or 105–106)—8 cr. hours	8
General ecology—1 course	4
Group C—Social Sciences	
3 credits in addition to 3 credits in economics	6
Humanities	
6 credits in addition to a course in "normative" ethics (NTRES 407, 411, B&SOC 206, or PHIL 241, 246, or 247)	9
Group D—Written and Oral Expression	
Freshman Writing Seminars—2 courses	6
Oral communications—1 course	3
Courses outside the Distribution Groups	
Statistics—1 course	3
Computer applications or programming—1 course	3

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

YEAR 1 *Total Hours*

One of 2 introductory courses: 3

NTRES 100 Principles of Conservation (Fall, 3 cr.)

NTRES 201 Environmental Conservation (Spr., 3 cr.)

YEAR 2

both courses listed:

NTRES 210 Introductory Field Biology (Fall, 4 cr.) 4

NTRES 253 Applied Ecology and Ecosystem Management (Spr., 3 cr.) 3

YEARS 3 AND 4

At least 9 credit hours from selected upper-level courses, with a minimum of 3 credit hours in ecology and 3 credit hours in management emphasis. Consult the current course list in G12, Fernow Hall for courses meeting this requirement.

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

Students who wish to do so may specialize further in natural resource ecology and management (including wildlife, fishery, forest, and aquatic sciences), or natural resource policy, management, and human dimensions.

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

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 of 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 331 Physiological and Biochemical Bases of Nutrition, and NS 332 Methods in Nutritional Sciences. In addition, students select a minimum of three advanced courses in nutritional sciences as well as elective courses in the broad areas of food production and processing, food and agricultural policy, the life sciences, environment and natural resources, communication, and education.

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-Kinzelberg 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, computers, 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, fruit science, or vegetable science. Students with well-defined interests upon arrival at Cornell can specialize in one of these programs in their freshman year. Others may prefer to start in the general plant sciences curriculum and specialize after exploring the program offerings.

Plant sciences is a multidepartmental program, sponsored by the Department of Plant Breeding in Emerson Hall, and the Departments of Floriculture and Ornamental Horticulture, Fruit and Vegetable Science, Plant Pathology, and the Section of Plant Biology, 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 Cooperative Extension educators, 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 other departments. In addition, an interest in plant science may be combined with another specialization, such as agricultural and biological engineering, education, statistics, international agriculture, food science, or agricultural, resource, and business management.

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, 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, business management, and many other disciplines to the production and marketing of greenhouse, nursery, and turfgrass crops, as well as to the selection and management of plants in both indoor and outdoor landscapes. Programs prepare students for careers at the professional and managerial levels in horticultural business, landscape management, botanical gardens and arboreta, research, teaching, communications, and extension and public education.

The core curriculum consists of the following courses:

BIO G 109 and 110, Biological Principles or an equivalent course

CHEM 206 or 207 and 208 or an equivalent course

HORT 100, Introduction to Floriculture and Ornamental Horticulture

HORT 102, General Horticulture

HORT 230, Woody Plant Materials

HORT 243, (BIO PL 243), Taxonomy of Cultivated Plants

HORT 300 Herbaceous Plant Materials

HORT 400, Principles of Plant Propagation

BIOPL 241, Plant Biology (Introductory Botany)

BIOPL 242, Plant Physiology (lecture)

BIOPL 244, Plant Physiology (laboratory)

SCAS 260, Introduction to Soil Science

ENTOM 241, Applied Entomology

PLPA 241, Plant Diseases and Disease Management or PL PA 401, Basic Plant Pathology

Although mastery of these subject areas is considered essential for students planning to enter a production 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 141, 142, 282, 315, 316, 317, 318, 410, 480. No other landscape architecture or freehand drawing courses may be applied to the requirement because they do not contain horticultural subject matter.

Students may select an area of emphasis in either production or landscape horticulture, or they may study generally across the specialization. Concentration in production prepares students for careers in greenhouse and/or nursery management and wholesale- and retail-product marketing. Specialization in landscape horticulture trains students for careers in turfgrass management, golf course management, exterior and interior landscape contracting and service, retail- and wholesale-marketing of services, public and botanical garden and arboretum management, urban horticulture, agroforestry, arboriculture, and related areas. Some students choose to pursue a general program in production and landscape horticulture including courses in both areas. Similarly, programs in horticultural business management, research, teaching, extension and public education, and communications/journalism may be arranged across two specialization areas. Students wishing to prepare for graduate study 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 a faculty adviser, each student will tailor a program to achieve individual educational objectives in production horticulture, landscape horticulture, horticultural business management, or general horticultural science. A core of management courses also is strongly recommended for students planning horticultural business careers. Students are also encouraged to take courses in these areas: agricultural and biological engineering, soil science, computer science, ecology, entomology, geology, plant breeding, plant pathology, plant physiology, oral and written expression, plant taxonomy, and weed science. Use of electives to pursue study in the humanities and in other areas of special interest to the student is encouraged. Numerous opportunities to become familiar with the horticultural industries and professions are provided through field trips, guest lectures, undergraduate seminars, independent or small-group study, optional internships, and work-experience programs.

Questions concerning the undergraduate curriculum, advising, and related manners should be addressed to Associate Professor Kenneth W. Mudge, Undergraduate Program Coordinator, Department of Floriculture and Ornamental Horticulture, 20 Plant Science Building, Ithaca, New York 14853–5908; telephone: 607–255–1794; e-mail: kwm2@comell.edu.

The department's office is located at 20 Plant Science Building. Departmental facilities include classrooms and laboratories in the Plant Science Building, greenhouse and laboratory facilities at the Kenneth Post Laboratory, the Test Garden, the Turfgrass Research Field and Laboratory, the Long Island Horticultural Research Laboratory and freehand drawing studios in Mann Library.

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

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

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

Students are encouraged to gain hands-on experience in plant genetics and breeding by conducting independent research under direction of a faculty adviser and/or by working for a faculty member on his/her research. Field, greenhouse, and laboratory facilities are available.

Plant pathology is the study of the causes of plant diseases, the mechanisms of the interactions of disease-causing agents and plants, and the methods of preventing or controlling plant diseases. For most students, a concentration in plant pathology as an undergraduate is preparation for graduate study in plant pathology or another field of plant science. However, this concentration also prepares students for careers as technical representatives for agribusiness, as Cooperative Extension agents, as state or federal regulatory agents, or as research technicians in laboratories of plant pathology, mycology, microbiology, and biotechnology.

Courses include chemistry, mathematics, introductory biology, botany, plant physiology, and introductory plant pathology. Additional plant pathology courses and other relevant courses from other fields are selected according to the particular interests of the student. Options include entomology; plant breeding; pomology; vegetable crops; floriculture and ornamental horticulture; and soil, crop, and atmospheric sciences.

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

The following subjects are considered essential to the plant protection specialization: botany and plant physiology, general ecology, soils, crop science, and microbial ecology. Additional courses in introductory entomology, introductory plant pathology, plant disease control, weed science, and integrated pest management are recommended.

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

Pomology (the science of fruit growing) provides students with knowledge of the scientific technology and the influence of environmental factors on the production, handling, and storage of deciduous fruit crops. New York is a national leader in fruit production.

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

Vegetable crops is offered for students with an interest in either applied or basic aspects of vegetable production. The high value of vegetables and their importance in the human diet assures a continued demand for trained personnel in all aspects of vegetable technology. A flexible curriculum is provided to prepare undergraduates for careers in a diversity of fields, including: horticultural

research, teaching, extension, production, processing, and marketing. A faculty adviser assists individual students in the selection of courses, which usually include: general horticulture, soils, botany, vegetable types and identification, vegetable production, and post-harvest handling or marketing. Additional course work depends upon the interest of the student, and may include: vegetable physiology; plant breeding; entomology; plant pathology; weed science; ecology; soil, crop, and atmospheric sciences; nutritional science; agricultural economics; international agriculture; and agricultural and biological engineering.

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

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

Rural Sociology

Technological, economic, demographic, and environmental changes are social processes, and each has major impacts on individuals, social groups, societies, and the international order. At Cornell, rural sociology students study these and other facets of social change in both domestic and international settings. Among the topic areas in which faculty members in the Department of Rural Sociology specialize are international agricultural and rural development, community and regional development and changes in the United States, environmental sociology, 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, and how to apply both to research and policy in their subject areas.

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

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 rural development, environmental sociology, sociology of agriculture, population studies, and other topics. Faculty members in this department are committed to both quality instruction and research programs. Being located in a college of agriculture, faculty members maintain strong ties to the technical fields within 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 Program on Science, Technology, and Society, and the Center for International Studies. Nearly half of the department faculty are associated with one or more area studies programs (the Southeast Asia Program, South Asia Program, Latin American Studies Program, East Asia Program, or the Institute for African Development). Department members also maintain working relations with faculty in the Department of Sociology and other social science units located in other colleges at Cornell. Students are encouraged to supplement their course work by electing courses in these other departments and programs, thereby rounding out their educations with different perspectives.

The courses offered in rural sociology can be grouped into 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 Rural Sociology 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 training in the formulation of strategies to enhance the socioeconomic well-being of citizens of those countries, (2) analysis of the social structures and processes for development in nonmetropolitan settings in the United States, (3) analysis of the processes of agricultural change and development in industrialized and low-income countries, and (4) an understanding of the processes of technological development and change in agriculture and other rural industries in developed and developing countries.

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

Courses in the population, environment, and society focus area provide an understanding of (1) the causes and consequences of the major components of population change—fertility, mortality, and migration; (2) the major patterns of population distribution and population characteristics in the United States and the developing world; (3) the relationships between social structure and the biophysical environment; (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 so as to stress either population studies or sociological aspects of natural resources and the environment.

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

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 population policy, etc.).

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, science of earth systems, and soil science. Employment opportunities are increased with practical experience, and the faculty of the department and the Career Development office of the college are glad to help students search for relevant summer jobs and internship opportunities. Professional certification can also be obtained in some of these 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 agricultural business, extension service work, and farming. Graduate school is also possible after a well-planned program. Students should take at least 12 credits of crops and 12 credits of soils and design the remainder of their curriculum to meet specific interests and goals. Some students pursue a major in agronomy with a concentration in 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 used 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 agricultural production or service after completion of the B.S. degree should take additional courses in economics, communication, plant pathology, entomology, and nutrition. Students planning graduate or professional study beyond the bachelor's degree should take advanced course work in organic chemistry and biochemistry, calculus, physics, and statistics.

Science of Earth Systems integrates atmospheric and soil science as well as other earth studies to develop a scientific basis for managing the basic resources of the planet. This is an interdisciplinary program described in detail elsewhere (see index).

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.

Special Programs in Agriculture and Life Sciences

General Studies. The opportunity to develop an independent major in General Studies is available for students interested in pursuing a general education in Agriculture and Life Sciences. In consultation with a faculty adviser, students 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 of several academic units of the college or university.

Students completing this major are often planning a career in agriculturally related food and service enterprises. Many of the fast-growing occupations require the broad perspective, the scientific and technical skills, the attitudes and the analytical ability that a general education fosters.

General Studies includes production agriculture as well as technical work in the agricultural and life sciences. Many biotechnology concerns deal with aspects of agriculture, especially plants, crops, and ecosystems in the natural environment. A strong grounding in biological sciences as well as knowledge of the agricultural sciences is essential in this rapidly growing field. Students should plan basic course work in the major areas of study in the college—animal sciences, plant sciences, environment and technology, agronomic sciences, biological sciences and social sciences. Advanced courses may be selected in these and other areas of individual interest or career aspiration. A course of study for a special program must be planned with and approved by a college faculty adviser. Information on the options and names of faculty advisers prepared to advise in special programs are available in the Counseling and Advising Office, 140 Roberts Hall.

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 socioeconomic factors in agricultural development, with the physical and biological nature of tropical crops and animals, and the various world areas for which study programs exist. Study of a foreign language is required.

In addition to the college distribution requirements, students in International Agriculture must take a minimum of 30 credits toward the major. A minimum of 7 credits in International Agriculture and 8 credits in a modern foreign language are required. The other courses recommended are drawn from a wide range of disciplines. The objective is to familiarize 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. Eligibility for the Dean's List in the College of Agriculture and Life Sciences is determined by the following criteria:

1) a minimum course load for the semester of 12 letter-graded credits;
2) achievement of a semester GPA of at least 3.50; and
3) achievement of an 'S' grade, or a 'C-' or better grade in each course (including physical education), with no Incompletes. Dean's List will be granted retroactively if students meet all the requirements after successful course completion to make up INC grades.

Bachelor of Science with Honors. Students receiving a cumulative GPA of 4.0 or greater (based on the last four full-time semesters of Cornell credits in residence, with a minimum of 48 letter graded credits) will graduate "summa cum laude."

Students receiving a cumulative GPA of greater than or equal to 3.75 and less than 4.0 (based on the last four full-time semesters of Cornell credits in residence, with a minimum of 48 letter graded credits) will graduate "magna cum laude."

Students receiving a cumulative GPA of greater than or equal to 3.5 and less than 3.75 (based on the last four full-time semesters of Cornell credits in residence, with a minimum of 48 letter graded credits) will graduate "cum laude."

Bachelor of Science with Distinction in Research. Students will graduate with a bachelor of science degree with distinction in research when, in addition to having completed all the graduation requirements, they have satisfactorily completed the honors research 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 Research 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 faculty and students 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 as it relates to 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 grade point average in the college are also nominated. Gamma Sigma Delta also promotes academic excellence through sponsorship of special programs in the three colleges.

Phi Kappa Phi is an honor society that recognizes outstanding scholarship in all academic disciplines. Members are nominated from among juniors, seniors, graduate students, and faculty. Seniors must be in the top 10 percent of their class, and juniors in the top 5 percent of their class to be eligible.

DESCRIPTION OF COURSES

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

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

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

INTERDEPARTMENTAL/ INTERCOLLEGE COURSES

American Indian Studies

American Indian Studies is the instructional component of the American Indian Program. It is a multidisciplinary program offering course work that enhances students' understanding of the unique heritage of North American Indians and 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 possible. Core courses are supplemented by a variety of offerings in several different departments.

The American Indian Program offers a concentration in American Indian Studies to undergraduate students in conjunction with their major defined elsewhere in the university. The concentration will be earned upon completion of five courses: American Indian Studies 100 (enroll for Rural Sociology 100) and American Indian Studies 175 (enroll for Rural Sociology 175), plus three other courses selected from the American Indian Studies course listing, for a total of at least 15 credits. Students choosing a concentration in American Indian Studies should obtain application materials from the AIP office in 300 Caldwell. AIP also offers a graduate minor.

Students interested in choosing the minor should contact Daniel Usner, History Department, 255–6753.

J. Mt. Pleasant, Director; D. J. Barr, S. Baugher, C. C. Geisler, D. J. Greenwood, J. Henderson, B. Lambert, D. L. Moore, K. Shanley, D. H. Usner, R. W. Venables, K. Walkingstick

Until American Indian Studies courses are entered into the registrar's computer listing, students should register for these courses in the cross-listed department.

AIS 100 Indian America to 1890 (enroll for Rural Sociology 100)
Fall. 3 credits. S-U optional. Enrollment limited to 550. W 7:30–10 p.m.
R. W. Venables.
Slide lectures survey the rich cultures and complex histories of the Indian nations north of Mexico. Indian arts and philosophies are compared and contrasted with those of Europe, Africa, Asia, Canada, and the United States. The origins of today's major legal issues involving American Indians are also discussed. The course begins with a survey of Indian America before Columbus and ends at Wounded Knee in 1890, the event which marks the end of the conquest of Indian America. Guest lecturers, including American Indian leaders, provide additional perspectives.

AIS 175 Issues in contemporary American Indian Societies (enroll for Rural Sociology 175)
Spring. 3 credits. S-U grades optional. Lecs, W 7:30–9:30 p.m.; sec, various times.
Staff.
American Indian cultural and political history from 1890 to the present will be the primary focus of this course, with a review of important earlier events in U.S./Native American national relations. Emphasis will be on Native American perspectives, with guest lectures and media presentations.

[AIS 209 Political History of American Indians in the U.S. (enroll for History 209)]

AIS 230 Cultures of Native North America (enroll for Anthropology 230)

AIS 260 Introduction to American Indian Literatures (enroll for English 260)

[AIS 261 Urban Archaeology (enroll for Landscape Architecture 261)]

[AIS 276 American Indian History 1500–1850 (enroll for History 276)]

[AIS 277 American Indian History since 1850 (enroll for History 277)]

[AIS 278 Native American Poetry (enroll for English 278)]

AIS 318 Ethnohistory of the Northern Iroquois (enroll for Rural Sociology 318)

[AIS 329 Indians, Settlers, and Slaves in the early South (enroll for History 329)]

AIS 360 Preindustrial Cities and Towns of North America (enroll for Landscape Architecture 360)

[AIS 361 Sociology of American Indians (enroll for Rural Sociology 360)]

AIS 363 American Indians, Planners, and Public Policy (enroll for Landscape Architecture 363)

AIS 367 American Indian Tribal Governments (enroll for Rural Sociology 367)

[AIS 370 Resistance and Adaptation: Native American Responses to the Conquest (enroll for History 370)]

[AIS 394 Topics in American Indian Literature (enroll for English 394)]

[AIS 429 Undergraduate Seminar in Indians of Eastern North America (enroll for History 429)]

AIS 442 American Indian Philosophies: Selected Topics (enroll for Rural Sociology 442)

[AIS 471 American Indian Women's Literature (enroll for English 471)]

[AIS 494 Special Topics in American Indian Studies]

[AIS 624 Graduate Seminar in American Indian History (enroll for History 624)]

[AIS 659 Trickster in American Indian Literature and Culture (enroll for English 659)]

[AIS 665 Native American Contributions to Anthropological Thought (enroll for Anthropology 665)]

[AIS 687 American Indian Literature: Issues of Transition, Collaboration and Alternate Discourse (enroll for English 687)]

Science of Earth Systems

During the past several decades, with the increasing concern about air and water pollution, nuclear waste disposal, the ozone hole, and global climate change, the scientific community has gained considerable insight into how the biosphere, hydrosphere, atmosphere, and lithosphere systems interact. It has become evident that we cannot understand and solve environmental problems by studying these systems individually. The interconnectedness of these systems is a fundamental attribute of the Earth System, and understanding their various interactions is crucial to understanding our environment.

A new major in the Science of Earth Systems (SES) is now available for students in the College of Agriculture and Life Sciences. As described in the "Interdisciplinary Centers, Programs, and Studies" section at the front of this catalog, SES is an intercollege major which is also accessible to students in the Colleges of Engineering and Arts and Sciences.

The SES curriculum emphasizes strong preparation in mathematics, physics, chemistry, and biology, and an introduction to the breadth of the major during the freshman and sophomore years. In the junior and senior years, students take a set of common SES core courses (SES 301, 302, 321, 402) and an additional set of advanced disciplinary or interdisciplinary courses that build on the basic sequences.

The SES program provides 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. The SES major also provides a sound background for students who are interested in entering fields such as environmental law and policy with a strong scientific understanding of the environment.

For complete information about the SES major, see the Web site at http://www.geo.cornell.edu/ses/SES_home.html

For more information, contact a SES adviser to explore the possibility of entering the SES major in the College of Agriculture and Life Sciences: K. H. Cook (SCAS), T. E. Dawson (Ecology and Systematics), L. O. Hedin (Biological Sciences), J.-Y. Parlange (ABEN), S. J. Riha (SCAS), J. Yavitt (NTRES).

Science of Earth Systems Courses

SES 301 Climate Dynamics (enroll for ASTRO 331 or SCAS 331)

SES 302 Evolution of the Earth System (enroll for GEOL 302 or SCAS 332)

SES 321 Biogeochemistry (enroll for GEOL 321 or NTRES 321)

SES 402 Mechanics in the Earth and Environmental Sciences (enroll for ABEN 385)

Department of Statistical Science

The university-wide Department of Statistical Science coordinates undergraduate and graduate study in statistics and probability. A list of suitable courses can be found in the "Interdisciplinary Centers, Studies, and Programs" section at the front of this catalog (see p. 22).

NONDEPARTMENTAL COURSES

ALS 101 Transition and Success in Cornell

Fall. 1 credit. Prerequisites: must be an entering student in CALS. Letter grade only. B. O. Earle (assisted by W. N. Alberta).

Discussion-oriented course to enable all new CALS students to enjoy their experience at and transition to Cornell. Lecture, discussion, guest speakers, and assignments that explore Cornell's history, services, and organizations will be used. Emphasis on role of Agriculture and Life Sciences in future of all related careers.

ALS 134 Emergency Medical Technician

Fall and spring. 3 credits. S-U grades optional. Prerequisite: none—but basic and advanced first aid recommended. Lec, M 2:00–5:30; lab, W 2:00–5:30. G. J. Conneman and A. E. Gantert.

E.M.T. is an intensive 140-hour course taught throughout the fall and spring semesters. Course includes training in C.P.R. for the professional rescuer, oxygen administration, airway management, fracture management, bleeding control, patient assessment, spinal immobilization, medical antishock trousers, and defibrillation. Students will qualify for the New York State E.M.T. Certification Exam upon successful completion of the course. Classes will be conducted in the Class of '44 classroom-fieldhouse.

ALS 400 Internship

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

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

ALS 500 Politics and Policy: Theory, Research, and Practice (also HSS 404 and GOVT 500)

Students in the College of Agriculture and Life Sciences must register for ALS 500. S. Jackson and staff.

This course, taught in Washington, D.C., forms the core of the public policy option of the Cornell-in-Washington Program. The central course objective is to provide students with the instruction and guidance necessary to analyze and evaluate their own chosen issue in public policy. Toward that end, the course has three components: (1) weekly lectures providing background on the structures and processes of national politics and policy as well as training in research methodology; (2) student externships; and (3) individual research papers or projects. All three components interrelate to provide students with a strategy and framework for integrating classroom-based learning, field experience, and individual research. Applications are made through the Cornell-in-Washington office, 471 Hollister 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.

AGRICULTURAL AND BIOLOGICAL ENGINEERING

M. F. Walter, chair; B. A. Ahner, L. D. Albright, D. J. Aneshansley, J. A. Bartsch, P. C. Baveye, T. J. Cook, J. R. Cooke, A. K. Datta, K. G. Gebremedhin, W. W. Gunkel, D. A. Haith, P. E. Hillman, J. B. Hunter, L. H. Irwin, L. Jelinski, W. J. Jewell, D. B. Lund, C. D. Montemagno, J.-Y. Parlange, R. E. Pitt, N. R. Scott, T. S. Steenhuis, M. B. Timmons, L. P. Walker

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 or spring. 3 credits. S-U grades optional. PC or Mac labs available. All students, including those pre-enrolled, must attend the first lecture to guarantee admittance and to select a laboratory section. Lec, fall: W F 12:20–1:10, spring: M W 12:20–1:10, labs, M 1:25–4:25 or 7:30–10:30 p.m. or T 1:25–4:25 or W 1:25–4:25 or 7:30–10:30 p.m., or R 1:25–4:25 p.m. Fee, $15. P. E. Hillman.

Introduction to application packages on microcomputers. Laboratories provide experience with word processing, spreadsheets, database management, presentation graphics, and Web page authoring. An independent project related to the student's major is required. PC or Mac labs cover the same software material. These packages and others such as desktop publishing, multimedia, statistical software, searching the Internet for information are discussed and demonstrated in the lectures, as well as computer hardware and operating systems.

ABEN 104 Introduction to Programming in Java and Fortran

Spring. 4 credits. S-U grades optional. Each lab section limited to 22 students. Lecs, T R 11:15–12:05; lab T 12:20–2:15 or W 7:30–9:25 p.m.. Fee, $15. P. E. Hillman.

An introductory course in computer programming with an emphasis on handling data and algorithm development. Problem sets are on topics of general interest. The first third of the course utilizes Fortran 90 to introduce students to procedural programming concepts and style. For the remainder of the course, students will be introduced to object-oriented programming using Java. 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. 3 credits. Each lab limited to 18 students. Lec, T R 9:05; labs M T or R 1:25–4:25, M or T 7–10. T. J. Cook.

Emphasis on selection of proper materials and techniques to accomplish a variety of metal fabrication and maintenance projects. To include both hand and machine tools, fasteners, strengths of materials, classification and identification of metals, soldering, brazing, forging, pipe fitting, sheet metal work, controlling distortion, oxy-acetylene cutting, and arc welding.

ABEN 132 Introduction to Wood Construction

Fall. 3 credits. Each lab limited to 15 students. Lec, T R 9:05; labs, T W or R 1:25–4:25, T or W 7–10. T. J. Cook.

Principles and practice of wood construction. To include site selection and preparation, drainage, water and septic development, footers and foundations, material properties, framing and roofing, comparison of alternatives to wood construction, use of hand and power tools, wood joining methods, fasteners, concrete work, and block construction. Each student will plan and construct an approved carpentry project.

ABEN 151 Introduction to Computing

Fall. 4 credits. Lecs, M W F 11:15–12:05; labs, W R 12:20–2:15, 2:30–4:25, F 1:25–2:30. Each lab and recitation section limited to 22 students. L. D. Albright.

An introduction to computer programming and concepts of problem analysis, algorithm development, and data structure in an engineering context. The structured programming language, JAVA, 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 200 Life after Graduation

Spring. 1 credit. S-U grades optional. Lec, T 1:25. R. E. Pitt.

A required course for freshman majors in Agricultural and Biological Engineering. A forum to discuss the career opportunities for engineering students and the activities and

curricula that will lead to these opportunities. A series of seminars are given by practicing engineers, Cornell faculty members, alumni, staff from Cornell career offices, and students. Students develop personalized written career plans, do a web search for jobs and internships, and select future courses to meet their career goals.

ABEN 250 Engineering Applications in Biological Systems (also Engineering Distribution 250)
Fall. 3 credits. Prerequisite: enrollment in an engineering curriculum. Recommended for the sophomore year. Lec, M W F 12:20. B. A. Ahner.
Case studies of engineering problems in agricultural, biological and environmental systems, including bioremediation, crop production, environmental controls, energy, biomedicine, and food engineering. Emphasis is on the application of mathematics, physics, and the engineering sciences to energy and mass balances in biological systems.

ABEN 300 Career Development
Spring. 1 credit. S-U option. Prerequisites: ABEN 200 or permission of instructors. Lec, T 2:30–3:20. Staff.
Career development for juniors who are thinking about jobs, graduate or professional school, or anything else. Students will work on planning their options after graduation. Development of resumes and cover letters, contacts with potential employers or graduate schools, job and school searches on the Web, professional engineering registration, entrepreneurial opportunities, career offices at Cornell, and practice interviews. Students are active participants. In addition to ABEN 300 sessions, attendance at four sessions of ABEN 200, selected by each student, is required.

ABEN 301 Renewable Energy Systems
Spring. 3 credits. Prerequisite: college physics. Lec, T R 8:40–9:55. L. D. Albright.
Introduction to energy systems with emphasis on quantifying costs and designing renewable energy systems to convert environmental inputs into useful forms of energy. Course will cover solar energy, small-scale hydropower, wind, bio-conversion processes, house energy balances, and the public policy implications of alternatives. Use of spread sheets will be extensive.

ABEN 305 Principles of Navigation (also Nav S 301)
Fall. 4 credits. Four classes each week (lecture-recitation-project work). Lecs, M W F 8:00–8:50; lab, R 8:00 or 9:05. J.-Y. Parlange.
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 *briefly* discussed. This course does not satisfy ABEN technical electives.

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

ABEN 350 Biological and Environmental Transport Processes
Fall. 3 credits. Prerequisites: MATH 294 and fluid mechanics (co-registration permissible). Lecs, M W F 11:15–12:05; disc, W 2:30–3:20. K. G. Gebremedhin.
Understanding the principles of heat and mass transfer in the context of biological and environmental 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 industrial processing of food and biomaterials.

ABEN 365 Properties of Biological Materials
Spring. 3 credits. S-U grades optional. Prerequisites: one semester of math and physics. Lec, T R 12:20–1:10; lab W 2:30–4:25 or F 2:30–4:25. J. A. Bartsch.
Mechanics and structural properties of biological materials. Mechanical damage of animal, plant, and food products. Laboratory exercises in quasi-static and dynamic testing of materials and interpretation of test results. Experimental techniques for determining engineering properties of these materials.

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

ABEN 371 Hydrology and the Environment (also Soil, Crop, and Atmospheric Sciences 371 and Geology 204)
Spring. 3 credits. Prerequisite: one course in calculus. 2 lecs, 1 lab. Lecs, T R 9:05; lab, F 2:30–4:25. T. S. Steenhuis, P. C. Baveye, L. Cathles.
Introduction to hydrology: the hydrologic cycle and the role of water and chemicals in the natural environment. Includes precipitation, infiltration, evaportranspiration, 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. This course satisfies the capstone design experience requirement.

ABEN 385 Mechanics in the Earth and Environmental Sciences
Spring. 4 credits. S-U option. Lecs, M W F 11:15; sec, W 2:30–4:25. P. Baveye, J.-Y. Parlange, and W. Brutsaert.
The study of the earth and the environment requires an understanding of transport and other physical processes within and at the surface of the earth. This course encourages the students to develop a broad working knowledge of mechanics and its application to the earth and environmental sciences, providing the background necessary to study the professional literature.

ABEN 411 Biomass Processing: Modeling and Analysis
Spring. 3 credits. Prerequisites: ABEN 250; ABEN 350 (or any course in heat and mass transport); BIOBM 331, 332, or BIOMI 290. Lec, M W F 9:05. L. P. Walker.
This course is designed to introduce students to how basic concepts from physical chemistry, enzyme and microbial kinetics, and transport phenomena are used to model biomass conversion and degradation processes. Examples of different agricultural and environmental processes are used to explore model development, solutions, and validation. There is a strong emphasis on the use of differential equations to model process dynamics.

ABEN 425 Science and Technology of Environmental Management
Fall. 3 credits. Prerequisite: graduate or senior. Letter only. Lec, T R 2:55–4:10. W. J. Jewell.
Quantitative description of decline in environmental quality caused by human activities, and exploration of science and technology solutions to pollution and their limits. Tools used by engineers and scientists to understand the environment will be used to focus on water quality problems (two-thirds), air quality (one-sixth) and land quality (one-sixth).

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 449 Computational Tools for Engineers
Spring. 3 credits. S-U or letter grade optional. Prerequisite: completion of the undergraduate engineering math sequence or permission of instructor. Labs, M W F 2:30. J. R. Cooke.
This laboratory course provides a hands-on exposure to contemporary engineering software with applications from applied mathematics and the engineering sciences. The symbolic computational software, Mathematica, provides the focus for the course. Topics from Math 191–294 and more advanced topics relevant to the upper-level undergraduate curriculum and research are treated.

ABEN 450 Bioinstrumentation
Fall. 4 credits. Prerequisites: MATH 294, ABEN 151, PHYS 213, or permission of instructor. Lec, M W 8:40–9:50; lab, M or W 2:30–4:25. D. Aneshansley.
Biological and biomedical applications are emphasized in this laboratory-based course. The electronic instrument from sensor to computer is considered. Static and dynamic characteristics of components and systems are determined theoretically and empirically. General analog and digital signal condition circuits are designed, constructed and tested. Course satisfies the capstone design requirement.

ABEN 453 Computer-Aided Engineering: Applications to Biomedical and Food Processes
Spring. 3 credits. Prerequisite: computer programming (ABEN 151 or CS 100) and heat and mass transfer (ABEN 350 or equivalent). Lecs, M W 11:15; computation disc/lab: F 11:15. A. K. Datta.
Introduction to simulation-based design as an alternative to prototype-based design. Analysis and optimization of complex real-life processes using an industry-standard physics-based computational software on a supercomputer or high end personal computers. Biomedical processes and industrial food processing applications of heat and mass transfer are covered. Computational topics introduce the finite-element method, pre- and post-processing, and pitfalls of using computational software. Students choose their own term project, which is the major part of the course (no final exam). The course satisfies the College of Engineering upper-level computing application requirement. It also satisfies the capstone design experience requirement for ABEN students.

[ABEN 454 Physiological Engineering
Fall. 3 credits. Corequisite: fluid mechanics. Lecs, T R 12:20–1:10; lab T R 1:25–4:25. Not offered 1999–2000. R. E. Pitt.
Engineering analysis and design in the physiology of animals and humans. Use of engineering principles to study how animals work in nature and to intervene in physiological functions. The two major engineering themes are: signal processing as related to neural conduction, sound processing, vision, and image processing; and systematics as applied to cardiovascular and respiratory systems, bioenergetics, and bird flight. Laboratories involve experiments, computing applications, field trips, and live animal demonstrations.]

ABEN 456 Biomechanics of Plants
Fall. 3 credits. Prerequisites: upper division undergraduate or graduate status, completion of introductory sequence in biology and one year of calculus, or permission of instructor. S-U or letter grade optional. Lec, T R 11:15–12:05; disc, W 3:35–4:25. J. R. Cooke and K. J. Niklas.
An engineering approach is taken to plant form and function following the text, *Plant Biomechanics*. Topics include: mechanical behavior of materials, effect of geometry on mechanical behavior, plant-water relations, plant cell walls, mechanical behavior of tissues, mechanical attributes of organs, the plant body, fluid mechanics and biomechanics and plant evolution.

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. Brutsaert, L. M. Cathles, J.-Y. Parlange, T. S. Steenhuis.
Intermediate-level study of aquifer geology, groundwater flow, and related design factors. Includes description and properties of natural aquifers, groundwater hydraulics, soil water, and solute transport.

ABEN 473 Watershed Engineering
Fall. 3 credits. Prerequisite: fluid mechanics or hydrology. Lecs, T R 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 water conveyance, soil erosion control, flood damage control, earthen dams, ponds, moisture conservation, drainage, and water supply. This course satisfies the capstone design experience requirement.

ABEN 474 Drainage and Irrigation Design
Spring. 3 credits. Prerequisites: fluid mechanics or hydrology. Lecs, M W F 12:20. T. S. Steenhuis and L. D. Geohring.
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 wherever possible. One major design project is required of each student. This course satisfies the capstone design experience requirement.

ABEN 475 Environmental Systems Analysis
Fall. 3 credits. Prerequisites: computer programming and one year of calculus. Lecs, M W F 10:10–11:00. L. P. Walker.
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, and dynamic programming) to evaluate management alternatives. Applications include water quality management, air pollution control, solid waste management, and industrial ecology.

ABEN 476 Solid Waste Engineering
Spring. 3 credits. Prerequisites: 1 semester of physics and 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
Fall. 3 credits. Prerequisites: one environmental science course and at least junior-level standing; or permission of instructor. T R 2:30–3:45. Not offered 1999–2000. 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 478 Ecological Engineering
Spring. 3 credits. Prerequisite: junior-level environmental quality engineering course or equivalent. Lecs, T R 2:30–3:45. W. J. Jewell.
Natural waste treatment systems are sustainable, driven by solar power, and generate useful and valuable by-products. Constructed wetlands, hydroponic applications of plants, wastewater farming, sludge and industrial residue application to land, soil restoration, bioremediation of toxics, and biofilters for air purification are examples of pollution control systems that depend on natural processes. Pollution control mechanisms in soils and plants are defined and used to design innovative treatment systems for agriculture, municipalities, and industry. This course satisfies the capstone design experience requirement.

ABEN 481 Design of Wood Structures
Spring. 3 credits. Prerequisite: ENG 202. Lecs, M W F 12:20 (Hollister Hall).
K. G. Gebremedhin. Two evening prelims.
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 wood and wood products; designs of beams, columns, trusses, frames, arches, bridges, diaphragms; connections, and special wood structural systems. Engineering judgment and individual responsibility in engineering design are also emphasized. ABEN students who want to take the course to satisfy the capstone design must sign up for additional 1 credit hour of ABEN 496.

ABEN 482 Biothermal Engineering
Spring. 3 credits. Prerequisites: ABEN 250 and 350, or equivalent. Lecs, T R 11:15; lab, W 1:25–4:25. N. R. Scott.
Analysis and design of the thermal and aerial environments of plants, animals and humans. Thermal environmental requirements dictate the design of buildings to act as buffers between biological systems and weather. Heat flow, air flow, psychrometrics, energy balances, thermal biology, animal and plant models, thermal modeling, mechanical and natural ventilation, solar energy, and weather phenomena. This course satisfies the capstone design experience requirement.

ABEN 491 Highway Engineering (also Civil and Environmental Engineering 462)
Fall. 3 credits. Prerequisites: junior standing in engineering, fluid mechanics, and soil mechanics (may be taken concurrently). Lec, T R 10:10; lab, T 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. This course satisfies the capstone design experience requirement.

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: 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. 1–6 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. (Agr.) degree program. Hours to be arranged. ABEN graduate faculty.
Comprehensive design projects dealing with existing engineering problems in the field. Emphasis is on the formulation of alternative design proposals that include consideration of economics, nontechnical factors, engineering analysis, and complete design for the best design solution. Projects are supervised by faculty members on an individual basis. However, there is a formal orientation during the first four weeks of the semester. A formal report and public presentation of the results of the design project are required for completion of the course(s). A minimum of 3 to a maximum 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 651 Bioremediation: Engineering Organisms to Clean Up the Environment
Spring. 3 credits. Prerequisites: BIOMI 290 or BIOMI 398 or BIOBM 331 or permission. B. Ahner.
This course examines ways in which organisms may be used to remove or metabolize pollutants in the environment including bacterial degradation of organics and phytoremediation of heavy metals. Through lectures and current literature, we will evaluate the benefits as well as the current obstacles. We will examine the current efforts to genetically engineer organisms for bioremediation and the potential risks of releasing them into the environment.

ABEN 652 Instrumentation: Sensors and Transducers
Spring. 3 credits. Prerequisites: linear differential equations, introductory chemistry and introductory physics, or permission of the instructor. D. J. Aneshanley.
Application of instrumentation concepts and systems to the measurement of environmental, biological, and agricultural phenomena. Construction and characterization of electronic sensors and transducers will be emphasized. Image processing techniques will be introduced. A final project is required.

ABEN 655 Thermodynamics and Its Applications
Spring. 3 credits. Prerequisite: Mathematics 293 or equivalent. Lecs, R 2:30–4:30. J.-Y. Parlange.
Thermodynamics and its applications to problems in engineering and agriculture. Topics include basic concepts (equilibrium, entropy, processes, systems, potentials, stability, phase transitions) and applications (soil and water processes, dilute solutions, electromagnetism, surface phenomena, heat and mass transport, structure of organizations).

ABEN 671 Analysis of the Flow of Water and Chemicals in Soils
Fall. 3 credits. Prerequisites: four calculus courses and fluid mechanics. Lec, R 3:35–4:50 (first meeting—TBA after that). J.-Y. Parlange.
The course encompasses a full range from simple to complex methods to describe the chemical and water flows on the surface, in the vadose zone, and through the aquifer. Current analytical, semi-analytical, and computer-based techniques are discussed. Both homogeneous and heterogeneous soils are analyzed. Offered alternately with Civil and Environmental Engineering 633—a complementary, but not identical, course.

ABEN 672 Drainage
Spring. 4 credits. Prerequisites: ABEN 471 and two calculus courses. S-U grades optional. Offered alternate years. Lecs, M W F 12:20; lab, T 1:25–4:25. T. S. Steenhuis.
Theory of water and solute flow in aquifers, hillslopes, and the vadose zone as it relates to artificial drainage is discussed. Drainage design as it relates to agricultural land, landfills, and land application sites will be critically reviewed. The importance of preferential flow and matrix flow on water quality of drainage waters is examined. Laboratories are used for hands-on experience with measuring soil parameters and for actual drainage design. This course satisfies the capstone design experience requirement.

[ABEN 677 Treatment and Disposal of Agricultural Wastes
Fall. 3 credits. Prerequisite: permission of instructor. Lecs, T R 2:30–3:45. Not offered 1999–2000. W. J. Jewell.
Emphasis is on the causes of agricultural waste problems and the application of fundamentals of treatment and control methods to minimize related pollution. Fundamentals of biological, physical, and chemical pollution control methods are used in design problems with animal wastes, food production, and food and fiber processing. A semester-long design project is required. This course satisfies the capstone design experience requirement.]

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

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

ABEN 692 Pavement Engineering (also Civil and Environmental Engineering 643)
Spring. 4 credits. Limited to engineering seniors and graduate students. Prerequisite: one introductory course in soil mechanics or highway engineering. Lec, W 1:25–2:15. 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 courses; soil stabilization methods; seal-coat design; design of flexible and rigid pavements; pavement design for frost conditions; and pavement evaluation using nondestructive 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 optional. Hours to be arranged. ABEN graduate faculty.
Topics are arranged by the staff at the beginning of the term.

ABEN 700 General Seminar
Fall. 1 credit. S-U grades only. Staff.
Presentation and discussion of research and special developments in agricultural and biological engineering and related fields.

ABEN 750 Orientation to Graduate Study
Fall. 1 credit. Limited to new graduate students. S-U grades only. Lecs, first 7 weeks, M 3:35–4:25; remainder to be arranged. J. A. Bartsch.
An introduction to ABEN research policy, programs, methodology, resources, and degree candidates' responsibilities and opportunities.

ABEN 754 How to Manage a Watershed (also Government 644)
Spring. 2–3 credits. S-U grades optional. T. Steenhuis, M. Walter, N. Uphoff and R. Barker.
Examines watershed development and its relation to 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 interaction of various aspects of watershed management and design in developing countries.

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

ABEN 781 Structures and Related Topics Seminar
Spring. 1 credit. Prerequisite: graduate status or permission of instructor. S-U grades only. Hours to be arranged. Staff.
Advanced analysis and design of production systems with emphasis on structural and environmental requirements, biological responses, and economic considerations. Hours to be arranged.

ABEN 785 Biological Engineering Seminar
Spring. 1 credit. Prerequisite: graduate status or permission of instructor. S-U grades only. Hours to be arranged. J. R. Cooke.
The interactions of engineering and biology, especially the environmental aspects of plant, animal, and human physiology, are examined in order to improve communication between engineers and biologists.

ABEN 800 Master's-level Thesis Research
Fall and spring. 1–15 credits. Prerequisite: permission of adviser. S-U grades. ABEN graduate faculty.

ABEN 900 Graduate-level Thesis Research
Fall and spring. 1–15 credits. Prerequisite: permission of adviser. S-U grades. ABEN graduate faculty. Variable credit for Ph.D. research before the "A" exam is passed.

ABEN 901 Doctoral-level Thesis Research
Fall and spring. 1–15 credits. Prerequisite: passing of Admission Candidacy Exam and permission of adviser. S-U grades. ABEN graduate faculty.

AGRICULTURAL, RESOURCE, AND MANAGERIAL ECONOMICS

A. M. Novakovic, chair; D. J. Allee, B. L. Anderson, C. B. Barrett, N. L. Bills, R. N. Boisvert, L. D. Chapman, N. H. Chau, R. D. Christy, G. J. Conneman, J. M. Conrad, H. de Gorter, G. A. German, D. A. Grossman, J. M. Hagen, J. S. Hopkins, M. J. Hubbert, H. M. Kaiser, S. M. Kanbur, W. A. Knoblauch, S. C. Kyle, E. L. LaDue, D. R. Lee, W. H. Lesser, E. W. McLaughlin, M. G. Meloy, R. A. Milligan, T. D. Mount, G. L. Poe, J. E. Pratt, C. K. Ranney, W. D. Schulze, M. W. Stephenson, D. H. Streeter, L. W. Tauer, W. G. Tomek, C. L. van Es, G. B. White, L. S. Willett

Courses by Subject

Farm management, finance, and production economics: 302, 402, 403, 404, 405, 406, 605, 608, 708

Statistics, quantitative methods, and price analysis: 210, 410, 411, 412, 415, 416, 417, 710, 711, 712, 713, 714, 717

Business management, law, and accounting: 220, 221, 320, 321, 323, 324, 325, 326, 327, 328, 422, 424, 425, 426

Public policy: 430, 431, 433, 630, 633, 634, 730, 731, 735

Marketing and food distribution: 240, 340, 342, 346, 347, 443, 446, 447, 448, 449, 640, 641, 740

Environmental and resource economics: 250, 450, 451, 651, 652, 750, 751

Economics of development: 464, 665, 666, 667, 762, 763

General, contemporary issues, research, and other: 100, 380, 494, 497, 498, 499, 694, 698, 699, 700, 800, 900, 901

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 100 Economics for Business in a Global Economy
Fall. 3 credits. Priority given to CALS majors. Prerequisite: past or concurrent enrollment in Economics 101, or the equivalent, required. Lecs, M W F 11:15–12:05; labs M 12:20–1:10, 1:25–2:15, 2:30–3:20, 3:35–4:25, 7:30–8:20 p.m., or 8:35–9:25 p.m.; T 8:00–8:50, 9:05–9:55, 10:10–11:00, 11:15–12:05, 12:20–1:10, 1:25–2:15, 2:30–3:20, or 3:35–4:25. W. D. Schulze.
Understanding individual markets and the world economy is critical for business success. This course focuses on understanding economic theory useful for formulating business strategy, such as highly competitive markets, asset markets functioning, market power, government regulation, environmental policy, international trade, and macroeconomic policy. Students participate in eight laboratory market experiments.

ARME 210 Introductory Statistics
Fall. 4 credits. Prerequisite: EDUC 115 or equivalent level of algebra. Lecs, M W F 1:25–2:15; secs, T 10:10–12:05, 12:20–2:15 (2 secs), or 2:30–4:25 (2 secs); W 10:10–12:05, 2:30–4:25 (3 secs) or W 7:30–9:25 p.m.; or R 12:20–2:15 (2 secs) or 2:30–4:25 (2 secs). 2 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 220 Introduction to Business Management
Spring. 3 credits. Priority given to CALS majors. Lecs, M W F 10:10–11:00; secs, M 2:30–3:20; T 12:20–1:10 (2 secs), 1:25–2:15 (2 secs), 2:30–3:20, or 3:35–4:25; W 12:20-1:10 (2 secs), 1:25–2:15 (2 secs), 2:30-3:20, or 3:35–4:25; or R 12:20–1:10 (2 secs), 1:25–2:15 (2 secs), or 2:30–3:20. 2 evening prelims. J. M. Hagen.
This course provides an overview of management and business. Human resources, marketing, finance, and strategy concerns are addressed with consideration paid to current issues such as globalization, ethics, quality, and strategic alliances. Case studies and guest executives are an important part of the course.

ARME 221 Financial Accounting
Spring. 3 credits. Not open to freshmen. Priority given to CALS majors. Lecs, M F 11:15–12:05 or 12:20–1:10; sec, T 10:10–12:05 (2 secs), 12:20–2:15, or 2:30–4:25; W 10:10–12:05, 12:20–2:15 (2 secs), 2:30–4:25 (2 secs), or 7:30–9:25 p.m. (2 secs); or R 10:10–12:05, 12:20–2:15, or 2:30–4:25. 2 evening prelims and a comprehensive final, weekly homework assignments, and 1 written case study and one project using an electronic spreadsheet. J. S. Hopkins.
A comprehensive introduction to financial accounting concepts and techniques, intended to provide a basic understanding of the accounting cycle, elements of financial statements, underlying theory of GAAP, and statements interpretation. Elements examined include inventory, depreciation, internal control of assets, time value of money, notes, stocks, bonds, and the statement of cash flows. Limited use of a financial data base of publicly held companies; introduction to financial information on the World Wide Web.

ARME 240 Marketing
Fall. 3 credits. Priority given to CALS majors. Lecs, M W F 10:10–11; secs, M 2:30–3:20; T 12:20–1:10 (2 secs), 1:25–2:15 (2 secs), 2:30–3:20, or 3:35–4:25; W 12:20–1:10 (2 secs), 1:25–2:15 (2 secs), 2:30–3:20, or 3:35–4:25; or R 12:20–1:10 (2 secs), 1:25–2:15 (2 secs), 2:30–3:20, or 3:35–4:25. 5 discussion sections are held during the semester. M. G. Meloy.
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 consumer goods industries. The principles and concepts from this course 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 Environmental Economics
Spring. 3 credits. Lecs, T R 2:55–4:10. D. Chapman.
Concepts and methods used in the public and private analysis of environmental resources. Subjects include valuation, benefit-cost analysis, and ecological economics. 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 income, 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 9:05–9:55; 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 320 Business Law I
Fall. 3 credits. Limited to juniors, seniors, and graduate students. Lecs, M W F 9:05–9:55. 1 evening prelim. D. A. Grossman.
Consideration is given chiefly to legal problems of particular interest to persons who expect to engage in business. Emphasis is on the law pertaining to 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 or permission of instructor. Lecs, T R 8:40–9:55. 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, like employment discrimination, secured transactions, product liability, unfair competition, and international business law.

ARME 323 Managerial Accounting
Fall. 3 credits. Priority given to CALS majors. Prerequisite: ARME 221 or equivalent. Lecs, M W 12:20–1:10; secs, R 10:10–12:05, 12:20–2:15 (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, weekly homework, one written case study, and one project using an electronic spreadsheet. J. S. Hopkins.
An introduction to cost accounting that emphasizes the application of accounting concepts to managerial control and decision making. Major topics include product costing, standard costing, cost behavior, cost allocation, budgeting, inventory control, variance analysis, measuring divisional performance, and accounting systems in the manufacturing environment. Use of electronic spreadsheets is required.

ARME 324 Financial Management
Spring. 4 credits. Priority given to CALS majors. Prerequisite: ARME 220 or equivalent. Recommended: ARME 221 and 210 or equivalents. Lecs, M W F 9:05–9:55; secs, W 2:30–4:25 or R 10:10–12:05, 12:20–2:15, or 2:30–4:25, or F 10:10–12:05 or 12:20–2:15. 2 evening prelims. Staff.
Focuses on three major questions facing management: how to evaluate capital investment decisions, how to raise the capital to finance the firm, and how to generate sufficient cash flows to meet the firm's cash obligations. Major topics include methods to analyze 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.

ARME 325 Personal Enterprise and Small Business Management
Spring. 4 credits. Limited to juniors and seniors. Prerequisites: ARME 220 and 221 or permission of instructor. Absolutely no adds or drops after second class meeting. Term project work will amount to approximately $100 per team. Lecs, T R 12:20–1:10; sec, W 2:30–4:25. Two additional hours to be arranged. D. Streeter.
Course is focused on the activities involved in planning a start-up business, including the exploration of strategic dimensions, performance of marketing research, and planning of financial aspects related to the new company. Lectures and hands-on clinics include visits by real world entrepreneurs who discuss the start-up process and the challenges of managing growth in a small business. Term project is the development of a business plan, completed in teams no fewer than three.

ARME 326 Human Resource Management in Small Businesses
Fall. 3 credits. Prerequisite: ARME 220 or ARME 302 or equivalent. S-U grades optional. Lecs, T R 10:10–11:25 or 11:40–12:55. R. A. Milligan.
An introduction to the management of human resources in small businesses. The focus is on developing and utilizing all of the capabilities of all small business personnel including owners, family members, and employees. Topics include recruitment, selection, compensation, training, empowerment, team building, leadership, performance management, and conflict resolution. Student involvement and active learning experiences are emphasized.

ARME 327 Accounting for Entrepreneurs
Spring. 3 credits. This course is intended for non-ARME majors. Students may not receive credit for this course in addition to credit for ARME 221 and/or ARME 323. Lecs, T R 10:10–11:25; sec W 2:30–3:20 or R 1:25–2:15. M. J. Hubbert.
This course provides an introduction to the principles of accounting used by entrepreneurs who plan, direct, control, and make decisions about critical business activities in their companies. This course will provide future entrepreneurs with the requisite technical skills to accumulate, record, and communicate financial information about their businesses to internal and external parties of the firm. We will explore the principles of financial accounting (accounts receivable, inventory, fixed assets, liabilities, time value of money, investments, owners' equity) and managerial accounting (budgeting, product costing, inventory management, break-even analysis) as they apply to small businesses. Use of accounting software and the Internet will be required. This course is intended for students who have no prior accounting courses and who are preparing for an entrepreneurial career path.

ARME 328 Innovation and Dynamic Management (also Hotel Administration 418)
Spring. 3 credits. Limited to juniors and seniors. Lecs, T R 10:10–11:25. C. Enz.
For description, see H ADM 418.

ARME 340 Futures and Options Trading
Spring. 3 credits. Limited to juniors and seniors. Priority given to CALS juniors and seniors, then out of college seniors. Prerequisites: ECON 101, EDUC 115 and ARME 210 or equivalent. S-U grades optional. Lecs, T R 10:10–11:25. W. H. Lesser.
The focus of the course is on the use of futures and options as risk management tools. Commodities, exchange rate, and interest rate derivatives are covered from the perspective of the hedger, but those interested in arbitrage and speculation will get some insights as well. Students will participate in a simulated trading exercise in which they will use 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; secs, R 12:20–2:15 (2 secs) or 2:30–4:25 (2 secs); F 10:10–12:05 (2 secs), or 12:20–2:15 (2 secs). In weeks that secs are held, there will be no F lecture. R. D. Christy.
Deals with the central link between marketing at the societal level and everyday consumption by the general public. As such, this course emphasizes the management aspects of marketing by considering consumer behavior, strategies in product and brand selection, pricing, promotion, sales forecasting, and channel selection. Identification and generation of economic data necessary for marketing decisions are considered. Public policy and ethical dimensions of marketing are examined.

ARME 346 Dairy Markets and Policy
Spring, weeks 1–7. 1 credit. Limited to juniors and seniors. Prerequisites: ECON 101 or equivalent. S-U grades optional. Lecs, R 2:30–4:25. M. Stephenson.
An introduction to dairy markets and policy. Major topics include: milk pricing, marketing channels, dairy trends and demographics, world trade for dairy products, and policy issues. Class participation is expected as topics and new ideas are explored.

ARME 347 Strategic Marketing for Horticultural Firms
Spring. 1 credit. Prerequisite: ARME 240. Lec, M 12:20–1:10. G. B. White.
This course will emphasize applications in strategic marketing. Lectures focus on practical aspects of the planning, implementation, and control phases of the strategic marketing process. Students will develop a long-range marketing plan for a fruit, vegetable, greenhouse, nursery, or related horticultural firm.

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 undergrad program office in Warren Hall.

ARME 402 Seminar in Farm Business Planning and Managerial Problem Solving
Fall. 3 credits. 4 half-day field trips. One all-day field trip. On days field trips are taken, class ends at 6:00. Prerequisite: ARME 302 or equivalent. Lecs, T R 12:20–1:10; sec, R 1:25–4:25. G. J. Conneman.
A capstone seminar/workshop designed for juniors and seniors who plan to return to the family business or home farm or to take positions in banking, credit, or agribusiness, as well as those who wish to establish entrepreneurial businesses. The objective of the course is to pull together interdisciplinary knowledge and apply it in a problem-solving/critical-thinking management context. Topics include managerial analysis and strategic planning, human resource management, and business and family arrangements.

ARME 403 Farm Management Study Trip
Spring. 1 credit. Prerequisite: ARME 302. Open by application only. Secs, 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 meets in advance 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 course work in farm management and farm finance. Open by application prior to March 1 of the year before the course is offered. W 2:30–4:25. E. L. LaDue.
A special program in agricultural finance, conducted with financial support from the Farm Credit System. Includes two days at Northeast Farm Credit offices, one week in Farm Credit Association offices, a one-day program on FSA financing during fall term, a two- to four-day trip to financial institutions in New York City, and an actual farm consulting and credit analysis experience in the spring term.

ARME 405 Farm Finance
Spring. 4 credits. Prerequisite: ARME 302 or equivalent. Lecs, M W F 9:05–9:55; sec, T 2:30–4:25. 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. Lec, R 11:15–12:05; sec R 1:25–4:25. Five half-day field trips, 1 all-day field trip. On days field trips are taken, class ends at 6:00. 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 410 Business Statistics
Spring. 3 credits. Prerequisite: ARME 210 or equivalent. Lecs, M W F 11:15–12:05. Two evening prelims. C. van Es.
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. A brief introduction to non-parametric methods is also included. 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 210 and either ECON 313 or PAM 200, or equivalents. Lecs, T R 10:10–11:25. C. B. Barrett.
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 are discussed and simultaneous equation models, simulation, and forecasting techniques are introduced.

ARME 412 Introduction to Mathematical Programming
Spring. 3 credits. Primarily for juniors, seniors, and M.S. degree candidates. Prerequisite: ARME 210 or equivalent. Lecs, T R 9:05–9:55; sec, R 12:20–2:15. H. M. Kaiser.
This is a course in applied linear programming. The emphasis will be on formulation, specification, and interpretation of solutions to mathematical models of economic problems. Standard LP problems such as cost minimization, blending, resource allocation, capital budgeting, product mix, transportation and financial planning, inventory management, etc., will be studied. Integer and nonlinear programming will be introduced if time permits.

ARME 415 Price Analysis (also Economics 415)
Fall. 3 credits. Prerequisites: ARME 210 or equivalent. ECON 313 or PAM 200 or equivalent. Lecs, M W F 9:05–9:55. H. M. Kaiser.
The focus of this course is on the analysis of supply and demand characteristics of commodities with particular attention to agricultural products. Special attention is paid to empirical analysis. Institutional aspects of pricing, temporal and spatial price relationships, price forecasting, and the economic consequences of pricing decisions are included.

ARME 416 Demographic Analysis in Business and Government (also Rural Sociology 331)
Fall. 3 credits. S-U with permission of instructor. Prerequisite: RSOC 213 or a statistics course. Lecs, W F 1:25–2:15; sec, M 1:25–2:15 or 2:30–3:20. W. Brown.
For description, see RSOC 331.

ARME 417 Decision Models for Small and Large Businesses
Spring. 3 credits. Limited to juniors and seniors. Preference given to ARME majors. Prerequisites: ARME 210 or equivalent. Lecs, M W 2:30–3:20; lab W 7:30–9:25 or R 12:20–2:15 or R 2:30–4:25. C. L. van Es.
The course is focused on economic and statistical models of decision analysis and their application in large and small business settings. The course will demonstrate how use of models can improve the decision-making process by helping the decision-maker: understand the structure of the decision, incorporate subjective probabilities as a way to portray risk, measure outcomes in a way that is consistent with attitudes toward risk, and understand the value of information. The importance of sensitivity analysis will be emphasized, as well as the need to combine both quantitative and qualitative considerations in decision-making. Cases will be drawn from small business scenarios, the public policy arena, and

corporate settings. Implementing decision models with computers will be the focus of lab sessions.

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 substitutes for probate procedures are covered.

ARME 424 Stategic Management
Fall. 3 credits. Limited to seniors majoring in business management and marketing. T R 8:40–9:55, 10:10–11:25 or 1:25–2:40. B. L. Anderson.
This is a capstone course designed to integrate what students have learned in other ARME courses with an emphasis on strategic decisions. Issues will be approached from the standpoint of the board of directors, chief executive officer, or business unit manager. What should be considered and how strategic decisions should be made are the focus of the course. While the primary focus is on public corporations, not-for-profits, cooperatives, and small business strategic decisions will also be included. The course is built around several high-level guest executives and a series of case studies. Improving oral and written communication skills in a business context is emphasized.

ARME 425 Small Business Management Workshop
Fall. 4 credits. Limited to seniors. Prerequisite: ARME 325 or NBA 300 and permission of instructor. Term project work will amount to approximately $100 per team. Lecs, M W 2:30–4:25. 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 the results of 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 or equivalent. Estimated cost of field trip, $60. 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. Issues are approached from the point of view of management, the board of directors, and members. Topics include characteristics of various types of business organizations, cooperative principles, legislation, taxation, as well as the unique nature of corporate strategies, management, financing, and marketing in cooperative, membership, and not-for-profit organizations. Primary focus is on operating cooperatives in agriculture, although alternative types of cooperative organizations are discussed, such as: credit unions, insurance cooperatives, employee stock ownership plans, housing cooperatives, flexible manufacturing networks, consumer cooperatives, and membership organizations.

ARME 430 International Trade Policy (also ECON 263)
Spring. 3 credits. Prerequisites: ECON 101–102 or equivalents and intermediate microeconomics. Lecs, T R 1:25–2:40. Optional section to be arranged. N. H. Chau.
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 trade policy, to trade in primary commodities, and to both developed and developing countries are also emphasized.

ARME 431 Food and Agricultural Policies
Spring. 3 credits. Prerequisite: intermediate microeconomics. Lecs, T R 11:40–12:55; sec, R 2:30–3:20 or 3:35–4:25. H. de Gorter.
The course deals broadly with food and agricultural policies, including price support and storage or reserve policies, agricultural protection, soil conservation programs, the structure of agriculture, domestic food subsidy programs, environmental issues, and food safety. The importance of international trade and agricultural policies in other countries is emphasized.

ARME 433 Devolution and Public Sector Restructuring (also City and Regional Planning 412)
Fall. 3 credits. S-U grades optional. Lec, T 10:10–12:35. M. E. Warner.
For description, see CRP 412.

ARME 443 Food-Industry Management
Fall. 4 credits. Limited to juniors and seniors. Prerequisite: ARME 448 or 342 or permission of instructor. Lecs, T R 11:40–12:55; sec T 2:55–4:10. 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 afternoon section.

ARME 446 Food Marketing Colloquium
Fall. 1 credit. Limited to juniors and seniors with extensive course work in food industry management and marketing. Permission of the instructor. S–U grades only. R 3:35–4:25. D. J. Perosio.
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. Students will participate in research topics on various aspects of the food industry.

ARME 447 Food Marketing Colloquium
Spring. 1 credit. Limited to juniors and seniors with extensive course work in food industry management and marketing. Permission of instructor. S–U grades only. R 3:35–4:25. D. J. Perosio.
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. Students will participate in 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 10:10–11:25. D. J. Perosio.
Merchandising principles and practices as they apply to food industry situations. The various elements of merchandising such as buying, pricing, advertising, promotion, display, store layout, profit planning and control, and merchandising strategy are examined in this course. The consequences of food industry trends and initiatives for other industry members, public policymakers, and consumers are considered.

ARME 449 Global Marketing Strategy
Spring. 3 credits. Prerequisite: previous marketing course. Limited to seniors and graduate students. M W 2:55–4:10. J. M. Hagen.
This course examines opportunities and challenges in the rapidly changing global marketplace. Topics include the decision to serve a foreign market, alternative strategies for entry into foreign markets (such as exporting or establishing a local subsidiary), and issues in implementing those strategies. The course includes case analysis and discussion.

ARME 450 Resource Economics (also Economics 450)
Fall. 3 credits. Prerequisites: MATH 111, ECON 313, and a familiarity with EXCEL. 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 451 Environmental Economics and Policy (also Economics 409)
Spring. 3 credits. Prerequisites: ECON 313, or intermediate microeconomics course, and calculus. Limited to undergraduate students. S-U grades optional. Lecs, M W 2:55–4:10. G. L. Poe.
This course explores the economic foundations for public decision making about environmental commodities and natural resources, using tools from intermediate microeconomics. Emphasis will be placed on the two leading economic paradigms of allocating public goods: the conventional economic approach, with specific emphasis on market failure, externalities, benefit-cost analysis, and the use of non-market valuation techniques; and a property rights/institutional perspective. Ecological economic concepts will also be examined.

ARME 464 Economics of Agricultural Development (also Economics 464)
Spring. 3 credits. Prerequisites: ECON 101–102, or permission of instructor. Lecs, T R 11:40–12:55. R. D. Christy.
This course is designed to provide an understanding of the economics of the agricultural sector in low-income countries. In addition, more general issues of economic development beyond the agricultural sector will be covered in order to provide the necessary context for an understanding of rural problems. Among the areas covered are the nature of development and technical change, welfare and income distribution, land

reform, food and nutrition policy, food security and food aid, competition with more developed countries and international markets, the effect of U.S. policy on agricultural development, and the role of international institutions. Examples from a wide variety of developing countries will be used to illustrate the basis for economic analysis.

ARME 494 Undergraduate Special Topics in Agricultural, Resource, and Managerial Economics
Fall or spring. 4 credits maximum. S-U grades optional. Staff.
The department teaches "trial" courses under this number. Offerings vary by semester, and will be advertised by the department.

ARME 497 Individual Study in Agricultural, Resource, and Managerial Economics
Fall or spring. Variable credit. S-U grades optional. Students must register with an Independent Study form (available in 154 Warren Hall). Staff.
To be used for special projects designed by faculty members.

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 154 Warren 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 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 499 Undergraduate Research
Fall, spring, or summer. 1–4 credits. Limited to students with grade-point averages of at least 2.7. Students must register with an Independent Study form (available in 154 Warren 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. $35 charge for reading materials; no text. T R 8:40–9:55. Offered alternate years. Not offered fall 1999 and fall 2001; next offered fall 2000.
E. L. LaDue.
Advanced topics in capital management and financing of agriculture. Special emphasis on current issues. Example topics: farm-sector funds flows, financial risk and decision analysis, agricultural finance policy, financial intermediation and intermediaries, firm growth, inflation, loan evaluation, and selected topics on financing agriculture in developing countries.]

ARME 608 Production Economics (also Economics 408)
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 and natural resources. Topics include the derivation, estimation, and use of production, cost, profit, demand, and supply functions. Production response over time and under risk is introduced.

ARME 630 Policy Analysis: Welfare Theory, Agriculture, and Trade (also Economics 430)
Spring. 4 credits. Prerequisites: ARME 608 or CE&H 603, ECON 313, or equivalent intermediate micro theory incorporating calculus. Lecs, T R 1:25–2:40.
H. de Gorter.
The first half of the course surveys the theory of welfare economics as a foundation for public policy analysis. Major issues addressed include the problem of social welfare measurement, the choice of welfare criteria, and the choice of market or nonmarket allocation. Basic concepts covered include measurement of welfare change, including the compensation principle, consumer and producer surplus, willingness-to-pay measures, externalities, and the general theory of second-best optima. The second half of the course focuses on public policy analysis as applied to domestic agricultural policy and international trade. The domestic policy component examines major U.S. farm commodity programs and related food and macroeconomic policies and analyzes their effects on producers, consumers, and other groups. The international trade component examines the structure of world agricultural trade, analytical concepts of trade policy analysis, and the principal trade policies employed by countries in international markets.

ARME 633 Devolution and Public Sector Restructuring (also City and Regional Planning 612)
Fall. 3 credits. S-U grades optional. Lec, T 10:10–12:35. M. E. Warner.
For description, see CRP 612.

ARME 634 Local Government Restructuring in New York State (also City and Regional Planning 618)
Spring. 4 credits. Prerequisite: ARME 633. S-U grades optional. Lec, F 9:05–12:05. M. E. Warner.
For description, see CRP 618.

ARME 640 Analysis of Agricultural Markets (also Economics 440)
Fall, weeks 1–7 (ends Oct. 15). 2 credits. Prerequisites: ARME 411 and 415 or equivalents. Lecs, M W F 8:40–9:55.
W. G. Tomek.
This course is about agricultural product markets. Focus is placed on their distinguishing characteristics, criteria for evaluating performance and models of price behavior including marketing margins.

ARME 641 Commodity Futures Markets (also Economics 441)
Fall, weeks 8–14 (starts Oct. 18). 2 credits. Prerequisites: ARME 411 and 415 or equivalents. Recommended: ARME 640. Lecs, M W F 8:40–9:55. W. G. Tomek.
This course is primarily about markets for agricultural futures contracts. Emphasis is placed on models of price behavior on futures markets including relationships among cash and futures prices. These principles provide a foundation for a discussion of hedging, speculation, and public-policy issues.

ARME 651 Environmental and Resource Economics
Spring. 4 credits. Limited to graduate students. Lecs, T R 10:10–11:25.
W. D. Schulze.
A review of welfare economics, environmental externalities, and common property resources, and a survey of current environmental and natural resource policy. Techniques for measuring benefits and cost—including property value and wage hedonic approaches, travel cost models and contingent valuation—are covered. Survey/data collection methods are described in detail. Explore innovative market mechanisms for resolving public good, common property, and externality problems. Students will be required to complete a paper describing their own formal economic analysis of a natural resource or environmental problem. Open to graduate students outside of economics. ARME 651 is a core course for the Environmental Management concentration/option.

ARME 652 Land Economics Problems (co-listed with Civil and Environmental Engineering 529)
Fall or spring. 1 or more credits. Limited to graduate students. Prerequisite: permission of instructor. S-U grades optional. W 7:30–9:25 p.m. D. J. Allee.
Special work on any subject in the field of land and resource economics.

ARME 665 Food and Nutrition Policy (also Nutritional Sciences 685)
Spring. 3 credits. Prerequisites: introductory microeconomics and intermediate statistics (i.e. through multiple regression), or permission of instructor. S-U grades optional. Lecs, M W 2:55–4:10. D. Sahn.
For description, see NS 685.

ARME 666 Economics of Development (also Economics 466)
Spring. 3 credits. Prerequisites: ECON 313 and 314 or permission of instructor. S-U grades optional. Lecs, T R 11:40–12:55. S. C. Kyle.
The course is designed as an introduction to the economics of development at the graduate level. The course will be split into two major sections, the first dealing with the microeconomics of households in developing countries and the second covering macroeconomic strategy and performance. A principal goal will be to illuminate the particular features of low-income countries which are important to economic analysis and policy. Special attention will be given to issues facing countries with important agricultural and resource sectors.

[ARME 667 Topics in Economic Development (also Economics 770)
Fall. 3 credits. Prerequisite: basic first-year courses in ECON or ARME, or instructor's permission. S-U grades optional. Lecs, T R 1:25–2:40. Not offered fall 1999. R. Kanbur.
This course is targeted to second-year graduate students. Topics covered will vary from year to year but may include: poverty, inequality, intra-household allocation, structural adjustment, debt. Examination will be by term paper.]

ARME 694 Graduate Special Topics in Agricultural, Resource, and Managerial Economics
Fall or spring. 4 credits maximum. S-U grades optional. Staff.
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 154 Warren Hall). Open only to graduate students. Undergraduates should enroll in ARME 498. S-U grades optional. Prerequisite: permission of instructor. Staff.
Designed to give graduate students teaching experience through involvement in planning and teaching courses under the supervision of departmental faculty members. The experience may include leading discussion sections, preparing, assisting in, or teaching lectures and laboratories, and tutoring. 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. S-U grades optional. 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 609 is highly recommended. Offered alternate years. Offered fall 1999 and 2001. Not offered fall 2000. Hours to be arranged. R. N. Boisvert.
Theoretical and mathematical developments in production economics, with emphasis on estimating production relationships, scale economies, technical change, factor substitution. Developments 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 interest.

ARME 710 Econometrics I
Spring. 4 credits. Prerequisites: matrix algebra and statistics at the level of BTRY 417 and 601 (BTRY 409 or ECON 619 preferred). Undergraduates must have permission of instructor. Lecs, M W F 8:40–9:55. W. G. Tomek.
This intermediate-level course covers selected statistical models and associated estimators used in econometrics; dynamic and other stochastic regressor models, seemingly unrelated regression and simultaneous equation models, and models with nonspherical error terms and specification errors. 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, M W 10:10–12:05. T. D. Mount.
Coverage 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 F 8:40–9:55. R. N. Boisvert.
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
Spring. 3 credits. Prerequisite: ECON 609. S-U only. Lecs, M W F 9:05–9:55. J. M. Conrad.
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 optimization and numerical 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 714 Experimental Economics
Fall. 4 credits. Prerequisite: ECON 609. Offered alternate years. Offered fall 1999 and 2001. Not offered fall 2000. Lecs to be arranged. W. D. Schulze.
The course will survey both experimental economics methods and research as an approach to test economic theory. Students will participate as subjects in a series of illustrative computerized experiments ranging from double auctions to public goods provision. Topics covered include experimental methods; decisions and games; markets (testing auction institutions); market power (monopoly, oligopoly); bargaining, compensation and performance; public goods; externalities, and voting; information and uncertainty; and economic anomalies. Students must design and write a paper describing their own experiment.

ARME 717 Research Methods in Agricultural Economics
Spring. 2 credits. Limited to graduate students. M 2:30–4:25. R. N. Boisvert.
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 International Trade Policy: Agriculture, Resources and Development
Spring. 3 credits. Limited to graduate students. Prerequisites: ARME 630 or equivalent. Offered alternate years. Offered spring 2000 and 2002. Not offered spring 2001. Hours to be arranged. D. R. Lee.
This course examines selected topics in the professional literature on international trade policy, focusing on agricultural trade and related topics, including trade liberalization, trade and environmental linkages, technological change and trade policy, and agricultural trade and development.

[ARME 731 Seminar on the Political Economy of Agriculture and Trade
Fall. 3 credits. Limited to graduate students. Offered alternate years. Not offered fall 1999 and 2001. Next offered fall 2000. T R 11:40–12:55. H. de Gorter.
A review of the professional literature relating to agricultural policy issues and techniques appropriate to the analysis of such issues.]

[ARME 735 Public Finance: Resource Allocation and Fiscal Policy (also Economics 735)
Fall. 4 credits. Not offered fall 1999. Time to be arranged. R. Kanbur.
For description, see ECON 735.]

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.
Develops the concepts and methodology for applying and analyzing the effects of public-policy directives to the improvement of performance in the U.S. food marketing system. Prospective topics include a survey of industrial organization principles, antitrust and other legal controls, and coordination systems in agriculture. Topics can be adjusted to students' interests.

ARME 750 Resource Economics
Fall. 3 credits. Prerequisites: ECON 609 and 618, or ARME 713. Lecs, M W F 9:05–9:55. 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
Spring. 4 credits. Prerequisites: ECON 609 and 618, or ARME 713. S-U grades optional. Hours to be arranged. R. N. Boisvert and L. D. Chapman.
Economic theory will be applied to the problems of managing environmental quality. Static and dynamic models of externality, decisions to preserve or develop natural environments, and methods of valuation will be presented.

ARME 762 Microeconomics of International Development
Fall. 3 credits. Prerequisite: completion of first year Ph.D. course sequence in ARME or ECON, or instructor's permission. S-U grades optional. Lecs, T R 10:10–11:25. C. B. Barrett.

This course focuses on models of individual, household, firm/farm, and market behavior in low- and middle-income developing economies. Topics covered include agricultural land, labor and financial institutions, technology adoption, food security and nutrition, risk management, intra-household analysis, reciprocity networks, and product/factor markets analysis. Empirical investigation is emphasized.

[ARME 763 Macro Policy in Developing Countries
Spring. 3 credits. Prerequisites: ECON 609, 610, 613 (may be taken concurrently), or permission of instructor. Offered alternate years. Not offered spring 2000; next offered spring 2001. Lec, T 2–4:25. S. C. Kyle.
This course examines macroeconomic policies in developing countries and their interaction with economic growth, development, and stability. Theoretical models useful for analysis of macro policies will be covered as well as an examination of empirical studies. Emphasis will be on research topics of current interest to students and professionals in the field, particularly those relating to the interaction of macro policy with micro and sectoral analysis.]

ARME 800 Master's-Level Thesis Research
Fall or spring. 1–9 credits. Prerequisite: permission of graduate committee chair. S-U grades only. Graduate faculty.
For students admitted specifically to a master's program.

ARME 900 Graduate-Level Thesis Research
Fall or spring. 1–9 credits. Prerequisite: permission of graduate committee chair. S-U grades only. Graduate faculty.
For students in a Ph.D. program *only before* the "A" exam has been passed.

ARME 901 Doctoral-Level Thesis Research
Fall or spring. 1–9 credits. Prerequisite: permission of graduate committee chair. S-U grades only. Graduate faculty.
For students admitted to candidacy after the "A" exam has been passed.

ANIMAL SCIENCE

A. W. Bell, chair; R. E. Austic, D. E. Bauman, D. H. Beermann, R. W. Blake, Y. R. Boisclair, D. L. Brown, W. R. Butler, L. E. Chase, G. F. Combs, W. B. Currie, H. N. Erb, R. W. Everett, D. G. Fox, D. M. Galton, R. C. Gorewit, H. F. Hintz, P. A. Johnson, K. Keshavarz, X. G. Lei, E. A. Oltenacu, P. A. Oltenacu, T. R. Overton, J. E. Parks, A. N. Pell, R. E. Pitt, E. J. Pollak, R. L. Quaas, S. M. Quirk, R. D. Smith, M. L. Thonney, M. E. Van Amburgh

AN SC 100 Domestic Animal Biology I
Fall. 4 credits. S-U grades optional. Lecs, M W F 9:05; sec, T W or R 2–4:25. W. B. Currie, M. L. Thonney, and staff.
An introduction to the science of raising animals in the context of commercial animal production. Lectures and labs address the biology of economically important species (morphology, anatomy, and physiology) and application of the biology to the management of animals within major livestock industries. Topics covered include fundamentals of anatomy, regulatory mechanisms, vital systems, digestion, and metabolism. Students care for small numbers of cattle, sheep, pigs, and chickens in different phases of their life cycle to maximize hands-on contact. Living animals will be used noninvasively, and fresh organs and tissues from dead animals will be used in laboratories.

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

AN SC 120 Animal Domestication and Behavior
Fall. 3 credits. T R 8:40–9:55. E. A. Oltenacu.
This Freshman Writing Seminar will explore the relationship between humans and their domestic animals. Students will study the role of animal behavior in the domestication process, both historically and in modern attempts to domesticate new species, and in finding solutions to current issues related to animal welfare.

AN SC 150 Domestic Animal Biology II
Spring. 4 credits. S-U grades optional. Lec, 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 208 or equivalent. Recommended: AN SC 100 and 150. Lecs, M W F 10:10; lab, M T W R or F 1:25–4:25. A. W. Bell and D. J. R. Cherney.
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 and performance; 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 the Dog
Spring, weeks 1–7. 1 credit. Prerequisite: AN SC 212 or equivalent. Offered alternate years. Next offered spring 2001; not offered spring 2000, 2002. Lecs W 7:30–9:25 p.m. H. F. Hintz.
Nutrition of the dog. Digestive physiology, nutrient requirements, feeding practices, and interactions of nutrition and disease.]

AN SC 214 Nutrition of Exotic Animals
Spring, weeks 1–7. 1 credit. Prerequisite: AN SC 212. Offered alternate years. Next offered spring 2000, 2002; not offered spring 2001. Lec, W 7:30–9:25 p.m. H. F. Hintz.
Principles of nutrition for exotic animals. 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 psittacines (parrots and related species) and raptors (birds of prey). Lectures, demonstrations, and local field trips.

[AN SC 216 Nutrition of the Cat
Fall, weeks 1–7. 1 credit. Prerequisite: AN SC 212 or equivalent. Offered alternate years. Next offered fall 2000; not offered fall 1999, 2001. Lecs, W 7:30–9:25 p.m. H. F. Hintz.
Nutrition of the cat. Digestive physiology, nutrient requirements, feeding practices, and interactions of nutrition and disease.]

AN SC 221 Introductory Animal Genetics
Spring. 3 credits. Prerequisite: a year of college biology. Lecs, T R 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 250 Dairy Cattle Principles
Fall. 3 credits. S-U grade optional. Lecs, T R 10:10; lab, T 1:25–4:25. D. M. Galton and T. Batchelder.
Introduction to the background and scientific principles relating to dairy cattle production. Laboratories are designed to provide an understanding of production techniques. This course is a prerequisite for AN SC 251, 351 and AN SC 355.

AN SC 251 Dairy Cattle Selection
Fall. 2 credits. Prerequisite: AN SC 250 or equivalent. S-U grades optional. Lec, W 1:25–2:15; disc, W 2:15–4:25. D. M. Galton.
Application of scientific principles of genetic programs in herds with different breeding programs. Emphasis on economical traits to be used to improve genetic progress and herd profitability.

AN SC 265 Horses
Fall. 3 credits. Prerequisites: AN SC 100 and 150 or permission of instructor. S-U grades optional. Lecs, T R 9:05; lab, R 1:25–4:25. C. Collyer.
Selection, management, feeding, breeding, and training of light horses.

AN SC 280 Molecular Biology in Agriculture and Medicine
Fall. 2 credits. Prerequisite: one year of introductory biology. Lec, T R 10:10. S. M. Quirk.
The applications of molecular biology to animal research, animal agriculture, industry and medicine are discussed. An introduction of basic recombinant DNA techniques is followed by topics such as transgenic animal production, mammalian cloning, genome projects, gene therapy and genetic screening. Ethical issues raised by use of these techniques will be discussed.

AN SC 290 Meat Science (also Food Science 290)
Fall. 2 or 3 credits. Lecs, T R 11:15; lab, M or R 12:20–3:20. Lecture only, 2 credits; lecture plus lab, 3 credits; lab cannot be taken without lecture. Staff.

An introduction to meat science through a study of the structure, composition, and function of muscle and its conversion to meat. Properties of fresh and processed meat, microbiology, preservation, nutritive value, inspection, and sanitation are also studied. Laboratory exercises include 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 plant 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 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 in some demonstrations. Dissection and examination of tissues from vertebrate animals will be included in selected laboratories.

AN SC 305 Farm Animal Behavior (also BIOAP 312)
Spring. 2 credits. Prerequisites: introductory course 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. Oltenacu and K. A. Houpt.
The behavior of production species (avian and mammalian) influences the success of any management program. Students study behaviors relating to communication, learning, social interactions, reproduction, and feeding 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 314 Practice in Critical Thinking in the Biological Sciences
Fall. 1 credit. M 12:20. A. van Tienhoven.
The course will consist of four or five presentations by the instructor of the "scientific method." Each week the students will critically review a published paper in the biological sciences as if it were a manuscript and submit their typed review. Each week, a different student will be designated to collate these reviews and write an evaluation to the "editor-in-chief." This evaluation will be reported verbally and in writing. Students thus will learn to think, write and to speak critically. Enrollment is limited to 10 juniors and seniors. Preference will be given to transfer students.

AN SC 321 Applied Animal Genetics Seminar
Fall. 2 credits. Prerequisite: AN SC 221 or equivalent. S-U grades only. Lec, M 12:20; disc M 1:25. P. A. Oltenacu and E. J. Pollak.
Topics of interest related to the genetic definition and control of qualitative and quantitative traits in various species of animals are presented. Genetic conservation programs and 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
Fall. 1 credit. Prerequisite: concurrent registration in AN SC 321 or instructor's permission. S-U grades only. M 2:30–4:25. P. A. Oltenacu and E. J. Pollak.
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 323 Equine Genetics Seminar
Fall. 1 credit. Prerequisite: AN SC 221 or equivalent. S-U grades only. Disc, T 1:25-2:15. P. A. Oltenacu and staff.
Topics of equine genetics will be presented and discussed. Independent library research, a short written paper, and an oral presentation will be important parts of this course. Lecture topics may include the genetic aspects of color, abnormalities, metabolic diseases, unsoundness, and performance.

AN SC 330 Poultry Biology, Nutrition, and Management
Spring. 2 credits. Prerequisites: AN SC 100 and 150 or permission of instructor. Offered alternate years. Next offered spring 2000, 2002; not offered spring 2001. Lec, F 2–4 (occasional field trips run past 4 p.m.). K. Keshavarz.
The course focuses on anatomy and physiology of various organs of poultry. Principles of poultry nutrition, breeding and embryology are discussed with an emphasis on their practical application. The student becomes familiar with the concept of least-cost feed formulation for poultry. The course also is designed to provide an understanding of current technology involved in commercial poultry production.

AN SC 341 Biology of Lactation
Spring. 2 credits. Prerequisite: AN SC 100–150 or Animal Physiology. Offered alternate years. Next offered spring 2000, 2002; not offered spring 2001. Lecs, T R 9:05. Y. R. Boisclair and staff.
A comprehensive survey of the biology of the mammary gland. Lectures cover: 1) basic aspects such as anatomy and development of the mammary gland, biochemistry and hormone regulation of milk synthesis and regulation of gene expression in the mammary cells; 2) practical aspects such as the impact of lactation on nutrition, reproduction, and diseases. Lactation in the dairy cow provides the primary context to the course, but examples from other mammals including humans will be used.

AN SC 351 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 1:25–4:25, and F (alternate weeks) 1:25–4:25. D. M. Galton and T. L. Batchelder.
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 355 Dairy Nutrition and Health
Spring. 3 credits. Prerequisite: AN SC 250 and permission of instructor. Letter only. Lecs, T R 9:05; lab, W 1:25–4:25. D. M. Galton, L. E. Chase and T. L. Batchelder.
Application of scientific principles to practical herd management with components of nutrition and herd health. Laboratories emphasize practical applications, analyses of alternatives, decision making, field trips, and discussion.

AN SC 360 Beef Cattle
Spring. 3 credits. Lec, T R 10:10; sec, W 2:00–4:25. Offered alternate years. Next offered spring 2000, 2002; not offered spring 2001. M. L. Thonney.
Emphasis is on the management of reproduction, nutrition, and selection in beef cattle enterprises. A cattle growth model is studied. Laboratories acquaint students with management skills through computerized simulations and working directly with cattle. Students spend several days during the semester feeding and caring for cows and their newborn calves.

AN SC 365 Equine Nutrition
Fall. 3 credits. Prerequisites: AN SC 100, 212, and 265 or equivalent. S-U grades optional. Lec, M W F 9:05–9:55. H. F. Hintz.
The principles of nutrition for horses will be presented. Digestive physiology, sources of nutrients, feeding programs for various classes of horses and interactions of nutrition and diseases will be discussed.

[AN SC 370 Swine Nutrition and Management
Fall. 3 credits. Recommended: AN SC 212. Lec, T R 11:15; lab, T 2–4:25. Offered alternate years. Next offered fall 2000; not offered fall 1999, 2001. X. G. Lei and K. Roneker.
This course focuses on swine nutrition, feeding, and management. Lectures are integrated basic nutrition and swine system including pig biology, digestive and metabolic development, nutritional biochemistry and physiology, impact of swine nutrition on environment, use of pig model in medicine, and current swine nutrition and biotechnology. Laboratory practice, animal projects, and problem troubleshooting are offered.]

[AN SC 380 Sheep
Spring. 3 credits. Lec, T R 10:10; sec, W 2:00–4:25. Offered alternate years. Next offered spring 2001; not offered spring 2000, 2002. M. L. Thonney.
Emphasis is on 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 management practices. Students work directly with sheep during laboratories and spend several days during the semester feeding and caring for ewes and their newborn lambs.]

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 or equivalent. Lec, R 1:25–3:20; sec, F 1:25–2:15. 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.

AN SC 400 Tropical Livestock Production
Spring. 3 credits. Prerequisite: upperclass standing. Lecs, T R 9:05; disc W 1:25–3:20. R. W. Blake.
An analysis of constraints on livestock production in developing countries of the tropics, economic objectives and risk, and production methods. Emphasis is on strategic use of animal and plant resources, animal performance with inputs restricted, decision making, and alternative systems of production. Principles, real examples, independent study projects, and classroom interactions will aid problem-solving efforts to improve food security.

AN SC 401 Dairy Production Seminar
Spring. 1 credit. Limited to juniors and seniors. Disc, M 7:30 p.m. D. E. Bauman and T. R. Overton.
Capstone course where students, with the help of faculty members, complete a study of the research literature on topics of current interest in the dairy industry. Students then make an oral and a written report on their topic with emphasis on integrating theory and practice.

AN SC 402 Seminar in Animal Sciences
Spring. 1 credit. Limited to juniors and seniors. May be repeated. S-U grades optional. Lec, M 4:30. W. B. Currie.
Review of literature pertinent to topics of animal science or reports of undergraduate research and Honors projects. Students present oral reports of their work for class discussion in addition to written reports.

[AN SC 403 Tropical Forages
Spring. 2 credits. Limited to seniors and graduate students except by permission of instructor. Prerequisites: crop production and livestock nutrition. Offered alternate years. Next offered spring 2001; not offered spring 2000, 2002. Lecs, T R 10:10. A. N. Pell.
An overview of tropical grasslands, seeded pastures, and crop residues as feed resources; grass and legume characteristics; establishment and management of pastures; determination of feeding value of forages and crop residues; physiology of digestion of ruminants that affects feeding behavior; problems of chemical inhibitors in plants; and preservation of tropical forages as hay or silage.]

AN SC 410 Nutritional Physiology and Metabolism
Fall. 3 credits. Prerequisites: biochemistry and physiology. M W F 11:15. R. E. Austic and D. E. Bauman.
A fundamental approach to nutrition focusing on the metabolic fate of nutrients and the interrelationships among nutrients, nutritional state, and metabolic processes. The overall goal is to increase understanding of metabolism and metabolic regulation through an integration of nutrition, biochemistry, and physiology.

AN SC 411 Applied Cattle Nutrition
Fall. 4 credits. Prerequisites: AN SC 100 and 212 (or equivalent); AN SC 355 is encouraged. Lecs, M W F 10:10; lab, M 1:25–4:25. M. E. Van Amburgh.
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 (Cornell Net Carbohydrate and Protein System) are used in the laboratory to apply the information presented in lectures, including evaluation of feeding programs on case study farms. Course is designed for juniors, seniors, and entering graduate students.

AN SC 412 Livestock and the Environment
Spring. 2 or 4 credits. No prerequisite for 2 credits (weeks 1–7). Students who have taken AN SC 411 (formerly 312) can sign up for 4 credits (full semester) for completing an independent project on whole-farm environmental planning. Lec, T R 11:15–12:05. D. G. Fox.
This course will explore controversial issues surrounding livestock and the environment, including competition with humans for food resources, impact of animal products on human health, and impact of livestock farms on environmental/community problems, including odor, pathogens, and excess nutrient effects on water quality. Those taking 2 additional credits will use computer software tools to evaluate aspects of whole-farm nutrient and environmental management on case study farms, with data collection and analysis continuing throughout the semester.

AN SC 414 Ethics and Animal Science
Fall. 2 credits. Enrollment limited to 20 students, juniors and seniors only. Lec, M 12:20; disc, W 12:20–1:10. One Saturday morning, required farm tour 9 a.m.–1 p.m., Saturday, September 4, 1999. D. J. Cherney.
Exploration of the place of humans in the biological world, origins of ethics and morality, speciesism, the use of animals for research and agricultural purposes, transgenic animals. A report on the farm tour or a book review, participation in discussion and a project of the student's choice will be used to evaluate the performance of each student.

AN SC 420 Quantitative Animal Genetics
Spring. 2 credits. Prerequisite: AN SC 221 or equivalent. Limited to 30 students. Lec, M 12:20; sec, M 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. Computer labs use interactive matrix algebra program for problem solving.

AN SC 425 Gamete Physiology and Fertilization
Fall. 2 credits. Limited to 50 students. Prerequisite: AN SC 300 or equivalent. Offered alternate years. Next offered fall 1999, 2001; not offered fall 2000. 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 aspects of gamete physiology and *in vitro* technologies such as cryopreservation, oocyte maturation and fertilization.

AN SC 427 Fundamentals of Endocrinology
Fall. 3 credits. Prerequisite: animal or human physiology or permission of instructor. Lecs, M W F 9:05. P. A. Johnson.
Physiology and regulation of endocrine secretions. Neuroendocrine, reproductive, growth, and metabolic aspects of endocrinology are emphasized. Examples are selected from many animals, including humans.

AN SC 456 Dairy Management Fellowship
Spring. 2 credits. Limited to seniors. Prerequisites: AN SC 351 and 355, and permission of instructor. S-U grades only. Hours to be arranged. D. M. Galton and T. Batchelder.
The program is designed for undergraduates who have a sincere interest in dairy farm management. Objectives are to gain further understanding of the integration and application of dairy farm management principles and programs with respect to progressive dairying and related industries.

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 Introduction to Research
Fall. 1 credit. S-U grades only. Required of students undertaking Honors in Animal Science. Open to Honors students in other programs and those planning to pursue research, by permission of the instructor. Disc, M 12:20–1:10. W. B. Currie.
An exposure to the world of scientific research; identifying problems; devising hypotheses, realistic research plans; scientific writings and other forms of communication, including the publicizing of science; finding and managing reference materials; cost of research, funding and beneficiaries; obligations imposed on investigators by society and regulatory agencies; responsibilities and freedom in science; ethical issues that impact on scientists—interactions between sponsors, investigators, professors, trainees and others. Students make oral presentations and prepare brief items of technical writing.

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. 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).
Affords opportunities for students to carry out independent research under appropriate supervision. Each student is expected to review pertinent literature, prepare a project outline, conduct the research, and prepare a report.

AN SC 601 Amino Acids (also NS 601)
Spring. 2 credits. Prerequisites: physiology, biochemistry, and nutrition. Lecs, W F 12:20. Offered alternate years. Next offered spring 2000, 2002; not offered spring 2001. R. E. Austic.
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 nutritional requirements for amino acids.

[AN SC 603 Mineral Nutrition: Metabolic, Health, and Environmental Aspects (also NS 603)
Fall. 2 credits. Prerequisites: biochemistry, physiology, and nutrition. Lec T 2:20–4:25. Offered alternate years. Next offered fall 2000; not offered fall 1999, 2001. X. G. Lei and G. F. Combs Jr.
This course focuses on the metabolic roles and environmental impacts of mineral nutrition in animal, human, and food systems. Team-taught lectures include general biochemical and physiological aspects of mineral metabolism and specific mechanisms of gene expression, regulation, and mammal health disorders associated with individual elements.]

AN SC 604 Vitamins (also NS 604)
Fall. 2 credits. Lec, T R 10:10.
G. F. Combs, Jr.
Text-based discussion sessions on nutritional aspects of the vitamins, including recent developments in nutritional and biochemical interrelationships with other nutrients and metabolites.

AN SC 606 Ruminant Nutrition: Microbial Ecology and Forage Chemistry
Spring. 4 credits. Prerequisites: Animal Science 212, Biochemistry. S-U grades optional. Lecs, M W F 9:05; disc, W 8:00 or W 1:25. Offered alternate years. Next offered spring 2000, 2002; not offered spring 2001. A. N. Pell.
This course provides an overview of ruminant nutrition with an emphasis on microbial ecology, forage chemistry and rumen function.

AN SC 610 Seminar
Fall and spring. 1 credit. S-U grades only.

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 major or minor in animal breeding. S-U grades only. Hours to be arranged.

AN SC 621 Seminar: Endo/Reprod Biology
Fall and spring. 1 credit. Prerequisites: permission of instructor. Registration limited to graduate students. S-U grades only. Lec, W 4:00. W. R. Butler and staff.
Current research in reproductive physiology is presented by staff members, graduate students, and visitors.

AN SC 625 Nutritional Toxicology (also TOX 625)
Spring. 2 credits. Prerequisites: biochemistry and nutrition courses. S-U grades optional. Lec, W 1:25–2:15; lab/disc, W 2:30–4:25. D. L. Brown.
Exploration of toxicological principles and a selective survey of natural food and feed toxicants. At the end of this course, students will understand relationships between nutrition and toxicology; be prepared to conduct research concerning the effects of naturally occurring toxicants; and be able to use multimedia to present their understanding of a class of toxicants. Occasionally, the class will take walking field trips. In addition, students will read printed and electronic communications and create STELLA simulation models and a system of Web pages related to a specific family of toxicants.

[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 2001; not offered spring 2000, 2002. Lec, M W F 10:10. A. W. Bell and D. E. Bauman.
An integrated systems approach to the nutritional physiology and energy metabolism of productive animals. Emphasis on extracellular regulation of tissue and organ metabolism of specific nutrients in relation to pregnancy, lactation, and growth. Critical discussion of techniques and approaches to the study of animal bioenergetics.]

AN SC 640 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 650 Molecular Techniques for Animal Biologists
Spring. 4 credits. Prerequisites: BIOBM 330 or BIOBM 332 or BIOBM 333 or equivalents and permission of instructors. Enrollment limited to 15 students. Lec, T 11:15; labs, T and R 1:25–4:25. Y. Boisclair and S. Quirk.
A laboratory course designed for students with little or no experience with techniques in molecular biology. Emphasis will be on modern techniques used in conducting research in animal-related sciences such as nutrition, physiology, pharmacology and immunology (e.g., subcloning, mutagenesis of DNA, RT-PCR, DNA sequencing and analysis, analysis of gene expression, protein expression). Lectures will introduce laboratory exercises and supplement laboratory topics. Students will perform an independent project requiring time outside scheduled laboratories and will give a scientific presentation.

AN SC 694 Special Topics in Animal Science
Fall or spring. 4 credits maximum. Prerequisite: graduate standing. 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.

AN SC 720 Advanced Quantitative Genetics
Spring. 3 credits. Prerequisites: matrix algebra, linear models, and mathematical statistics. S-U grades optional. Offered alternate years. Next offered spring 2000, 2002; not offered spring 2001. Hours to be arranged. R. L. Quaas.
This course covers statistical methods used in a variety of problems in the quantitative genetics of animal populations. The initial focus is the estimation of breeding values for purposes of ranking animals for selection. The core of the course is the mixed linear model; linear estimators and predictors are treated extensively. The importance of appropriate modeling is emphasized. Generalizations to nonlinear models, via Bayesian principles, are made, i.e., inferences from posterior distributions.

AN SC 800 Master's-Level Thesis Research
Fall or spring. Credit to be arranged, maximum 12 credits/semester. Prerequisite: permission of adviser. S-U grades only. 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, maximum 12 credits/semester. Prerequisite: permission of adviser. S-U grades only. Graduate faculty.
For students in a Ph.D. program **only before** the 'A' exam has been passed.

AN SC 901 Doctoral-Level Thesis Research
Fall or spring. Credit to be arranged, maximum 12 credits/semester. Prerequisite: permission of adviser. S-U grades only. Graduate faculty.
For students admitted to candidacy after 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 (BIOG 305)

BIOLOGICAL SCIENCES

The program of study in biology is offered by the Office of Undergraduate Biology. For course descriptions, see the section on Biological Sciences.

BIOMETRY AND STATISTICS

N. S. Altman, chair, G. Casella, C. Castillo-Chavez, M. Contreras, C. E. McCulloch, S. J. Schwager

The Department of Biometrics in Statistical Science offers the following courses in Biometry and Statistics. Students need to register under Course Listings: College of Agriculture and Life Sciences—Biometry and Statistics.

BTRY 90 Introduction to Biomathematics
Spring. 1 credit. S-U grades only. Prerequisite: one year of college-preparatory high school algebra.
An introductory course on the use of mathematics, computing, probability, and statistics in the biological sciences. Throughout the course, biological examples are used to develop quantitative ideas. Topics, which may change from semester to semester, will be selected from those covered in Biometry 101. Each semester, a selection of topics from a list that includes basic statistics and probability, curve fitting, elementary matrix algebra, differentiation, integration, and difference and differential equations, will be taught. The course will meet twice a week for 30 minutes. Each class will be followed by a computer laboratory for an hour and fifteen minutes, where the students will use Mathematica, a symbolic mathematics and graphics package to illustrate and expand the concepts covered in class.

BTRY 100 Statistics and the World We Live In (also STBTRY 100)
Fall. 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 101 Introduction to Biometry I
Spring. 4 credits. S-U grades optional. Prerequisites: pre-calculus.
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 102 Introduction to Biometry II
Fall. 4 credits. S-U grades optional. Prerequisite: BTRY 101 or 2 semesters of calculus.
This course is the continuation of Biometry 101. It provides a more in-depth view of the use of mathematics, computing, and probability and statistics in the biological sciences. Topics covered include discrete and continuous models, applications of differential and integral calculus, optimization methods, matrix algebra, and Markov models.

BTRY 261 Statistical Methods I (also STBTRY 261)
Fall. 4 credits. Letter only. Prerequisite: BTRY 100 [formally 200] or prior experience in data collection and interpretation. Limited to undergraduates.
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, 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. The lectures may co-meet with BTRY 601. Sections, homeworks and exams are administered separately.

BTRY 302 Statistical Methods II (also STBTRY 302)
Spring. 4 credits. Letter only. Prerequisite: BTRY 261 or BTRY 601. Limited to undergraduates.
A continuation of BTRY 261. 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 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 multiway factorial, nested and split plot designs; comparing two or more regression lines; analysis of covariance. Emphasis is on the appropriate design of studies prior to data collection and the appropriate application and interpretation of statistical techniques. For practical applications, computing is done using the SAS statistical package. The lectures co-meet with BTRY 602. Sections, homeworks and exams are administered separately.

BTRY 400 Biometry Seminar (also STBTRY 400)
Fall and spring. 1 credit. S-U grades only. Prerequisite: BTRY 302 or BTRY 409 or by permission of the instructor.
Students will attend weekly seminar, the Biometrics Unit Discussion Series. Can be taken concurrently with BTRY 600 only with permission of instructor. Students can only take course twice.

BTRY 408 Theory of Probability (also STBTRY 408)
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 either a one-semester introduction to probability or a foundation for a course in the theory of statistics.

BTRY 409 Theory of Statistics (also STBTRY 409)
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.

BTRY 417 Matrix Algebra
Spring. 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 is on understanding basic ideas and on developing skills for applying matrix algebra.

[BTRY 451 Mathematical Modeling of Populations
Fall. 3 credits. S-U grades optional. Prerequisites: MATH 112, BTRY 408, or equivalent. Offered alternate years. Not offered 1999–2000; offered fall 2000.
This course will emphasize stochastic and deterministic models relevant to population genetics and population biology. Computer simulations and use of mathematical packages will be an integral part of the course.]

BTRY 494 Undergraduate Special Topics in Biometry and Statistics (also STBTRY 494)
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 495 Statistical Consulting (also STBTRY 495)
Spring. 2 credits. S-U grades only. Limited to undergraduates. Prerequisites or co-requisites: BTRY 302 and 409 and permission of instructor.
Participation in the Department of Biometrics 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 (also STBTRY 497)
Fall and 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 (also STBTRY 498)
Fall and spring. 2 credits. S-U grades optional. 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 (also STBTRY 499)
Fall or spring. 1–3 credits. S-U grades optional. 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 (also STBTRY 600)
Fall and spring. 1 credit. S-U grades only. Prerequisite or corequisite: BTRY 409 or permission of instructor.

BTRY 601 Statistical Methods I (also STBTRY 601)
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 (also STBTRY 602)
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 (also STBTRY 603)
Spring. 3 credits. Prerequisite: BTRY 601 and 602 or permission of instructor. Offered alternate years. Next offered spring 2001.
Categorical data analysis, including logistic regression, loglinear models, stratified tables, matched pairs analysis, polytomous response and ordinal data. Applications in biomedical and social sciences.]

BTRY 604 Statistical Methods IV: Applied Design (also STBTRY 604)
Spring. 3 credits. Prerequisites: BTRY 601 and 602 or permission of instructor. Offered alternate years. Not offered spring 2001.
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 639 Epidemiology Seminar (also STBTRY 639)
Spring. 1 credit, variable. S-U grades only. Permission of instructor.
This course will develop skills in the preparation and interpretation of epidemiological data by discussing current research topics and issues.

BTRY 662 Mathematical Ecology (also STBTRY 662)
Fall. 3 credits. S-U grades optional. Prerequisites: a year of calculus and a course in statistics.
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 STBTRY 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 682 Statistical Methods for Molecular Biology (also STBTRY 682)
Fall. 2 credits. S-U only. Prerequisite: permission of instructor. Not offered 1999–2000.
Statistical and mathematical topics of current interest in molecular biology: genetic mapping, physical mapping, DNA sequence analysis, phylogenetic inference, population modeling. Topics may vary. The course may be repeated for credit.]

BTRY 694 Graduate Special Topics in Biometry and Statistics (also STBTRY 694)
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 (also STBTRY 697)
Fall, spring, or summer. 1–3 credits. S-U grades optional.
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 717 Linear and Generalized Linear Models (also STBTRY 717)
Spring. 3 credits. S-U grades optional. Prerequisites: BTRY 409, BTRY 417 and 602 or equivalents. Offered alternate years. Next offered spring 2001.
Statistical modeling and inference using linear models and generalized linear models. Estimation by least squares, maximum likelihood, quasi-likelihood and generalized estimating equations. The use of link functions and generalized linear models to accommodate nonlinear models and non-normally distributed data. The use of random effects to accommodate correlation structures in both linear mixed models and generalized linear mixed models and to model longitudinal data. Some use of software packages and illustrative examples.]

BTRY 795 Statistical Consulting (also STBTRY 795)
Fall and spring. 2 credits. S-U grades only. Limited to graduate students.
Participation in the Department of Biometrics 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 798 Graduate Supervised Teaching (also STBTRY 798)
Fall and spring. 2–4 credits. S-U only. Permission of instructor and chair of special committee plus at least two advanced courses in statistics and biometry.
Students assist in teaching a course appropriate to their previous training. Students will meet with a discussion section, prepare course materials, and assist in grading. Credit hours will be determined in consultation with the instructor, depending on the level of teaching and the quality of work expected.

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

R. E. Ostman, chair; K. Berggren, M. Campo, A. P. Chan, R. D. Colle, L. Cowdery, B. O. Earle, G. Gay, D. A. Grossman, J. Heyman, D. Krikorian, B. Lewenstein, T. M. Russo, C. Scherer, D. Scheufele, J. Shanahan, M. A. Shapiro, P. Stepp, R. B. Thompson, L. VanBuskirk, W. B. Ward

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 Communication in Social Relationships
Spring or summer. 3 credits. Spring: lecs, M W F 1:25–2:15. D. Krikorian.
An overview of current knowledge about communication, with particular emphasis on interpersonal communication. Introduction to a wide range of contemporary theories and research about effective communication in contexts such as friendships, small groups, organizations, and health care settings.

COMM 117 Writing about Communication
Spring. 3 credits. Concurrent enrollment in COMM 116 required. T R 10:10–11:25. L. VanBuskirk and staff.
Students develop skill in various writing styles and genres. The class explores communication practices and theories as they are observed and studied in personal and professional contexts. Assignments polish students' ability to gather information, to analyze information, to integrate ideas about communication, and to express those ideas clearly and cogently.

COMM 120 Contemporary Mass Communication
Fall or summer. Lecs, M W F 12:20–1:10. J. Shanahan.
The processes and effects of communication systems. Topics include the evolution of communication media, current knowledge about mediated communication, and the role of communication in contemporary social issues. Discussion sections relate the course topics to students' personal experience. Assignments include case studies, experiential learning exercises, and short papers.

COMM 121 Investigating Communication
Fall. 3 credits. Students must be enrolled concurrently in COMM 120. Lecs, T R 10:10–11:25, 11:40–12:55 or 1:25–2:40. R. Ostman.
An examination of research methods in communication, with particular emphasis on the mass communication process. Exercises in writing, speaking, and working in small groups focus on topics such as gender depictions, violence in the media, and social roles.

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 expertise of 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. Fluency 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. K. Berggren, 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 speaker evaluations, and engage in other speech-related activities.

COMM 203 Argumentation and Debate
Fall or summer. 3 credits. T R 10:10–11:25. P. Stepp.
The student will learn the principles of argumentation and the rules of debate. Classroom debates on the CEDA national topic will provide experience in critical thinking, rapid organization of thoughts, employment of research, and writing and speaking in a logical, persuasive manner.

COMM 204 Effective Listening
Fall, spring, or summer. 3 credits. Limited to 25 nonfreshman students per section. No students accepted or allowed to drop after the second week of classes. Lec, M 2:55–4:10; sec, W 1:25–2:40, 2:55–4:10; R 1:25–2:40, 2:55–4:10. R. Thompson.
Lecture and sections are used to present an analysis of the process of listening, to identify barriers to effective listening, and to develop students' listening skills. Topics include audiology, cultural contexts, intercultural communication, linguistics, therapeutic listening, and critical analysis of information. Students are involved in skill-building exercises and in writing self-analytical papers, as well as attending seminars.

COMM 230 Visual Communication
Fall. 3 credits. Lec 01, T R 9:05–9:55; lab, T 2:30–4:25; W 10:10–12:05, 12:20–2:15 or 2:30–4:25. C. Scherer.
An introduction to visual communication theory. Course examines how visuals 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 240 Communication Systems and Technologies
Spring. 3 credits. Lec T R 11:40–12:55. A. P. Chan.
An exploration of the nature of communication systems and technologies. Topics include a brief history of communication and information technologies, descriptions of the uses, and impacts of technologies within the social system, and an introduction to electronic message design and construction.

COMM 250 Newswriting for Newspapers
Fall. 3 credits. Limited to 25 students. Keyboarding ability essential. Students missing first two classes without university excuse will be dropped. Lecs, M W 9:05–9:55; labs, R 2:30–4:25 or F 9:05–11:00. 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 253 Information Gathering and Presentation
Spring. 3 credits. Prerequisite: COMM 117, COMM 121. Lec, M W 11:15; lab R 9:05–9:55, F 11:15–12:05 or F 2:30–3:20. L. Cowdery.
Students learn how to locate information from data bases, interviews, and printed materials, to evaluate it, and to present it in written, tabular, and graphic form. Formats include media stories, research reports, and materials for public information. Experience in industry research methods helpful; concurrent enrollment in COMM 282 recommended.

COMM 260 Science Writing for Public Information
Fall, spring, or summer. 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, M W F 10:10–11:00; Spring: Lec 01, M W F 9:05–9:55 or Lec 02, M W F 1:25–2:15. L. Cowdery.
An intensive course in simplifying scientific and technical material for specific audiences within the general public. Weekly assignments include instructions, descriptions, explanations, and summaries in such formats as the newsletter, brochure, and report. Audience analysis will be emphasized. Not oriented to the mass media.

COMM 263 Organizational Writing
Fall, spring, or summer. 3 credits. Limited to 25 junior, senior, or graduate students per section. Prerequisite: any college-level writing course. Lec 01, M W F 10:10–11:00, Lec 02, M W F 11:15–12:05. L. Van Buskirk and staff.
Students write as members of different organizations, and as representatives of business, government, community, and other interests. Emphasis is on adapting tone to the audience and to the purpose of the message. Writing assignments include reports, memoranda, proposals, and letters. Assignments are based on cases developed from current websites.

COMM 272 Principles of Public Relations and Advertising
Summer. 3 credits. Not open to freshmen. 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. Letter only. T R 11:40–12:55. Not offered 1999–2000. 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 areas relevant to CALS programs, including environment, agricultural policy and land use. Communication 116 or 120 are suggested but not required.]

COMM 282 Communication Industry Research
Spring. 3 credits. Prerequisite: COMM 116, 120, 121. Lec, M W 12:20–1:10; labs, F 9:05–11:00, F 12:20–2:15, or R 9:05–11:00. D. Scheufele.
Public opinion polls, readership/viewership studies, audience segmentation techniques, and media and message effect evaluation are all widely used in communication industries. This course covers the use of basic research design, measurement, sampling, and simple descriptive statistics in conducting these studies.

COMM 284 Sex, Gender, and Communication
Fall. 3 credits. Not open to freshmen. T R 2:55–4:10. L. Van Buskirk.
The course explores the personal, career, social, and economic implications of gender categories. Topics considered include theories of gender construction, social structures, personal relationships, and gender concerns in the workplace.

COMM 285 Communication in Life Sciences (also Science and Technology Studies 285)
Spring. 3 credits. M W F 10:10–11:05. B. Lewenstein.
Environmental problems...public health issues...scientific research. In each of these areas, communication plays a fundamental role. From the mass media to individual conversations, from technical journals to textbooks, from lab notes to the World Wide Web, communication helps define social issues and research findings. This course examines the institutional and intellectual contexts, processes, and practical constraints on communication in the life sciences.

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. Lec, M W 11:15–12:05; sec, T 2:30–4:25; W 1:25–3:20; R 10:10–12:05. B. Earle.
The study and practice of written and oral communication skills used in formal and informal organizations, including interviews, informative and persuasive speeches, reports, and discussions. Students exercise and enhance the organizational, analytical, and presentational skills needed in particular settings suited to their own business and professional careers.

COMM 303 Speech and Debate Practicum
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.
Students will learn preparation for practice in CEDA (Cross Examination Debate Association) debate, Lincoln Douglas debate, or individual speaking events. The class will be divided into four groups according to level of experience; therefore it may be repeated to a maximum of 8 credits.

[COMM 315 Introduction to Health Communication
Fall. 3 credits. COMM 116 or COMM 120 or permission of instructor. Juniors and seniors only. T R 11:40–12:55. Not offered 1999–2000. Staff.
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, and public health campaigns. Instruction techniques include class discussion, presentations, and group projects.]

COMM 330 Communication Technologies and Management of Information
Fall. 3 credits. Prerequisite: COMM 240. T R 10:10–11:25. A. P. Chan.
Appropriate use of communication and information technologies can facilitate the coordination, control, and management of information. This course surveys existing theories and practice of information management, integrating insights cutting across communication, economics, management science, and sociology.

COMM 350 Writing for Magazines
Fall, spring, or summer. 3 credits. Limited to 25 juniors, seniors, and graduate students, or others with permission of instructor. No drops after third week. Extensive out-of-class writing assignments. Fall: M 1:25–4:25. W. Ward; spring: lec, T R 8:40–9:55; lab, R 1:25–2:15. 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. Limited to 24 students. Prerequisite: one college-level writing course. Lecs, M W 9:05; lab, W 12:20–2:15. 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 newsletters, radio, TV, and other media.

COMM 353 Science Writing Practicum
Spring. 1 credit. Prerequisite: COMM 260, COMM/S&TS 352, ENG. 350 or permission of instructor. Hours TBA. Offered even-numbered years. B. Lewenstein.
Students will cover the annual meeting of the American Association for the Advancement of Science, held in February each year. Before the meeting, students will review science writing techniques and issues. At the meeting, students will meet with science writers and attend press conferences and scientific sessions. Students will write at least two stories. Students responsible for all costs of travel, lodging, and meals.

COMM 368 Text Editing and Management
Fall. 3 credits. Limited to 25 junior, senior, or graduate students. Prerequisite: COMM 250, 260, 263, 350 or 352. M W F 12:20–1:10. L. Cowdery.
How to guide a manuscript from draft to presentation. Topics include production, copy editing and design, document management, and editorial decision making. Publications include books, magazines, newsletters, and promotional and educational materials for internal and external use. Appropriate for those who will oversee publications as part of their work.

COMM 376 Planning Communication Campaigns
Spring. 3 credits. Prerequisites: COMM 282 or equivalent social research course (may be taken concurrently). T R 10:10–11:25. R. D. Colle.
Overviews theories that guide and influence social change efforts. Research techniques and communication tools used in communication planning and campaign design are reviewed. Class discussion focuses on social change efforts in nutrition and health, rural development, marketing, and the environment. Students work closely with a client in designing a communication campaign.

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. R. D. Colle.

[COMM 382 Communication Research Design
Spring. 3 credits. Lec, T R 3:35; lab, W 2:30–4:25. Prerequisite: COMM 282 or equivalent; one course in statistics (may be concurrent). Not offered 1999–2000. C. Scherer.
Discussion of advanced communication research methods. Emphasis on research design and measurement techniques. Final paper will be a complete research proposal for a senior or Honors thesis in Communication.]

COMM 398 Issues in Teaching Communication
Fall. 1 credit. Prerequisite: must be past or current undergraduate teaching assistant for COMM 201, 204, or 301. Alternate M 7:30–9:10 p.m. K. Berggren.
This seminar brings together novice educators to discuss ideas, experiences, and practice. Integration of theory into actual education efforts is challenging for professional educators. Novice teachers are not aware of their common experiences, much less of a theoretical component to education. In discussions of actual teaching experiences, literature reviews, research reports, textbook chapters, curriculum, and evaluation tools, we will examine new ideas and practices. The primary goal of the seminar is to enrich and deepen the novice teaching experience.

COMM 405 Community Service Practicum
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 talents in structured experiences in which they design and implement a speech or debate project in local schools or the community.

COMM 410 Organizational Behavior and Communication

Fall. 3 credits. Labs limited to 15 junior, senior, or graduate students. Prerequisite: COMM 116 or equivalent. Lec, M W 11:15–12:05; Sec 01, W 2:30–4:25; Sec 02, F 10:10–12:05; Sec 03, F 10:10–12:05; Sec 04, 12:20–2:15; Sec 05, 12:20–2:15. D. Krikorian.

Study of management and leadership in formal organizations with emphasis on the psychology of communication between supervisor and employee; examination of formal and informal communication networks, and interpersonal communication in an organizational context. Case studies analyzed in lab.

COMM 411 Leadership from a Communication Perspective

Spring. 3 credits. Limited to 30 students. Lec, T R 1:25–2:40. 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 412 Communication Leadership Lab

Spring. 1 credit. Concurrent enrollment in COMM 411 required. Hours TBA. P. Stepp.

This course will provide laboratory experience in leadership and the methods used to analyze leadership in an organization. Students will take turns serving as a group leader of six to eight students in applying leadership theories to study leadership styles, leader-follower relations, organizational culture, and leadership competencies in an organization.

COMM 418 Communication and Persuasion

Spring. 3 credits. Prerequisite: COMM 116 and 120 or introductory psychology or social psychology. M W 2:55–4:10 (one evening mid-semester prelim). M. Campo.

The course focuses on theories of communication's 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/public information, and interpersonal communication. Lectures concurrent with COMM 618; graduate students should enroll in COMM 618.

COMM 420 Public Opinion and Social Processes

Fall. 3 credits. Lec, T R 10:10–11:25. D. Scheufele.

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.

COMM 421 Communication and the Environment

Spring. 3 credits. Lec, T R 11:40–12:55. 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 or COMM 120. 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 audio-visual 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 424 Communication in the Developing Nations

Fall. 3 credits. Limited to juniors and seniors. T R 2:55–4:10. R. Colle.

The role of communication in development programs, particularly in the Third World. 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. Lectures concurrent with COMM 624; graduate students should enroll in COMM 624.

COMM 426 Impact of Communication Technologies

Spring. 3 credits. M W 2:55–4:10. B. Lewenstein.

Examine emerging technologies of communication, such as computer-based information systems and satellites and their potential for influencing communication processes and social systems. Also examines the impacts of previous communication innovations from cave painting to television. Lectures concurrent with COMM 626; graduate students should enroll in COMM 626.

COMM 428 Communication Law

Spring. 3 credits. Offered even-numbered years. 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 for those 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 429 Legal Issues in Business and Electronic Communication

Spring. 3 credits. Prerequisite: COMM 428. Offered odd-numbered years. M W F 11:15–12:05. D. Grossman.

The increase in commercial use of the Internet and new types of interactive electronic media in business create unique contexts for applying traditional principles of law. This course will examine the rights and responsibilities of parties involved in electronic commerce, including information security (guaranteeing confidentiality and effective record-keeping), electronic contracts and EDI, rights in information (copyrights, trade secrets, trademarks and patents), regulation of information content (pornography and advertising) and regulation of on-line conduct (criminal liability and civil exposure).

COMM 439 Interactive Multimedia: Design and Research Issues

Fall. 3 credits. Prerequisite: permission of instructor. Lec, T 11:40–12:55; lab 01, T 1:25–2:15, lab 02, R 1:25–2:15. 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. Lectures concurrent with COMM 639; grad students should enroll in COMM 639.

COMM 440 Computer Mediated Communication: Theory and Practice

Spring. 3 credits. Permission of instructor. Letter grade only. Lec, T 12:20–2:15; lab 01, T 11:15–12:05; lab 02, R 11:15–12:05. G. Gay.

Course will focus on the design of computer interfaces and software from the user's point of view. The goal is to teach user interface designs that "serve human needs" while building feelings of competence, confidence, and satisfaction. Topics include formal models of people and interactions, collaborative design issues, psychological and philosophical design considerastions, and cultural and social issues. Lectures concurrent with COMM 640; graduate students should enroll in COMM 640.

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. Offered even numbered years. M W 2:55–4:10. B. Lewenstein.

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 new knowledge about PCST. Course format is primarily seminar/discussion.

COMM 476 Communication Fellows Program
Spring. 2 credits. M 2:55–4:10. Prerequisites: permission of instructor; limited to communication seniors selected based on goals and academic preparation. B. O. Earle.
A series of lectures, seminars and guest speakers exploring the planning, evaluation and policy-making process. Includes a three-day trip to a metropolitan area to visit corporate leaders, administrative agencies and policy makers. Fee charged.

COMM 486 Risk Communication
Spring. 3 credits. T R 2:55–4:10. C. Scherer.
An examination of theory and research related to the communication of scientific information about environmental, agricultural, food, health, and nutritional risks. Course will concentrate on social theories related to risk perception and behavior. Case studies involving pesticide residues, waste management, water quality, environmental hazards, and personal health behaviors will be examined. Emphasis will be placed on understanding, applying, and developing theories of risk communication. Lectures concurrent with COMM 686; graduate students should enroll in COMM 686.

COMM 490 Senior Thesis in Communication
Fall, spring. 3 credits; may be repeated for a maximum of 6 credits. Prerequisite: COMM 382. Staff.
Seniors conduct research based on a thesis proposal written in COMM 382. Supervision provided by a member of the Communication graduate faculty assisted by a Ph.D. candidate. Thesis will be reviewed by faculty readers before approval.

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 496 Internship
Fall, spring, summer, and intersession. 1–3 credits. Students must apply no later than the spring pre-course enrollment period for a fall internship or the fall pre-course enrollment period for a spring or summer internship. **Prerequisites: limited to communication juniors or seniors, 3.0 average in communication courses, and approval of academic advisor.** 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 497 Individual Study in Communication
Fall or spring. 1–3 credits; may be repeated to 6 credits with a different supervising faculty member. Prerequisite: 3.0 cumulative average. Students must register with an Independent Study form (available in 140 Roberts Hall).
Individual study under faculty supervision. Work should concentrate on locating, assimilating, synthesizing, and reporting existing knowledge on a selected topic. Attempts to implement this knowledge in a practical application are desirable.

COMM 498 Communication Teaching Experience
Fall or spring. 1–3 credits; may be repeated to 6 credits with different courses. **Limited to juniors and seniors.** Intended for undergraduates desiring classroom teaching experience. Prerequisite: 3.0 cumulative average (2.7 if teaching assistant for a skill development course) and permission of the faculty member who will supervise the work and assign the grade. Students must register with an Independent Study form (available in 140 Roberts Hall).
Periodic meetings with the instructor cover realization of course objectives, evaluation of teaching methods, and student feedback. In addition to aiding with the actual instruction, each student prepares a paper on some aspect of the course.

COMM 499 Independent Research
Fall or spring. 1–3 credits; may be repeated to 6 credits. Limited to seniors and graduate students. Prerequisite: 3.0 cumulative average. Students must register with an Independent Study form (available in 140 Roberts Hall).
Permits outstanding students to conduct laboratory or field research in communication under appropriate faculty supervision. The research should be scientific: systematic, controlled, empirical. Research goals should include description, prediction, explanation, or policy orientation and should generate new knowledge.

COMM 510 Organizational Behavior and Communication
Fall. 3 credits. Lec, M W 11:15–12:05; sec, TBA. D. Krikorian.
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 communciation in an organizational context. Case studies analyzed in lab. Lectures concurrent with COMM 410; graduate students should enroll in COMM 510.

[COMM 610 Seminar in Organizational Communication
Spring. 3 credits. Prerequisites: COMM 410/510 or one course in organizational behavior or permission of instructor. Not offered 1999–2000. Lec, M W 11:15–12:05; lab, F 10:10–12:05. D. Krikorian.
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 618 Communication and Persuasion
Spring. 3 credits. Prerequisite: introductory research methods course and introductory psychology or social psychology course. M W 2:55–4:10. M. Campo.
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/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. T R 10:10–11:25. D. Scheufele.
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, communcation 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.

COMM 622 Psychology of Television
Fall. 3 credits. Prerequisites: introductory psychology or social psychology and introductory research-methods course. M W F 12:20–1:10. M. Shapiro.
A survey of knowledge about the psychological influence of television and other audio-visual 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 422; graduate students should enroll in COMM 622.

COMM 624 Communication in the Developing Nations
Fall. 3 credits. Open to juniors, seniors, and graduate students. T R 2:55–4:10. 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. Lectures concurrent with COMM 424; graduate students should enroll in COMM 624.

COMM 626 Impact of Communication Technologies
Spring. 3 credits. Open to seniors. M W 2:55–4:10. B. Lewenstein.
Examines emerging technologies of communication, such as computer-based information systems and satellites and their potential for influencing communication processes and social systems. Also examines the impacts of

previous communication innovations from cave painting to television. Lectures concurrent with COMM 426; graduate students enroll in COMM 626.

COMM 639 Interactive Multimedia: Design and Research Issues
Fall. 3 credits. Prerequisite: permission of instructor. Lec, T 11:40–12:55; lab 01, T 1:25–2:15; lab 02, R 1:25–2:15. G. Gay.
An overview of multimedia technologies (videodisk, 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. Lectures concurrent with COMM 439; grad students should enroll in COMM 639.

COMM 640 Computer Mediated Communication: Theory and Practice
Spring. 3 credits. Prerequisite: permission of instructor. Lec, T 12:20–2:15; lab 01, T 11:15–12:05; lab 02, R 11:15–12:05. G. Gay.
Course will focus on the design of computer interfaces and software from the user's point of view. The goal is to teach user interface designs that "serve human needs" while building feelings of competence, confidence, and satisfaction. Topics include formal models of people and interactions, collaborative design issues, psychological and philosophical design considerations, and cultural and social issues. Lectures concurrent with COMM 440; graduate students should enroll in COMM 640.

COMM 641 Human-Computer Interaction
Spring. 3 credits. Offered odd-numbered years. T R 8:40–9:55. G. Gay.
An examination of how people relate to, think about, and think with new communication technologies in schools, homes, and the workplace. Using assigned readings from multiple disciplines, class exercises, field studies, and case studies, students will study and critique aspects of human-computer interaction, social psychology, and other issues that shape the process and effectiveness of designing, implementing and using computer systems.

COMM 676 Communication Planning for Social and Behavioral Change
Spring. 3 credits. T R 10:10–11:25. R. D. Colle.
Overview theories that guide and influence social change efforts. Research techniques and communication tools used in communication planning and campaign techniques and communication tools used in communication planning and campaign design are reviewed. Class discussion focuses on social change efforts in nutrition and health, rural development, marketing, and the environment. Course seeks to integrate theory, data-based generalizations, and planning processes into an integrated communication plan.

COMM 680 Studies in Communication
Fall. 3 credits. Limited to graduate students in communication; others by permission of instructor. M W 8:40–9:55. J. Shanahan.
A review of classical and contemporary readings in communication, including key concepts and areas of investigation. An exploration of the scope of the field, the interrelationships of its various branches, and an examination of the role of theory in the research process.

COMM 681 Advanced Communication Theory
Spring. 4 credits. Prerequisite: COMM 680 or graduate standing and permission of instructor. T R 2:30–4:25. M. A. Shapiro.
Development of, and contemporary issues in, communication theory. Discussion will include the interaction between communication and society, social groupings, and mental processing.

COMM 682 Methods of Communication Research
Spring. 3 credits. Lec, M W 12:20–1:10; sec, F 12:20–2:15. D. Scheufele.
An analysis of the methods used in communication research. Emphasis 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.

[COMM 683 Quantitative Research Methods in Communication
Spring. 3 credits. Prerequisite: COMM 682 or equivalent. Lec, M 6:00 p.m.–9:00 p.m. Not offered 1999–2000. Staff.
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 685 Training and Development: Theory and Practice (also International Agriculture 685 and EDUC 685)
Spring. 4 credits. S-U grades optional. Charge for materials, $45. F 9:05–12:05; lab to be arranged. Not offered 1999–2000. Staff.
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. Design for scientists, administrators, eductor-trainers, and social organizers in rural and agricultural development programs in the U.S. and abroad.]

COMM 686 Risk Communication
Spring. 3 credits. T R 2:55–4:10. C. Scherer.
An examination of theory and research related to the communication of scientific information about environmental, agricultural, food, health, and nutritional risks. Course will concentrate on social theories related to risk perception and behavior. Case studies involving pesticide residues, waste management, water quality, environmental hazards, and personal health behaviors will be examined. Emphasis will be placed on understanding, applying, and developing theories of risk communication. Lectures concurrent with COMM 486; graduate students should enroll in COMM 686.

COMM 691 Seminar: Topics in Communication
Fall and spring. No credit. S-U grades only. Hours to be arranged. G. Gay and R. Colle.
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. S-U grades only. Prerequisite: permission of committee chair.
Project research for Master of Professional Studies (Communication) students.

COMM 781 Seminar in Psychology of Communication
Spring. 3 credits. Letter grade. Offered odd-numbered years. Prerequisite: COMM 680 and 681 or equivalent graduate level theory in psychology or social psychology. Hours to be arranged. M. Shapiro.
Discussion and analysis of selected current issues in the psychology of communication. Students will discuss and synthesize current research and theory in the mental processing of communication.

COMM 794 Seminar in Communication Issues
Fall, spring, or summer. 1–3 credits. Letter grade only. Prerequisite: permission of instructor.
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. Letter grade only. 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. Letter grade only. 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. Letter grade only. 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. S-U grades only. Prerequisite: permission of committee chair.
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. S-U grades only. Prerequisites: completion of "A" exam; permission of committee chair.
Dissertation research for doctoral candidates.

EDUCATION

D. H. Monk, chair; G. J. Applebee, W. S. Carlsen, C. A. Conroy, J. D. Deshler, J. A. Dunn, D. M. Ewert, D. E. Hedlund, S. C. Piliero, G. J. Posner, R. E. Ripple, V. N. Rockcastle, D. E. Schrader, J. W. Sipple, R. E. Steele, K. A. Strike, H. D. Sutphin, D. J. Trumbull, D. G. Way

EDUC 005 Basic Review Mathematics
Fall. 3 credits (this credit is not counted toward the 120 credits required for the degree). Lecs, M W F 8:00 or 9:05. S. C. Piliero.
Review of concepts necessary for success in basic mathematics and statistics courses. Topics include problem solving, graphing, basic algebra skills, linear and quadratic functions, polynomial equations, exponents and logarithms, and trigonometry. Considerable emphasis is placed on learning mathematics for understanding and solving word problems.

EDUC 101 Introduction to Education
Fall. 3 credits. T R 11:40–12:55. G. J. Posner.
An introduction to the field of education that is structured around an examination of three contemporary policy issues. The issues are chosen to help students understand important aspects of formal schooling systems (e.g., the public schools, colleges, and universities) as well as nonformal educational activities (e.g., adult education, extension education, and community education). The course is team-taught by two members of the faculty and is designed for students seeking a self-contained introduction to education that can also lead to additional study in the field.

EDUC 115 Introductory College Mathematics
Spring. 4 credits. M W F 11:15 or 12:20. S. C. Piliero.
Designed for students wishing to fulfill distribution requirements and/or prepare for study in calculus. This course offers a multi-representational approach to college-level precalculus mathematics, stressing conceptual understanding, problem solving, and applications in a technology-enhanced environment. Considerable emphasis is placed on numerical, graphical and symbolic representations of functions and their transformations. Students will use graphing calculators in a collaborative lab setting.

EDUC 120 Education for Empowerment
Spring. 3 credits. W 1:25–4:25. R. E. Steele.
Common themes running through the modules include human learning, teaching strategies, political/social/economic factors affecting education. The course provides an opportunity to sample different areas of study and to gain knowledge and awareness of one's own educational processes.

[EDUC 210 Psychology of Learning and Memory
Fall. 3 credits. Prerequisite: introductory psychology. Not offered 1999–2000. J. A. Dunn.
This course deals with contemporary theories of learning, issues in the study of learning, and application of the principles of learning to the management of teaching and learning. Practical applications of research findings will be emphasized. One or more experimental projects and the use of microcomputers will be required.]

EDUC 212 Psychological Foundations of Education
Spring and fall. 3 credits. S-U option available. Prerequisite: introductory psychology. W 2–4:25 plus times to be arranged. J. A. Dunn.
A lecture/discussion survey of the psychological foundations of educational practice. Topics include the selective contributions of developmental, social, and experimental psychology, including instructional technology, to American education.

EDUC 220 Community Learning and Service Partnership
Fall. 4 credits. S-U grades optional. T R 2:55–4:10. Staff.
Students learn to be self-directed learners, to integrate theory, and to be critical observers of their own experiential learning, issues of diversity and empowerment, interpersonal communication, and critical analysis. Concepts and skills are learned through participation in a campus-based adult education program, the Community Learning and Service Partnership (CLASP). Students practice adult education facilitation techniques in lab.

EDUC 240 The Art of Teaching
Fall and spring. 3 credits. Fall: M 8–9:55 or T 10:10–12:05 or 2:30–4:25. Spring: M 8–9:55 or 12:20–2:15 or T 2:30–4:25 or W 12:20–2:15 or 2:30–4:25. G. J. Posner and staff.
This course is designed for all students interested in finding out more about teaching. Students engage in field experiences to find out what teaching involves. Possible field experiences range from large group to tutorial situations, from preschool to adult education, from traditional school subject matters to recreational and vocational areas, and from school-based to nonformal situations. Class work builds on those experiences and provides skills and concepts to make the field experiences more profitable.

EDUC 271 Sociology of Education
Fall. 3 credits. S-U grades optional. T R 10:10–11:25. J. W. Sipple.
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. M W F 11:15–12:05. D. E. Schrader.
This course applies psychological concepts to educational settings such as schools with a focus on understanding the interaction between people, context and knowledge in schools and other learning environments. It examines education as a social, moral, and interpersonal enterprise that respects differences between individuals. This course is designed to foster effective teaching and learning across the life span, but with a focus on secondary education.

EDUC 317 Psychology of Adolescence
Spring. 3 credits. Prerequisite: introductory psychology. S-U grades optional. M W 11:15–12:05; Friday morning section to be arranged. D. E. Schrader.
This course surveys the nature of adolescent cognitive, social, moral, and self-development. Theories of adolescence are examined in the context of real-life experiences of adolescents using case analysis as a methodological tool. Educational implications will be discussed for both formal and informal settings.

EDUC 331 Careers in Agriculture, Extension, and Adult Education
Fall. 1–3 credits. Letter grade only. M 2:00–4:25. J. D. Deshler, D. E. Foster, and G. J. Applebee.
This course will offer modules in three areas of teaching: Adult Education, Cooperative Extension, and Agricultural Education. Each module will offer one hour of credit, and students may take one or more of the modules. The course will provide a historical perspective and an introduction to the organization and scope of programs for each module. Students will examine career opportunities and characteristics of the professions addressed by each module. Course activities include field observations and experiences during arranged times.

EDUC 332 Instructional Methods in AgriScience Education
Spring. 1–3 credits. Prerequisite: enrolled in a Cornell teacher education program or permission of instructor. R 2:00–4:25. C. A. Conroy, R. E. Steele.
Selection, practice, and evaluation of methods in AgriScience education will be stressed. The course offers a modular approach to focus on teaching strategies and methodology unique to teaching in schools. Content will include program planning (Module I), experiential learning (Module II), and youth leadership (Module III). All students must enroll for one credit in Module I; students may be exempt from Modules II and III with permission of instructor. Participants will be required to participate in field experiences at arranged times.

[EDUC 335 Youth Organizations
Spring. 3 credits. T R 10:10–11:25; lab to be arranged. Not offered spring 1999–2000. Staff.
Visionary, creative, and competent leaders are essential for youth organizations. Class participants learn how to facilitate both youth and adult volunteer leadership development. They examine factors affecting membership,

purposes, design, operation, and administration of youth organizations. The course provides students with indepth learning-by-doing experience of how youth organizations function. Field experience with a recognized youth organization is required.]

EDUC 370 Issues in Educational Policy
Spring. 3 credits. T R 10:10–11:25. 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 1:25–2:40. 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. Staff.

EDUC 401 Our Physical Environment
Fall. 3 credits. Prerequisite: permission of instructor. Charge for laboratory supplies, approximately $7. T 1:25–4:25. V. N. Rockcastle.
A practical, relatively nonmathematical study of some basic relationships and physical interactions in the environment, with emphasis on physics and earth science. Attention is paid to analysis for understanding and techniques for teaching. An individual research project is included. Useful for teachers, environmental educators, and those for whom physical science seems difficult or uninviting.

EDUC 402 Knowing and Learning in Science, Mathematics, and Agriscience
Fall. 4 credits. Prerequisite: enrollment in a Cornell teacher education program or permission of instructor. M W 2:30–4:25. D. J. Trumbull and S. C. Piliero.
Students examine both current notions in the history and philosophy of science that explain how knowledge within a discipline develops and current theory and research that examines the individual's acquisition of knowledge. This material serves as a basis for students' individual research projects investigating neophytes' knowledge of science and mathematics concepts. All students enrolled must complete fieldwork. Fieldwork will comprise a minimum of three hours a week in an appropriate educational setting.

EDUC 403 Observing and Teaching Science, Mathematics, and Agriscience
Spring. 4 credits. Prerequisites: enrollment in a Cornell teacher education program or permission of the instructor. C. A. Conroy and S. C. Piliero.
Designed for prospective secondary teachers, this course provides a multiple-perspectives orientation to the culture of schools and the work of teaching science and mathematics. 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 planning, delivery and evaluation of instruction classroom management, and other issues such as equity, tracking, and classroom language.

EDUC 413 Psychology of Human Interaction
Fall. 3 credits. Enrollment limited. Prerequisite: permission of instructor. 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. Prerequisites: introductory psychology, social or personality psychology. T R 10:10–12:05. D. E. Hedlund.
The processes of counseling are examined from various theoretical perspectives. Typical counseling issues are examined, and implications are drawn for counseling strategies, 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 their field experience.

EDUC 430 Special Problems in Agricultural Education
Fall, spring, or summer. 1–3 credits. Letter grade only. W 12:20–1:10. C. A. Conroy and R. E. Steele.
An opportunity to study individually selected problems in agricultural education.

EDUC 445 Curriculum Design Workshop
Summer. 3 credits. G. J. Posner.
A general practical approach to course planning. Readings, group discussions, workshops, and individual conferences centering on each student's project. This project consists of designing a course in a subject area for an age level and an institutional setting of the student's choosing.

EDUC 447 Curriculum Design Laboratory: A Technology-Intensive Course
Spring or summer. 3 credits. W. S. Carlsen.
A project-focused introduction to course design, from needs assessment, through materials development, to the evaluation of student outcomes. The course involves the creation and implementation of an actual curriculum, and the nature of the project will vary from year to year. Students are expected to make extensive use of computer software writing, design, management, and communications. The summer section of 447 will be smaller and we anticipate that, rather than working on a single class project, students will undertake curriculum development projects of their own design.

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 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 483 Comparative Studies in Adult Education
Spring. 3 credits. S-U grades optional. T R 3:35–5:00. J. D. Deshler.
Focuses on the variety of adult-education programs in countries around the world. Literature on comparative adult education, international conferences on adult education, UNESCO adult-education publications, and international community development are analyzed in relationship to each student's exploration of adult education in two countries. Description of adult education in other countries is shared by international students.

EDUC 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 495 Senior Seminar
Spring. 2 credits. Education majors or permission of instructors. S-U only. To be arranged. Undergraduate coordinator for the department.
This seminar focuses in depth on two or three significant educational issues, which may vary from year-to-year depending on the interests and background of students and faculty. The seminar attempts to help students relate the knowledge gained in their particular concentrations to a set of broad issues in education. While education faculty will be involved in selecting the issues and providing guidance for the seminar, students will be expected to provide the initiative and leadership in the classroom.

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 adviser, study a problem or topic not covered in a regular course or may undertake tutorial study of an independent nature in an area of educational interest.

EDUC 498 Undergraduate Teaching
Fall or spring. 1 or 2 credits; 4 credits maximum during undergraduate career. Limited to students with grade-point averages of at least 2.7. S-U grades optional. Students must register with an Independent Study form (available in 140 Roberts Hall). 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. D. Glock.
The course focuses on skills enabling individuals to cope with such concerns as motivation, dealing with difficult people, productive criticism, improving comprehension, adjusting to different learning styles, and communicating with the public. Practice is coordinated with theory and research findings. The ongoing dynamics of the course necessitate intense participation over a period of time, not provided by regularly scheduled fifty-minute class periods. Additional auto-tutorial lab time is scheduled. Appropriate for anyone who works with people.

EDUC 507 Science and Environment for Teachers
Summer. 3 credits. S-U option. Prerequisite: contact instructor for details. W. S. Carlsen.
This three-week inservice program for secondary and middle school science teachers focuses on biological, chemical, and hydrological methods of water monitoring and watershed dynamics. Participants also use remote sensing; work with computers; investigate topics in science, technology and society; learn pedagogical techniques that are consistent with science reform initiatives; and discuss and develop new types of assessment.

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 professions, education, and areas involving management of human resources. A workshop design is required for the second credit. Participants must bring a tape recorder to class.

EDUC 523 Food and Fiber Across the Curriculum
Summer. 0–3 credits. D. E. Foster and staff.
An intensive five-day course designed to help New York State elementary teachers and administrators implement the New York Agriculture in the Classroom Program and understand the complexity of New York's leading industry. Participants learn how instructional materials and experiences with our food-fiber system can be used to teach students language arts, mathematics, science, and social studies. One credit is earned by class attendance and participation. Two credits require one additional project. Three credits require two additional projects.

EDUC 548 Effective College Teaching
Spring. 1–3 credits. S-U grade option. T 5:00–7:00. D. Way.
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 design a course and improve their effectiveness as teachers.

EDUC 601 Secondary Agriculture, Science and Mathematics Teaching Practicum
Fall or spring. 6 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, C. A. Conroy, S. C. Piliero, G. J. Posner, A. Solomon, M. S. Slack, and D. J. Trumbull.
Supervised student teaching in science or mathematics at the secondary level. Program includes teaching in a local school for ten weeks.

EDUC 602 Teaching Agriculture, 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. S. C. Piliero, M. S. Slack, and D. J. Trumbull.
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 606 Seminar in Science and Mathematics Education
Fall. 1 credit. S-U grades only. T 4:30–5:30. W. S. Carlsen and S. C. Piliero.
Explores topics in science and mathematics education. The focus of the seminar changes each year.

EDUC 609 Methods for Interpretive Research
Spring. 3 credits. Prerequisite: course in research methods or measurement or permission of instructor. M W 2:30–4:00. Offered alternate years. D. J. Trumbull.
This course examines some of the methods of educational interpretive research. An interpretive research perspective attends to the complex interactions between researcher, researched and contexts and accepts the centrality of interpretation in the conduct of human affairs. This perspective imposes some unique demands on researchers wishing to justify the quality of their projects. In the class, students will practice methods for gathering and interpreting data by conducting a small project using methods as they relate to the aims and assumptions of interpretive research.

EDUC 611 Educational Psychology
Fall. 3 credits. Prerequisite: introductory psychology. S-U grades optional. 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 refresher course in contemporary educational psychology.

EDUC 614 Epistemological Development and Reflective Thought
Fall. 3 credits. S-U grades optional. M 12:20–2:15. 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. M 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. Staff.
An opportunity for practical experience in educational professions development.

EDUC 621 Work-Experience Coordinator Certification Course I
Summer. 3 credits. S-U grades optional. Staff.
The first of a two-course sequence designed to develop the competencies needed for certification as a coordinator of diversified cooperative work experience programs. The course focuses on the history and philosophy, types, operation, and evaluation of work-experience programs including articulation

with JPTA and VESID. Field interviews are required. A prerequisite for Course II, EDUC 622.

EDUC 622 Work-Experience Coordinator Certification Course II
Summer. 3 credits. Prerequisite: EDUC 621 Work-Experience Certification Course I. Staff.
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, Extension, and Adult Education
Fall or spring; may also be offered in summer. 1–3 credits. S-U grades optional. Hours to be announced. R. E. Steele.
The course provides an opportunity for graduate-level study of individually selected problems and issues in agricultural, extension, and adult education.

EDUC 632 Teaching Agricultural, Extension, and Adult Education
Summer. 3 credits. Prerequisite: an introductory course in teaching methods or permission of instructor. Hours to be announced. C. A. Conroy.
The focus of the course is on the selection, use, and evaluation of methods and materials for teaching. Methods for group and informal instruction are covered. Opportunity is provided for students to develop teaching competence based on their individual needs and interests. Development of self-evaluation skills is included. A class project on the development of instructional materials is required.

EDUC 633 Program Planning in Agricultural, Extension, and Adult Education
Spring. 3 credits. Field trip. Lec, T R 10:10–11:25; 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 635 Experiential Learning
Fall. 2 credits. Prerequisite: open to undergraduates with permission of instructor. S-U grades optional. T 12:20–2:15. R. Steele.
Participants will explore various dimensions of scholar and practitioner thinking about the understanding and practice of experiential learning. Theoretical perspectives on experiential education, reflective practice, and a critical learning systems perspective will be explored through readings and applied assignments. The instructor will introduce methods of facilitation designed to encourage inquiry and dialogue for improvement of both nonformal and formal educational activities. The course process is intended to engage participants in reflective dialogue—nurturing emergence of learning community elements.

EDUC 644 Curriculum Theory and Analysis
Spring. 3 credits. M 1:25–4:25. 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 651 Developing a Research Proposal
Spring. 2 credits. Letter or S-U option. T R 3:35-4:25. Offered alternate years. Not offered 1999–2000. C. A. Conroy and D. J. Trumbull.
Study of procedures for developing and writing a research proposal. Emphasis will be given to identifying a significant topic, recognizing weaknesses in illustrative proposals, and clear and concise writing. Students will be provided with some assistance in constructing a brief proposal of their own.]

EDUC 661 Administration of Educational Organizations
Fall. 3 credits. R 3:35–6:00. J. W. Sipple.
Perspectives on the administration of educational organizations. Consideration of social science, legal and ethical theories, and their application to both public schools and higher education. Intended for students who are considering careers as educational administrators, as well as for those who want to further their understanding of educational organizations.

EDUC 664 Educational Finance
Fall. 3 credits. S-U grades optional. W 3:35–6:00. Staff.
An analysis of the distribution and utilization of public and private resources for educational purposes. The discussion will revolve around the issues of equity, efficiency, and freedom of choice. Alternative methods of financing schools will be evaluated, and the perplexing legal and moral issues raised by such questions as "Who pays?" and "Who benefits?" will be discussed. Specific attention will be given to budgeting, accountability, and productivity. An opportunity for individuals to focus on their own areas of interest, such as occupational education, the two-year college, or secondary or higher education.

EDUC 665 Administrative Decision Making
Spring. 3 credits. S-U grades optional. W 3:35–6:00. Staff.
An introduction to decision making theory and its relevance to the field of educational administration. Specific applications will be made to the study and improvement of productivity within educational systems. A wide variety of educational settings will be considered, including higher education and non-formal education.

EDUC 680 Foundations of Extension Adult Education
Fall. 3 credits. Limited to 20 students. S-U grades optional. F 9:05–12:05. J. D. Deshler.
An analysis of alternative purposes, nature, and scope of extension, adult, and continuing education programs in the United States and abroad, with emphasis on the relationship of programs to historical, cultural, political, and social settings. Definitions, conceptual controversies, philosophical issues, and current research directions will be examined through a seminar approach.

EDUC 682 Community Education and Development
Fall. 3 credits. Limited to 25 students. Letter grade only. M 1:25–4:25. Staff.
An examination of the concept of community; changes in community life; the analysis of community; alternative strategies for community development; patterns of response to community by universities, colleges, schools, cooperative extension, and government service agencies; and such functional dimensions of community education programming as participatory decision making, volunteers, leadership development, council formation and function, interagency coordination, and change-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 J. 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 694 Special Topics in Education
Fall, spring, or summer. 1–3 credits. Prerequisite: permission of instructor. S-U grades optional. Hours to be arranged. Staff.
Topics to be announced.

EDUC 711 Contemporary Issues in Educational Psychology
Fall and spring. Variable, 3 credits. S-U grades optional. Staff. Fall: hours to be announced. J. Dunn. Spring and fall: T 2:00–4:30.
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 12:20–2:15. Not offered 1999–2000. D. E. Schrader.
This seminar focuses on current topics in moral development research as related to the educational process. Topics include the question of the development of moral reasoning, gender differences, the relationship between moral judgment and moral action, questions related to moral education in secondary schools and university settings, and professional ethics in educational settings. This course takes a life-span perspective; however, special emphasis will be placed on development from adolescence through adulthood.]

EDUC 718 Adult Learning and Development
Spring. 3 credits. Prerequisite: permission of instructor. S-U grades optional. W 2:00–4:25. R. E. Ripple and J. D. Deshler.
Deals with adult development and learning behavior from points of view of educational psychology, and adult education. Inferences are drawn from theory and research to the practice of adult continuing education. Appropriate for graduate students in educational psychology, extension and continuing education, and community service education, and for others interested in adult learning and development.

EDUC 730 Seminar in Agricultural, Extension, and Adult Education
Spring. 2 credits. S-U grades optional. R 8:00–9:55. Staff.
Emphasis on current problems and research in agricultural, extension, and adult education. Includes discussion and analysis of student and staff research.

[EDUC 745 Seminar in Curriculum Theory and Research
Fall. 3 credits. Prerequisite: EDUC 644, or permission of instructor. Not offered 1999–2000. T 2:30–5:00. G. J. Posner.
Theoretical issues in curriculum and appropriate areas for curriculum research are discussed. Two current topics of interest are the hidden curriculum and school reform. Both topics serve to uncover the relation between ideology and research.]

EDUC 760 Practicum Seminar in Educational Administration
Fall, spring and summer. 2 credits. S-U only. Hours to be arranged. J. W. Sipple and K. A. Strike.
The practicum seminar is taken in conjunction with the administrative internship and serves to tie together previous coursework, current policy issues, and the concurrent internship. It involves two elements. First, current interns will meet regularly during the semester to bring their knowledge base (developed in the program) to bear on their current duties and problems and will collaboratively problem solve with faculty and other interns. Second, interns will participate in special topics seminars as needed in order to supplement coursework in critical areas. Examples of special topics are AIDS, sexual harrassment in the workplace, child abuse, and substance abuse recognition.

EDUC 761 Internship in Educational Administration
Fall, spring and summer. 9 credits. S-U only. Hours to be arranged. G. Posner, J. W. Sipple and K. A. Strike.
The internship experience will provide aspiring administrators with supervised professional activities in a public school district. Students undertaking an internship in Educational Administration will (1) learn the practical day-to-day skills of school administration under the supervision of an on-site administrator, and (2) conceptualize and execute a research project dealing with an issue of interest to the participating school district and the student's special committee. Students will work in collaboration with their special committee and on-site supervisor to integrate educational theory and the field experience. A minimum of 20 hrs per week will be devoted to on-site internship duties. Students will enroll concurrently in EDUC 760 (practicum seminar) to complete additional degree and certification requirements.

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. R. E. Steele.
Extension education in the developing nations is studied using, as an analytical frame of reference, a hypothetical model comprising such components as community organization, community-based learning, indigenous facilitators and leaders, extension generalists and specialists, training and research-extension linkages. Case materials on alternative extension models and intercountry experiences provide an empirical base.

EDUC 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.

ENTOMOLOGY

D. A. Rutz, chair; M. C. Caillaud, N. W. Calderone, B. N. Danforth, J. Ewer, P. P. Feeny, C. Gilbert, A. E. Hajek, M. P. Hoffmann, J. K. Liebherr, J. E. Losey, R. A. Morse, B. L. Peckarsky, D. Pimentel, L. S. Rayor, R. B. Root, J. P. Sanderson, J. G. Scott, A. M. Shelton, E. J. Shields, M. J. Tauber, W. M. Tingey, Q. D. Wheeler

Courses by Subject

Apiculture: 260, 264
Behavior: 215, 325, 471, 662
Ecology: 452, 455, 456, 470, 471, 672
Introductory courses: 201, 212, 215
Medical entomology and veterinary entomology: 352
Morphology: 322
Pathology: 463
Pest management: 241, 277, 441, 444, 477, 644
Physiology and toxicology: 370, 483, 490, 685
Systematics: 331, 453, 631, 632, 634, 635

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 Alien Empire: Bizarre Biology of Bugs
Spring. 2 credits. Limited to 100 students. S-U grades optional. Lecs, T R 9:05; optional field trips, required lab demonstrations. Offered alternate years. B. N. Danforth.
Insects are the most abundant and diverse animals on earth. This course will explore the bizarre biology of insects by examining their evolutionary history, anatomy, development, feeding habits, life-history strategies, behavior, and their interactions with humans (both positive and negative) through history. Optional field trips and one open lab will provide hands-on opportunities for examining these amazing animals.

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. Lab fee $35. C. Gilbert.
Introduces the science of entomology by focusing on basic principles of systematics, morphology, physiology, behavior, and ecology of insects. The laboratory in early fall includes field trips to collect and study insects in the natural environment. A 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. L. S. Rayor.
An introduction to the fascinating world of spiders. Evolution, ecology, behavior, and physiology of spiders and their close kin will be explored 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, and potential use in IPM.

ENTOM 241 Applied Entomology
Spring. 3 credits. Prerequisites: BIO G 101–102 or equivalent. Lecs, T R 10:10; lab/disc, T or W 12:20–3:15. W. M. Tingey.
Introduction to major pest species and tactics for their management. Discussions of insect pest management requirements on farms, gardens, forests, and urban environments, along with descriptions of control methods, materials, and equipment.

ENTOM 260 Introductory Beekeeping
Fall. 2 credits. Lecs, T R 11:15. R. A. Morse.
Introduces the fundamentals of practical beekeeping, including the life history, physiology, and behavior of honey bees. The classical experiments on the dance language and the role of pheromones are reviewed. Some lectures are devoted to pollination of agricultural crops and the production of honey and beeswax.

ENTOM 264 Practical Beekeeping
Fall. 1 credit. Limited to 20 students. Prerequisite: ENTOM 260 (may be taken concurrently). Lab, R 2–4:25. R. A. Morse.
This course consists of fourteen laboratory sessions to acquaint students with practical methods of colony management. Laboratories involve actual work with honey bee colonies and equipment. Some of the topics covered are management of bees for apple pollination, honey harvesting and processing, and disease identification and control.

[ENTOM 277 Natural Enemies Managing Pests: An Introduction to Biological Control
Spring. 2 credits. S-U grades optional. Lecs, T R 1:25–2:15; lab demonstration; optional field trip. Offered alternate years. Not offered spring 2000; next offered spring 2001. A. E. Hajek.

An introduction to the dynamic field of biological control. What is it and when should it be used? This course covers a diversity of types of biological control including use of parasitoids, predators, pathogens, and competitors as well as plant breeding to control pests from microbes to weeds to invertebrates to vertebrates. This presentation is intended for students curious about controlling pests without using synthetic chemicals.]

[ENTOM 322 Comparative Insect Morphology

Spring. 5 credits. Prerequisite: ENTOM 212 or 241. Lecs, M W F 9:05; labs, M W 1:25–4:25. Offered alternate years. Not offered spring 2000; next offered spring 2001. B. N. Danforth.

This course provides a detailed introduction to the external and internal anatomy of insects. Lectures introduce basic concepts in insect morphology, such as the organization of the insect body plan and organ systems, functional morphology, homology, phylogeny, modularity, and development. The laboratory portion of the course introduces students to the basic methods of insect microdissection, specimen preparation, and scientific illustration. High-quality, publishable illustrations are produced based on student art-work.]

[ENTOM 325 Insect Behavior

Spring. 3 credits. Prerequisites: introductory biology or introductory entomology or permission of instructor. Lecs, M W F 12:20. Offered alternate years. Not offered spring 2000; next offered spring 2001. L. S. Rayor.

Insects are the most diverse organisms on earth, with equally diverse behavior. This course will explore the behavior of insects, ranging from the individual sensory and physiological mechanisms that are the basis of insect behavior, to the behavioral dynamics of foraging, courtship, parental care, and social behavior. Topics include insect learning, perceptual abilities, host finding strategies, predation, pollination, and examination of current issues in insect behavior.]

ENTOM 331 Introductory Insect Systematics

Fall. 4 credits. Prerequisite: ENTOM 212. Lecs, T R 12:20; labs, T R 1:25–4:25. Offered alternate years. Q. D. Wheeler.

An introduction to the classification, evolutionary history, and distribution of the insects. Laboratory practice in the identification of orders, families, and representative genera of insects; methods of collection, preservation, and study. Lectures on theory and practice of insect systematics and major features of insect evolution. Insect collections are required.

[ENTOM 352 Medical and Veterinary Entomology

Fall. 3 credits. Prerequisites: BIO G 101–102 or equivalent. S–U grades optional. Lecs, T R 10:10; lab, R 1:25–4:25. Offered alternate years. Not offered fall 1999; next offered fall 2000. Staff.

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. Lecs, T R 9:05. Offered alternate years. Not offered fall 1999; next offered fall 2000. 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. Hours to be arranged. Offered alternate years. M. P. Hoffmann 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 241 or their equivalents or permission of instructor. Lecs, M W F 9:05; labs M or T 1:25–4:25. P. Arneson and J. Losey.

Lectures integrate the principles of pest control, ecology, and economics in the management of pests across multiple 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 257 or 357/358 and 251 or 301; or permission of instructor. Lecs, M W F 11:15. Offered alternate years. Not offered spring 2000; next offered spring 2001. P. 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)

Fall. 3 credits. Prerequisite: a course in systematics or permission of instructors. S-U grades optional. Lecs, T R 10:10; lab T 1:25–4:30. Offered alternate years. J. K. Liebherr and M. Luckow.

A survey of techniques in historical biogeography, and the development of modern biogeographic theory in the context of classical, ecological and phylogenetic analytical methods. Geological and paleontological aspects of biogeography will be presented, and large-scale biogeographic patterns discussed. Laboratories will focus on computer applications and discussion of controversial issues.

ENTOM 455 Insect Ecology (also BIOES 455)

Fall. 3 credits. Prerequisites: BIOES 261 or equivalent and ENTOM 212 or equivalent knowledge of another taxon. S-U grades optional. Lecs, M W F 11:15. Offered alternate years. 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 and NTRES 456)

Spring. 4 credits. Limited to 60 students. Recommended: BIOES 261. S-U grades optional. Lecs, T R 9:05; labs, T W or R 1:25–4:25. Offered alternate years. Not offered spring 2000; next offered spring 2001. B. L. Peckarsky.

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 disturbances. **Lab:** a field project includes descriptive and experimental techniques and hypothesis testing related to environmental assessment.]

ENTOM 463 Invertebrate Pathology

Spring. 4 credits. Prerequisites: one year of introductory biology. S-U grades optional. Lecs, M W F 9:05; lab, W 1:25–4:25. Offered alternate years. 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 microinjection, electrophoresis, immunoassay, density gradient centrifugation, soil extraction, and computer simulation.

ENTOM 470 Ecological Genetics

Spring. 3 credits. Prerequisites: BIOES 278 or permission of instructor. S-U grades optional. Lecs, T R 10:10; disc, 1 hr/wk to be arranged. Offered alternate years. C. M. Caillaud.

A study of the genetic basis and evolution of ecologically important traits. Blending theory with an experimental approach to study evolution in nature, the course includes methods for measuring genetic variation and natural selection; biometrical and molecular analysis of genetic architecture; constraints and limits on evolution in natural populations; genetic aspects of coevolution, phenotypic plasticity, and conservation of endangered species. Examples are taken from studies of animals and plants.

ENTOM 471 Freshwater Invertebrate Biology and Biomonitoring

Spring. 5 credits. Recommended: ENTOM 212. S-U grades optional. Lecs, T R 9:05; labs, T R 1:25–4:25. Offered alternate years. B. L. Peckarsky.

The lecture explores the morphology, physiology, phylogeny, life histories, behavior,

feeding ecology, and evolution of macroscopic freshwater invertebrates with an emphasis on contrasting the attributes of aquatic and terrestrial insects. The laboratory involves field collections and laboratory identification of invertebrates and stresses the use of keys. Students will prepare a collection of freshwater invertebrates or conduct a project using freshwater invertebrates to biomonitor stream habitat quality.

ENTOM 477 Biological Control
Fall. 3 credits. Prerequisites: ENTOM 212, BIOES 261, and permission of instructor. Lecs, T R 9:05; lab T 1:25–4:15. Offered alternate years. M. J. Tauber.
Approach and procedures in biological control of arthropod pests and weeds. Demonstrations focus on living parasitoids and predators. Discussions focus on case histories.

[ENTOM 483 Insect Physiology
Fall. 5 credits. Prerequisite: ENTOM 212 or permission of instructor. Lecs, M W F 11:15; lab W 1:25–4:25 and a disc, to be announced. Offered alternate years. Not offered fall 1999; next offered fall 2000. 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)
Spring. 4 credits. Prerequisites: general chemistry. S-U grades optional. Lecs, M W F 9:05; disc 1:25–2:15, day to be arranged. Offered alternate years. Not offered spring 2000; next offered spring 2001. J. G. Scott.
The history, metabolism, and mechanism of action of synthetic and naturally occurring insecticides. Mechanisms of insecticide resistance, evaluation of insecticide toxicity, and new approaches to 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. Limited to 18 students. 3 week summer session. Prerequisites: an introductory course in insect taxonomy and permission of instructor. Labs, M T W R F 9–4; Saturday field trips. Offered alternate years. Q. D. Wheeler.
A comprehensive review of the comparative morphology, phylogenetic relationships, classification, natural history, and distribution of the Coleoptera, including adult and immature stages. Laboratory practice in identification and methods for collection and study of beetles. A collection is required.

ENTOM 632 Advanced Coleopterology
Summer. 1–3 credits. Prerequisite: permission of instructor. S-U grades optional. Offered alternate years. Not offered summer 2001; next offered summer 2000. Lab, to be arranged. Q. D. Wheeler.
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 bionomics of selected taxa, with accompanying laboratory studies on identification and comparative morphology. Collections sometimes required.

ENTOM 635 Insect Molecular Systematics
Winter session, 2000. 2 credits. Prerequisites: permission of instructor. Offered alternate years. Lectures/labs M-F 9:00 am.-1:00 pm. Limited to 6 students. B. N. Danforth.
Analysis of DNA sequence variation can provide a powerful tool for resolving problems in insect systematics, from species level taxonomic decisions to higher level (ordinal) relationships. This course will introduce students to the basic methods of insect molecular systematics, including DNA extraction, gel electrophoresis, PCR, DNA purification, and DNA sequencing (manual and automated). Results will be analyzed using available computer programs. Students are encouraged to collect preliminary data for thesis or post-doctoral research.

ENTOM 644 Advanced IPM: Theory and Implementation
Spring. 1–4 credits. S-U grades optional. Lecs, M W F 10:10. Coordinator: J. E. Losey.
This advanced course in integrated pest management (IPM) will be comprised of a rotating series of four-week intensive modules on specialized topics. Topics will range from basic ecology and genetics of pests and their natural enemies to specific strategies for pest management implementation. The course is designed to provide advanced IPM instruction for graduate and upper-level undergraduate students with intermediate backgrounds in IPM. In special cases, students with little or no background in IPM seeking intensive instruction on a specialized topic may enroll with permission of the instructor. Each module is a unique unit and students may take any or all modules each time the course is offered. Prerequisites and grading procedures will be determined by the instructor(s) of each module. Potential modules include: Insecticide resistance and resistance management—J. Scott: Entomology (Ithaca); Crop protection decision-making—J. Nyrop: Entomology (Geneva); Economics of pest management—Staff: ARME; Greenhouse and Floriculture IPM—J. Sanderson: Entomology (Ithaca); IPM in fruit systems—A. Agnello, G. English-Loeb: Entomology (Geneva); Genetics in managed ecosystems—C.M. Caillaud: Entomology (Ithaca); Turf-grass insect IPM—M. Villani: Entomology (Geneva); Insect vectors of plant pathogens—Staff; IPM of soil-dwelling arthropods—M. Villani: Entomology (Geneva); Integrated weed and insect pest management—C. Mohler: Ecology & Systematics; IPM implementation and extension—M. Hoffmann, J. Sanderson: Entomology (Ithaca); Plant resistance—Staff: Entomology, Plant Breeding; Integrated Pest Management in Tropical Agriculture—P. Arneson: Plant Pathology (also PL PA 655); IPM of natural systems—B. Blossey: Natural Resources; Sustainable strategies for pest management—Staff.

ENTOM 662 Insect Behavior Seminar
Spring. 2 credits. Prerequisites: permission of instructor and ENTOM 212 and BIONB 221 or equivalents. S-U grades optional. Offered alternate years. 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 BIOES 261, 462. S-U grades optional. Hours to be arranged. Offered alternate years. 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. Hours to be arranged. C. Gilbert.

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. Staff.

ENTOM 900 Doctoral-Level Thesis Research
Credit to be arranged. Prerequisite: permission of instructor. S-U grades optional. Staff.

Jugatae Seminar
Fall and spring.
A seminar conducted by Jugatae, the entomology club of Cornell University, to discuss topics of interest to its members and guests. All interested undergraduate and graduate students are encouraged to attend.

FLORICULTURE AND ORNAMENTAL HORTICULTURE

Floriculture and Ornamental Horticulture courses are listed under Horticultural Sciences.

Freehand Drawing and Scientific Illustration

Freehand Drawing and Scientific Illustration courses are offered through the Department of Floriculture and Ornamental Horticulture and are described in the section "Freehand Drawing and Scientific Illustration."

FOOD SCIENCE

D. D. Miller, chair; T. E. Acree, D. K. Bandler, D. M. Barbano, C. A. Batt, M. C. Bourne, J. W. Brady, D.P. Brown, J. M. Brown, R. B. Gravani, T. Henick-Kling, J. H. Hotchkiss, H. T. Lawless, C. Y. Lee, R. H. Liu, S. J. Mulvaney, J. M. Regenstein, S. S. H. Rizvi, S. K. Sharma, K. J. Siebert.

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. M 1:25–2:15. J. H. 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 Exploring Food Processing
Spring. 1 credit. S-U grades only. F 12:20. Five field trips, one on F 12:30–2:30 and four on F 12:30-5:30. D. P. Brown.
A series of seminars on current technological and regulatory developments in food science. Field trips to four commercial food manufacturing/processing plants and one food research organization will be used to illustrate the application of current technologies. A course project, using the Food Science Alumni Network, will be required.

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 needed to make healthy food choices. A systematic approach to food production, processing, distribution, and consumption will be presented. Each student will analyze the nutritional quality of his or her personal diet using a computer diet analysis program. Topics include relationships between diet and health; food processing; food safety; and discussions of contemporary issues relating to food quality, safety, and nutrition.

FOOD 200 Introductory Food Science
Fall. 3 credits. Prerequisite: college level courses in chemistry and biology. M W F 11:15–12:05. J. H. Hotchkiss.
A comprehensive introduction to the principles and practice of food science and technology. Topics include: chemistry of foods; nutritional significance; food formulation, preservation, and processing; microbiology and fermentations; composition and processing of food commodities; and contemporary issues including food safety, regulation, and world food needs. Interrelationships between the chemical, physical, nutritional and quality properties of foods as affected by formulation, processing, and packaging are stressed.

FOOD 210 Food Analysis
Spring. 3 credits. Prerequisite: CHEM 208 or equivalent. Lecs, W F 12:20; lab, M 12:20–3:20. R. H. Liu.
Introduces basic analytical techniques for food analysis and other biological analysis. Emphasizes fundamental principles of analytical chemistry, basic laboratory techniques, and modern instrumental methods. Gravimetric, volumetric, and spectrophotometric methods, gas chromatography (GC), high-performance liquid chromatography (HPLC), infrared spectra (IR), and atomic absorption spectometry are discussed.

FOOD 250 Kosher and Halal Food Regulations
Spring. 2 credits. Sophomore standing and above. M 7:30–9:25 p.m. J. M. Regenstein.
A comprehensive introduction to kosher and halal foods in the American food industry with some coverage of home practices. The kosher food laws, their origin, and their application in modern food processing will be examined. The nature of the kosher supervision industry in America will be described. Halal laws will also be examined and the interactions between the two communities explored. Current food-related issues in both communities will be reviewed, including recent court decisions. Some aspects of ethnic foods will also be considered.

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. Lab cannot be taken without lecture. D. E. Shaw.
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, 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. R 12:20–4:25. Offered alternate years. Next offered fall 2000. D. K. Bandler and D. P. Brown.
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 consumer acceptance.]

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 R 1:25–4:10; lec, T 12:20. S. K. Sharma and S. S. H. Rizvi. Limited to 10 students in each lab session.
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 351 Milk Quality
Fall. 1 credit. Prerequisite: AN SCI 250 or equivalent or permission of instructor. F 12:20. D. K. Bandler and D. P. Brown.
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 Applied and Food Microbiology (also BIOMI 394)
Fall. 2–3 credits. Prerequisites: BIOMI 290–291. M W F 12:20–1:10. C. A. Batt.
Microorganisms play a central role in a variety of food, agricultural and environmental processes. This course will present a comprehensive survey of the roles that microorganisms play in industrial/biotechnological processes as well as their importance in the safety and production of foods. Issues related to the biochemistry, genetics and physiology of microorganisms important in these processes will be reviewed. A 2 credit core section on food microbiology is complemented by a 1 credit section on industrial/biotechnology applications.

FOOD 395 Food Microbiology Laboratory
Fall. 2 credits. Prerequisite: BIOMI 291 or equivalent. M W 2:00–4:25. J. M. Brown.
Work includes study of the physiological characteristics of representative food microorganisms, practice in using general and special methods for microbiological testing and control of food products, and practice in the application of a systematic approach to controlling the safety of foods.

[FOOD 396 Food Safety Assurance
Spring. 2 credits. Prerequisite: MICRO 290 or permission of instructor. T R 9:05–9:55. Offered alternate years. Not offered spring 2000. 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 the Hazard Analysis Critical Control Point (HACCP) concept, good manufacturing practices, prerequisite programs, and the application of current technologies in reducing the risk 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 4:30–5:20. D. K. Bandler.
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. M W 11:15–12:05. Offered alternate years. Next offered 2001. J. H. Hotchkiss.
A discussion of the sequence of events in developing and marketing new food products. Topics include food formulation, packaging and labeling, food additive and ingredient regulations, taste panels, market testing, market research, and patents.]

[FOOD 405 Managing Food Waste Without Trashing the Environment
Spring. 2 credits. Prerequisite: FOOD 200 or its equivalent. Lec, 12:30–2:15; lab, M 2:30–4:25. Offered alternate years. Not offered spring 2000 or 2002. J. M. Regenstein.
A look at the various waste streams generated by food plants, institutional feeders, supermarkets, and restaurants. What is the role of waste minimization? What technologies can control or remediate the problems? What are the disposal, composting, and recycling options? What are the legal requirements locally, state-wide, and nationally that affect various food waste processes? This course will serve as a general introduction to available waste management technologies and to policy issues faced by a wide range of businesses and production plants.]

FOOD 406 Cheese and Other Fermented Dairy Foods
Fall. 2 credits. Prerequisite: background in microbiology. R 12:20–4:25. Offered alternate years. Next offered fall 1999. D. K. Bandler and D. P. Brown.
Principles and practices of fermentation and processing techniques as they apply to cheeses, cultured dairy foods, beer, 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 9:05–9:55. J. W. Brady.
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 interactions and functional roles in foods. The effects of chemical changes during processing and storage on quality and nutritional aspects of several food commodity groups (milk, meat, fruits and vegetables, cereals and legumes) are described.

FOOD 410 Sensory Evaluation of Food
Fall. 2–3 credits (one lab credit). Prerequisite: statistics. Lec, T R 9:05–9:55; lab, F 1:25–4:25. H. T. Lawless.
Topics include the sensory evaluation methods used to test the flavor, appearance and texture of foods by quantitative description and simple difference testing, consumer testing for product acceptability, sensory tests in quality control, strategic product research and product development. The psychological principles in sensory testing and statistical methods for sensory data analysis are presented. The laboratory provides first hand experience in organizing and conducting sensory tests and an introduction to online date collection and analysis. Undergraduate Food Science majors are required to take both the lecture and the laboratory.

FOOD 415 Principles of Food Packaging
Spring. 3 credits. M W F 9:05–9:55. Offered alternate years. Next offered spring 2000; not offered spring 2001. J. H. Hotchkiss.
The chemical and physical properties and manufacture of the basic materials used to construct packaging are discussed. The influence of packaging on shelf life is presented. Emphasis is on newer packaging technologies and materials. Economics, design, and regulation of food packaging are briefly presented.

FOOD 419 Food Chemistry Laboratory
Spring. 2 credits. Prerequisites: BIOBM 330 or 331 and concurrent registration in FOOD 409. W 12:20–4:25. D. D. Miller and J. M. Brown.
A laboratory course emphasizing fundamental chemical principles and laboratory techniques necessary for an understanding of the chemistry of foods. Relationships between chemical composition and functional, nutritional, and organoleptic properties of foods are stressed. Many of the laboratory techniques involved are common to those used in biochemistry laboratories (e.g., electrophoresis, chromatography, enzyme assays) but are applied to specific foods or beverages.

FOOD 423 Unit Operations in Food Manufacturing
Fall. 4 credits. Intended for seniors and food science majors. Lec, T R 11:15–12:05; recitation, T 12:20; lab, 1:25–4:25 T or to be arranged. S. J. Mulvaney and S. K. Sharma.
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. 25, 2000) to enroll. S-U grades optional. T R 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 447 International Postharvest Food Systems
Fall. 2 or 3 credits. Prerequisite: freshman chemistry. S-U grades optional. T R 10:10–11:00. M. C. Bourne and staff.
An interdisciplinary course designed for all undergraduate and graduate students in CALS. Describes postharvest food losses and methods to reduce the loss. Topics include storage and care of unprocessed and minimally processed foods such as cereal grains, fruits, vegetables, tubers, and fish; biology and control of fungi, insects, and vertebrates in foods; chemical causes of quality loss; effects of climate; and economic and social factors affecting food preservation and storage. Emphasis is given to the problems in developing countries. The third credit requires a written case study of a country or commodity.

FOOD 450 Fundamentals of Food Law
Spring. 2 credits. Offered alternate years. Next offered spring 2000; not offered spring 2001 or 2003. J. M. Regenstein.
Introduction to the complex array of federal and state statutes and regulations that control the processing, packaging, labeling, and distribution of food, including aspects of safety and nutritive value. Emphasis will be on the Food and Drug Administration and U.S. Department of Agriculture regulations, but the course also will refer to other regulatory agencies. Emphasis will be placed on how a food or agricultural professional interacts with this legal system during legislative action, regulatory rule making, and with respect to compliance.

[FOOD 456 Advanced Concepts in Sensory Evaluation
Spring. 2 credits. Prerequisite: FOOD 410. S-U grades optional. Offered alternate years. Next offered spring 2001. F 1:25–3:20. H. T. Lawless.
Readings and discussions of primary source materials in sensory evaluation, including recent advances in sensory methods, historical perspectives, psychophysics, perceptual biases, and multivariate statistical approaches to sensory data. A major independent research project is conducted on a current issue in sensory evaluation.]

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 a professor or a group of students, or selected lectures of a course already offered. As topics may be changed, the course may be repeated for credit.

FOOD 498 Undergraduate Teaching Experience
Fall or spring. 3 credits maximum. Prerequisite: permission of instructor. Students must register with an Independent Study Form (available in 140 Roberts Hall). S-U grades only.
Students assist in teaching a course appropriate to their previous training and experience. 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). This course may be repeated for credit.
Students conduct original research directed by a food science faculty member.

FOOD 600 Seminar in Food Science
Fall and spring. 1 credit. S-U grades only. Required of all food science graduate students. T 4:30–5:30.
A weekly seminar series on contemporary topics and issues in the Field of Food Science and Technology. Representatives from academia, industry, and government provide presentations on a wide variety of topics. Graduate students in the Field of Food Science and Technology may use the forum to present their required thesis research seminar. Required of all graduate students in the Field of Food Science and Technology. Strongly recommended for graduate students minoring in Food Science and Technology.

[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. F 1:25–3:30. Offered alternate years. Not offered fall 1999. D. M. Barbano.
A detailed study of milk constituents and their properties. Properties of various milk constituents are related to observed physical and chemical changes that occur in dairy products during and after processing. This course will emphasize current research in dairy chemistry.]

[FOOD 605 Physical Chemistry of Food Components
Fall. 3 credits. Prerequisite: an undergraduate course in physical chemistry. M W F 10:10. Offered alternate years. Not offered fall 1999. 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). M W 11:15. Offered alternate years. Next offered spring 2000; not offered spring 2001. C. A. Batt.
There have been great advances in applying the modern tools of molecular biology to the detection of microorganisms and their metabolites. The primary emphasis of this course will be to review the recent developments in the theory and application of nucleic acid and antibody-based detection systems, especially as they concern food safety. In addition, other approaches, including measurement of impedence, ATP, and endotoxins, will be discussed.

FOOD 608 Chemometric Methods in Food Science
Fall. 2 credits. Prerequisite: basic statistics and chemistry or permission of instructor. S-U grades optional. W 1:25–3:20. Offered alternate years. Next offered in 2000. K. J. Siebert.
Food science applications using multivariate statistical methods (chemometrics) include extracting information from large data sets, modeling molecular and product properties, optimizing analytical methods and processing operations, discerning relationships between product composition and sensory properties, identifying cultivars or species, and detecting adulteration. The techniques covered are also applicable to many other problems in biology and chemistry.

FOOD 616 Flavors—Analysis and Applications
Spring. 2 credits. S-U grades optional. Lec, F 1:25; disc, F 2:30. Offered alternate years. Next offered spring 2000; not offered spring 2001. H. T. Lawless and T. E. 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. T R 10:10. Offered alternate years. Next offered spring 2000; not offered spring 2001. 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 621 Food Lipids
Fall. 2 credits. Letter grade. Prerequisites: FOOD 409 and a Biochemistry course.
An advanced course in food lipids. Describes the physical, chemical and biochemical properities of lipids, interactions and changes in food processing and storage, food technology and applications, and modern analytical methodology of lipids.

FOOD 665 Engineering Properties of Foods
Spring. 2 credits. Prerequisite: course in transport processes or unit operations as applied to foods; or permission of instructor. T R 12:20–1:10. Offered alternate years. Next offered spring 2000; not offered spring 2001. S. S. H. Rizvi, S. J. Mulvaney, and S. K. Sharma.
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 694 Special Topics in Food Science
Fall or spring. 4 credits maximum. 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.

FOOD 698 Graduate Teaching Experience
Fall and 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.

FOOD 900 Graduate-Level Thesis Research
Fall or spring. Credit to be arranged. Maximum credit, 12. Prerequisite: limited to doctoral students who have not passed the "A" exam; permission of Special Committee Chair. S-U grades only. Graduate faculty.

FOOD 901 Doctoral-Level Thesis Research
Fall or spring. Credit to be arranged. Maximum credit, 12. Prerequisite: limited to doctoral students who have passed the "A" exam; permission of Special Committee Chair. S-U grades only. Graduate faculty.

Related Courses in Other Departments

Introduction to Computing (ABEN 151)

Introduction to Business Management (ARME 220)

Marketing (ARME 240)

Food Industry Management (ARME 443)

Biological and Environmental Transport Processes (ABEN 350)

Computer-Aided Engineering: Applications to Biomaterials and Food Processing (ABEN 453)

Practical Aspects of Postharvest Handling of Horticultural Crops (HORT 325)

FREEHAND DRAWING AND SCIENTIFIC ILLUSTRATION

Freehand Drawing is a program within the Department of Floriculture and Ornamental Horticulture. Other courses offered by the department are listed under Horticultural Sciences.

[FR DR 109 Nature Drawing
Fall. 3 credits. Limited to 25 students. S-U grades optional. Permission of instructor required. M W F 10:10–12:05. Not offered fall 1999. R. J. Lambert.
A beginning course with emphasis on the drawing of natural forms: plants, animals, and landscapes. Of particular interest to students in floriculture and ornamental horticulture, landscape architecture, biological sciences, nature education, or similar fields. Outside field notebook assignments.]

[FR DR 211 Freehand Drawing and Illustration
Fall. 2 credits. Prerequisite: FR DR 109 or equivalent. S-U grades optional. 6 studio hours scheduled in 2 or 3 hour units between 9:05 and 12:05 M T W R. Not offered 1999. R. J. Lambert.
Progression to the organization of complete illustrations. Subject matter largely from sketchbooks, still life, and imagination. Composition, perspective, and ways of rendering in different media are considered.]

FR DR 214 Watercolor
Spring. 2 credits. S-U grades optional. 4 studio hours scheduled in 2 hour units between 9:05 and 12:05 and 2 hours outside sketching. M T W R. R. J. Lambert.
A survey of watercolor techniques. Subject matter largely still life, sketchbook, and on-the-spot outdoor painting.

FR DR 316 Advanced Drawing
Fall. 2 credits. Prerequisite: FR DR 109, 211 or permission of instructor. S-U grades optional. 4 hours to be arranged. M R 9:05–12:05, 2 hours outside sketching. 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 1999–2000. R. J. Lambert.
A survey of methods of illustration. Training in techniques of accurate representation in media suitable for reproduction processes, including pen and ink, scratchboard, wash, and mixed media.]

FRUIT AND VEGETABLE SCIENCE: HORTICULTURAL SCIENCE

See Horticultural Sciences.

HORTICULTURAL SCIENCES

Horticultural science courses at Cornell are taught by the faculty of the Department of Floriculture and Ornamental Horticulture and the Department of Fruit and Vegetable Science (Pomology and Vegetable Crops).

Floriculture and Ornamental Horticulture

T. C. Weiler, chair; N. L. Bassuk, G. L. Good, C. F. Gortzig, J. Gruttadaurio, R. J. Lambert, R. W. Langhans, C. P. Mazza, W. B. Miller, R. G. Mower, K. W. Mudge, A. M. Petrovic, D. A. Rakow, F. S. Rossi, L. A. Weston, T. H. Whitlow

Fruit and Vegetable Science

H. C. Wien, chair; R. R. Bellinder, L. A. Ellerbrock, D. E. Halseth, I. A. Merwin, M. P. Pritts, A. Rangarajan, J. Sieczka, L. D. Topoleski, C. B. Watkins, D. W. Wolfe

Courses by Subject:

General horticulture: 100, 101, 102
Public garden management: 485
Crop production:
- Agroforestry: 415
- Fruit: 200, 442, 444, 445, 450
- Greenhouse and controlled environments: 400, 410
- Nursery: 400, 420
- Turfgrass: 330, 475
- Vegetable: 225, 456, 460

Extension education: 476, 629
Horticultural physiology: 400, 450, 455, 456, 460, 462, 615, 620
Independent study, research, and teaching: 470, 495, 496, 497, 498, 499, 500, 605, 700, 800, 900
Internships: 496
Landscape horticulture: 301, 435, 440, 485, 491
Plant materials: 230, 243, 300, 301, 335, 430
Plant propagation: 400
Postharvest physiology: 325, 625, 630
Seminars: 602, 630
Special topics: 470, 494, 629, 630, 635, 694
Turfgrass management: 330, 475
Vegetable types and varieties: 220, 465

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.

HORT 100 History of Horticulture
Fall. 2 credits. Lec, T 2:00–4:30. C. F. Gortzig.
A survey of the history and development of horticulture as a science, art and profession. Discussions cover from pre-history to the present with emphasis on the 1700's to present. A field trip to historic sites for which there may be a charge of $30–$50.

HORT 101 Introduction to Floriculture and Ornamental Horticulture
Fall. 2 credits. Lec, W 10:10; lab W 1:25–4:25. T. C. Weiler and staff.
Introduction to the technology and career opportunities in floriculture and ornamental horticulture. Exploration of private and/or public sector activities: production (greenhouse, nursery, and sod), sales (retail and wholesale), landscape management (landscape management, recreational turfgrass management, urban horticulture) related professional and commercial fields. The role of science and technology in the continuing development of horticultural practice. Field trips to horticultural firms and demonstration 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.
This course acquaints the student with applied and basic horticulture. Open to all students who want a general knowledge of the subject or who want to specialize in horticulture but have a limited background in practical experience or training in plant science. Includes flower, fruit, and vegetable growing and gardening techniques.

HORT 200 Introductory Pomology
Fall. 3 credits. S-U grades optional. Lec, T R 10:10; lab, T 1:25–4:25. I. A. Merwin.
A general introduction to pomology—the science and art of fruit growing. Lectures and discussion emphasize the natural history, ecology, botany, physiology, integrated pest management, and diverse production systems for fruits grown in temperate climate areas. Lab sessions and field-trips involve fruit anatomy and morphology, clonal selection and propagation, planting and pruning techniques, fruit harvesting and storage, environmental and sustainability issues, WWWeb-based information on fruit growing, and hands-on practice in local orchards and vineyards.

HORT 220 Vegetable Types and Identification
Fall. 2 credits. T 2–4:25. L. Topoleski.
This course acquaints students with the vegetable species grown in the Northeast and the pests and disorders encountered in their production. Subjects covered include identification of economically destructive weeds, diseases and insects of vegetables, identification of vegetable and weed seeds, seedlings, nutrient deficiencies, vegetable judging, grading, and grade defects.

HORT 225 Vegetable Production
Fall. 4 credits. Lecs, M W F 11:15; lab, W 2–4:25; 1 S fieldtrip and 3 fieldtrips (September). W 11:15–6:00. L. A. Ellerbrock.
Intended for those interested in the production, processing, and marketing of vegetables. Topics included are techniques, problems, and trends in the culture, harvesting and storage of the major vegetable crops. Field trips to conventional and organic farms and hands-on experience in growing vegetables in the laboratory are included.

HORT 230 Woody Plant Materials
Spring. 4 credits. Fee for lecture-laboratory manual: $35. Lecs, T R 9:05; lab T 2–4:25 **required** and **either** W **or** F 2–4:25. Staff.
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 BIOPL 243)
Fall. 3 credits. Prerequisite: one year of introductory biology or written permission of instructor. May not be taken for credit after BIOPL 248. Lec, M W 10:10–11:00; lab, W 1:25–4:25. Offered even years. Not offered fall 1999, next offered fall 2000. M. A. Luckow.
A study of ferns and seed plants, their relationships, and their classification into families and genera, emphasizing cultivated plants. Particular emphasis is placed on gaining proficiency in identifying and distinguishing families and in preparing and using analytic keys. Attention is also given to the economic importance of taxa, to the basic taxonomic literature, and to the elements of nomenclature.]

HORT 300 Herbaceous Plant Materials
Fall. 3 credits. Fee for lecture-laboratory manual: $35. Lecs, T R 10:10; lab, T 2–4:25. W. B. Miller.
Identification, use, characteristics, and garden cultural requirements of annual and herbaceous perennial plants, especially those used in northern climates. Practical gardening experiences at selected campus locations. Field trips to nearby specialty nurseries. Garden planting design is not a component of the course.

HORT 301 Plants for Interiors
Spring. 3 credits. Prerequisite: HORT 300 or permission of instructor. Fee for lecture-laboratory manual: $35. Lecs, M W 11:15; lab, R 2–4:25. Offered even years. T. C. Weiler and staff.
Study of plants for interiors: identification, design characteristics, and cultural requirements; the interior landscape industry (organization, bidding, installation, maintenance); use of plants as elements of planting design (trees, shrubs, groundcovers, and accent plants (including potted flowering plants and cut flowers). Required 3-day field trip, estimated cost, $130.

[HORT 325 Practical Aspects of Postharvest Handling of Horticultural Crops
Spring. 3 credits. Not offered spring 2000. Lecs, M W 9:05; lab T 1:25–4:25. Staff.
A study of changes that occur in horticultural crops between harvest and consumer. Practices that affect the rate of change and the final effect on quality of the commodity are discussed. Maturity/quality indices, preharvest treatments, and harvesting/handling practices and storage/transportation requirements of selected horticulture crops are covered.]

[HORT 330 Turfgrass Management
Fall. 3 credits. Prerequisite: SCAS 260. Lec, M W 11:15; lab, F 11:15–1:10. Offered even years. Not offered fall 1999, next offered fall 2000. A. M. Petrovic.
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, nutrition in the management of turfgrass sites, and integrated pest management.]

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 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: BIOPL 242 and 244 or another course in plant physiology. Lecs, T R 9:05; lab, R 1:25–4:25. K. W. Mudge.
Sexual (seed) propagation and asexual (vegetative) propagation including cuttage, graftage, tissue culture, layering and specialized vegetative reproductive structures. Physiological, environmental, and anatomical principles are stressed in lecture and hands-on skills in laboratories. Examples include both temperate as well as tropical horticultural, agronomic, and forestry crops.

HORT 401 The How, When and Why of Grafting—A Distance Learning Approach
Spring. 2 credits. Lec: autotutorial (web, cd); Lab: greenhouse/autotutorial; Discussion: email. K. W. Mudge.
A four week autotutorial approach to the principles and practices of grafting and budding as applied to plant propagation. Emphasis will be on the role of grafting in modern horticultural practice and on student development of hands on grafting skills. Instruction will involve microcomputer presentation of lecture materials (world wide web, cd-rom) asynchronous discussion (email), and hands on greenhouse laboratory exercises.

[HORT 410 Production and Marketing of Crops Grown in Controlled Environments
Spring. 4 credits. Letter grade only. Offered odd years; 2001. Lecs, T R 10:10; lab 2–4:25. T. C. Weiler and staff.
Basics of establishing and managing agricultural production in environmentally optimized facilities; technology basics, systems and practices, structures, systems and equipment, materials handling, heating and cooling, lighting, fertilizing and irrigation, environmental stewardship, integrated pest management, business management; world centers of production; production of cut, pot, bedding, vegetable, and fruit crops in controlled environments, emphasizing predictive harvesting through environmental, physical, and chemical management of growth and development. Each student will grow one or more crops. Required 3-day field trip, estimated cost, $130.]

HORT 415 Principles and Practices of Agroforestry (also NTRES 415)
Spring. 3 credits. Prerequisites: senior or graduate standing or permission of instructor. S-U option. Lecs, M W 10:10; lab, W 1:25–4:25. K. W. Mudge, J. P. Lassoie.
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 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. Prerequisite: HORT 400. Lecs, M W F 9:05; lab, M 2–4:25. Field trips. Offered odd years; 1999, 2001. 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 430 Special Topics in Ornamental Plants
Fall or spring. Credit and hours to be arranged. Primarily for upperclass floriculture and ornamental horticulture majors. Prerequisites: HORT 230, 300, 301, 335, or the equivalent, and permission of instructor. R. G. Mower.
Topical subjects in plant materials. Independent and group study of important groups of woody and herbaceous plant materials not considered in other courses. The topic is given in the supplementary announcement.

[HORT 435 Landscape Management
Fall. 4 credits. Prerequisites: HORT 230 or 335. Lecs, M W F 9:05; lab, M 2:00–4:25. Offered even years. Not offered fall 1999, next offered 2000. G. L. Good.
A study of the practices involved in the maintenance of woody ornamental plants in the landscape. The major emphasis will be on post-planting techniques, including water and fertilization management, weed management, pruning, and general tree care. 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 1:25–4:25. Offered odd years: 1999, 2001. T. H. Whitlow.
An inquiry based treatment of the principles and methods of ecology, conservation biology, hydrology, soil science and related disciplines applied to the 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 Berry Crops: Culture and Management
Fall. 3 credits. Lecs, M W 9:05; lab, M 1:25–4:25. Offered even years. Not offered 1999–2000. 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. Frequent field trips enhance classroom activities.]

HORT 444 Applied Viticulture
Fall. 3 credits. Lecs, T R 9:05; lab, R 2–4:25. Not offered 2000. R. M. Pool.
Grape production and post-production practices with emphasis on the Great Lakes and Finger Lakes regions. We will examine grape varieties, site selection, and vine 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 practices, marketing and processing.

HORT 445 Orchard Management
Spring. 3 credits. S-U grades optional. Lec T R 10:10; lab, T 1:25–4:25. Offered even years. Not offered in 2001. I. A. Merwin.
The science and technology of deciduous tree-fruit production. Topics include basic tree and fruit physiology, orchard renovation and design systems, nutrition, irrigation and

freeze protection practices, tree pruning and training, post-harvest fruit storage, marketing and economic spreadsheet models, monitoring and decision systems for integrated pest management, and efficient utilization of orchard equipment. Emphasis is on the agroecology of perennial crop systems, with labs providing hands-on experience in orchard management. Previous coursework in pomology and other plant sciences is suggested, but not a prerequisite.

[HORT 450 Soil Management and Nutrition of Perennial Crops
Fall. 3 credits. Fee for course materials $35. Lecs, M W 8; lab, M 1:25–4:25. Not offered 1999–2000.
Fundamentals of mineral nutrition and soil management for perennial horticultural crops. Soil management effects on crop performance, nutrient relationships, and interaction with other components of crop production systems are emphasized. Mineral nutrition aspects deal with diagnostic techniques, interpretation of tissue and soil analyses, and nutrient requirements for optimizing crop performance.]

[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 1999–2000.
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 460 Plant-Plant Interactions
Spring. 3 credits. Prerequisite: any crop production on plant ecology course or permission of instructor. Lecs, T R 9:05; lab/disc, M 2–4:25. Not offered spring 2001. D. W. Wolfe.
Mechanisms by which plants interfere or positively interact within the context of environmental conditions such as light, temperature, and fertility. Competitive and chemical interactions are considered between weeds and crops, among crops in polyculture, and between individuals in monoculture. Most examples will be taken from temperate and tropical monoculture and intercropping systems, but implications for natural ecosystems will also be considered.

[HORT 462 Vegetable Crop Physiology
Spring. 3 credits. Prerequisites: HORT 225 and BIOPL 242. Lecs, T R 9:05; lab/disc, M 2–4:25. Offered alternate years. Next offered spring 2001. H. C. Wien.
Study of the physiological processes that determine the timing, quantity, and quality of vegetable crop yields. Processes of flower induction, fruit set, fruit growth, and the relations between vegetative and reproductive growth are covered. The course emphasizes practical hands-on greenhouse experiments and small group discussions.]

HORT 465 Vegetable Varieties and Their Evaluation
Fall, weeks 1–7. 2 credits. Prerequisites: HORT 225 or permission of instructor. S-U grades only. Lecs, W F 8; lab, F 1:25–4:25. Offered alternate years. Not offered fall 2000. D. W. Wolfe and A. Rangarajan.
Principles of vegetable variety evaluation and selection of techniques in relation to program objectives. Morphology, yield, and quality of selected crops will be studied in the field. The seed industry will be briefly discussed.

HORT 470 Special Topics in Pomology
Spring. 3 credits. Open to undergraduates by permission. Hours to be arranged. Staff.
Selected topics are considered with respect to the current literature, experimental techniques, or applied technologies. Topics change from one year to another and reflect the expertise and research interests of the professors who participate. Topics selected for each term will be announced several months before the term begins.

HORT 475 Golf Course Management
Fall. 2 credits. Prerequisite: HORT 330 or equivalent. Lecs, F 1:25–4:25. Offered odd years. A. M. Petrovic.
Advanced study in the management of golf course operations including selection of root zone materials, fertilization practices, integrated pest management practices, irrigation systems, environmental based decision making, personnel management and financial operations. Analysis of a central New York golf courses will provide the basis for discussion.

HORT 476 Practical Problem-Solving in Horticulture
Fall. 2 credits. Lec, M 12:20–1:10; lab W 2–4:25. C. P. Mazza.
Foundation for extension or similar career oriented students. Application of horticultural science principles to practical situations. Techniques of synthesizing information from various scientific disciplines. Classes led by staff in several departments. Topics are interdisciplinary, drawing from expertise in horticultural science (landscape and food), entomology, plant pathology, natural resources, and Cornell Plantations.

HORT 480 Plantations Seminar Series
Fall. 1 credit. S-U grade only. W 7:30 p.m. D. A. Rakow.
A 10-week series of seminars given by prominent speakers on a variety of horticultural, natural sciences, and human cultural themes.

[HORT 485 Public Garden Management
Spring. 3 credits. Prerequisites: HORT 300 or HORT 301; HORT 230 or HORT 335. Lec, T R 10:10-11:00, lab, T R 11:15-12:05. Two-and-one-half-day field trip to visit other botanical gardens and arboreta. Offered odd years; 2001. Not offered spring 2000. D. A. Rakow.
The course will explore the history of public gardens, types of contemporary public gardens, and the operation of botanical gardens and arboreta. Included will be separate units on: collections curation, design of collections, management of landscapes and natural areas, educational programming, interpretive programs, research, financial management, and staffing.]

HORT 491 Design and Plant Establishment in the Urban Environment (also LA 491)
Fall. 3 credits. Prerequisites: HORT 230 or 335 or permission of instructor. Lecs, T R 12:20; lab, T 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 environmental constraints placed on plants, we will be able to critically assess and modify potential planting sites, select appropriate trees, shrubs, and ground covers, 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. 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.

In **Sections 01 and 02,** the departments teach "trial" courses under this number. Offerings may vary by semester, and will be advertised by the departments. Courses offered under the number will be approved by the department curriculum committees, and the same course will not be offered more than twice under this number.

Section 01, Fruit and Vegetable Science

Section 02, Horticultural Practicum. Fall. 3 credits. Lab, R 1:25–4:25. D. A. Rakow and staff.
In Section 02, students will gain practice in developing specific manual skills under the direction of experienced plantations' staff. Applied theory and practice for a variety of horticultural topics: integrated pest management, water, bog, and marsh gardening, bed preparation and planting perennials, tree planting, pruning techniques, small engine maintenance, stone patio and path construction, and dry stone wall construction.

HORT 495 Undergraduate Seminar
Fall or spring. 1 credit. Fruit and Vegetable Science. Undergraduate participation in weekly departmental seminar series. Graduate students should enroll in HORT 602. May be taken four times for one credit per semester. S-U grades only. R 4. C. B. Watkins and A. Rangarajan.
Current topics in Fruit and Vegetable Science (see HORT 602).

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. Staff.

HORT 497 Independent Study in Horticultural Sciences
Fall or spring. Credit variable. S-U grades optional. Prerequisite: permission of instructor(s). Students must register with an Independent Study form (available in 140 Roberts Hall). Independent study in horticultural sciences under the direction of one or more faculty members. Hours to be arranged. Staff.

HORT 498 Undergraduate Teaching Experience
Fall or spring. Credit variable. S-U grades optional. Prerequisites: previous enrollment in course to be taught or equivalent, and written permission of the instructor. Students must register with an

Independent Study form (available in 140 Roberts Hall). Hours to be arranged. Staff.

Designed to give qualified undergraduate students teaching experience through actual involvement in planning and teaching horticultural sciences courses under the supervision of departmental faculty members. This experience may include leading discussion sections; preparing, assisting in, or teaching laboratories; and tutoring.

HORT 499 Undergraduate Research

Fall or spring. Credit variable. S-U grades optional. Prerequisite: permission of instructor. Students must register with an Independent Study form (available in 140 Roberts Hall.) Hours to be arranged. Staff.

Undergraduate research projects in horticultural sciences.

HORT 500 Master of Professional Studies (Agriculture) Project

Fall or spring. 1–6 credits. (6 credits maximum toward MPS [Agriculture] degree). S-U grades optional. Staff.

A comprehensive project emphasizing the application of principles and practices to professional horticultural teaching, extension, and research programs and situations. Required of Master of Professional Studies (Agriculture) candidates in the respective graduate fields of horticulture.

HORT 600 Seminar in Floriculture and Ornamental Horticulture

Fall or spring. 1 credit. Prerequisite: permission of instructor. Lec, M 12:20. Staff.

Graduate students join distinguished visitors and Cornell staff members for weekly professional seminars on current teaching, research, and extension in floriculture and ornamental horticulture. Students will present a seminar based on their work. Often students use the presentations as part of their thesis defense and in preparation for job interviews.

HORT 602 Seminar in Fruit and Vegetable Science

Fall or spring. 1 credit. S-U grades only. R 4:00. A. Rangarajan and C. B. Watkins.

Weekly seminars consist of graduate student research project reports, faculty research topics, as well as guest speakers from other universities and/or industry. Required of graduate students majoring or minoring in pomology or vegetable crops. Undergraduate students register under HORT 495 Sec 1.

HORT 615 Quantitative Methods in Horticultural Research

Spring. Weeks 1–7. 2 credits. Prerequisite: BTRY 601, BTRY 602 or permission of instructor. S-U grades only. T R 2:30–4:25. Offered alternate years. Not offered spring 2001. D. W. Wolfe.

Advantages and limitations of conventional experimental designs and analyses of greenhouse and field (including-on-farm) experiments. Use and interpretation of plant growth analysis techniques. Discussions will include critical analysis of published data and research in progress.

[HORT 620 Woody Plant Physiology

Spring. 4 credits. BIOPL, BIOBM 331, CHEM 357, or equivalent, or permission of instructor. Letter grade only. Lecs, T R 8:40–9:55. Lab, T 1:25–4:25. Offered odd years; 2001. T. H. Whitlow.

An examination of physiological processes in woody plants emphasizing whole plant integration and how these processes affect plant growth under both natural and cropping systems. Topics include evolution of the woody plant form, structure and function of the root and shoot, growth periodicity, dormancy, growth analysis, carbon balance and allocation, root symbioses, and physiological responses to biotic and abiotic stress. Faculty from Geneva and Fruit and Vegetable Science collaborate in teaching.]

[HORT 625 Advanced Postharvest Physiology of Horticultural Crops

Spring. 3 credits. Prerequisite: BIOPL 242 and/or HORT 325. Lecs, T R 10:10; disc, to be arranged. Not offered spring 2000.

Physiological and biochemical aspects of growth and maturation, ripening, and senescence of harvested horticultural plant parts. Topics include morphological and compositional changes during ripening and storage life, some physiological disorders, aspects of hormone action and interactions, and a consideration of control.]

HORT 629 Special Topics in Plant Science Extension (also Plant Breeding 629)

Spring. 2 credits. Offered alternate years. F 1:25–4:25. W. D. Pardee.

Designed for graduate students and advanced undergraduates to provide a broader knowledge of cooperative extension philosophy and methods. Developed for students interested in extension and research in public and commercial organizations. Topics relate to extension in other countries as well as in the United States.

HORT 630 Current Topics in Postharvest Horticulture

Spring. 1 credit. Prerequisite: permission of instructor. Hours to be arranged. Staff.

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 grade only. 1 hour per week, to be arranged. T. H. Whitlow.

A discussion of readings from Kuhn, Popper, Waddington and others emphasizing application of the philosophy of science to the real world practices of scientists.

HORT 636 Current Topics in Horticulture

Fall or spring. 1 credit. S-U grades only. 1 hour per week, to be arranged. Staff.

Fruit and Vegetable Science. A seminar series on current topics chosen by participating students and faculty, on a rotating basis. Format consists of weekly discussion groups, with each participant presenting at least one oral report based on independent reading and/or experimentation relating to the chosen topic. Interested students should contact the designated instructor(s) for each term.

HORT 694 Special Topics in Horticulture

Fall or spring. 4 credits maximum. S-U grades optional. Hours to be arranged. Sec 01, Floriculture. Sec 02, Fruit and Vegetable Science. 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 committees, 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. Staff.

Designed to give graduate students teaching experience through involvement in planning and teaching courses under the supervision of departmental faculty members. The experience may include leading discussion sections, preparing, assisting in, or teaching lectures and laboratories; and tutoring.

HORT 800 Thesis Research, Master of Science

Fall or spring. Credit to be arranged. S-U grades only.

HORT 900 Thesis Research, Doctor of Philosophy

Fall or spring. Credit to be arranged. S-U grades only.

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 300 Perspectives in International Agriculture and Rural Development

Fall. 2 credits. F 1:25–3:20. R. W. Everett.

A forum to discuss both contemporary and future world food issues and the need for an integrated, multidisciplinary team approach in helping farmers and rural development planners adjust to the ever-changing food needs of the world.

INTAG 402 Agriculture in the Developing Nations I

Fall. 2 credits. Prerequisite: International Agriculture 300. F 1:25–3:20. P. A. Arneson and staff.

The goal of this course is to acquaint students with the major issues and problems in international agriculture and rural development and to show how problems in development are being addressed by international, government, and non-government agencies. The lectures/discussions attempt to establish the global context for sustainable agricultural development and focus on agriculture in the tropics, using case studies of agricultural development in Latin America, especially Ecuador. This course may be taken as a stand-alone survey course in international agriculture, but it is also the preparatory course for participation in Agriculture in the Developing Nations II (International Agriculture 602), which includes a trip to Ecuador during the intersession.

INTAG 403 Traditional Agriculture in Developing Countries

Fall. 1 credit. S-U only. T 8–8:50. H. D. Thurston, D. Bates, R. Blake, J. Lassoie, A. Power, E. Fernandez, T. Steenhuis.

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 599 International Agriculture and Rural Development Project Paper
Fall and spring. 1–6 credits. Limited to M.P.S. candidates in the fields of International Agriculture and Rural Development (IARD) and International Development (ID). S-U grades only. Staff.

INTAG 602 Agriculture in the Developing Nations II
Spring. 3 credits. Prerequisites: INTAG 300 or equivalent, INTAG 402, and permission of instructors. Cost of field-study trip includes air fare and approximately $450 for lodging, meals, and personal expenses. T R 2:30–4:25 until midterm only. R. W. Blake and staff.
Oriented to provide students an opportunity to observe agricultural development in a tropical environment and promote interdisciplinary exchange among staff and students. The two-week field-study trip during January to Latin American countries is followed by discussions and assignments dealing with problems in agriculture and livestock production in the context of social and economic conditions.

INTAG 603 Administration of Agricultural and Rural Development (also Government 692)
Spring. 4 credits. M 2:30–5:30. N. T. Uphoff and T. W. Tucker.
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 in agricultural or social sciences who may have administrative responsibilities during their professional careers.

INTAG 650 Special Topics in International Agricultural and Rural Development
Fall or spring. 1 credit. 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 658)
Spring and summer. 4 credits. S-U grades optional. Charge for materials $45. Lec, F 9:05–12:05; lab, 1 hour per week, to be arranged. At Communication Graduate Center. R. Colle and D. Deshler.
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 694 Graduate Special Topics in INTAG
Fall or spring. 1–4 credits. S-U or letter option. 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 are approved by the department curriculum committee, and the same course is not offered more than twice under this number.

INTAG 694.1 Tropical Fallow Management
Fall and spring. 1–2 credits. Prerequisite: permission of instructor required. Letter or S-U grades. E. Fernandes and L. Fisher.
This discussion course is linked to the CIFFAD initiative on Fallow Management in the Tropics, which is supported by several CIIFAD programs. The course, which is coordinated by the Management of Organic Inputs in Soils of the Tropics (MOIST) group, will build upon the outputs from discussions in previous semesters and continue to refine the analytical framework and guidelines for the characterization, evaluation and synthesis of managed tropical fallow systems. Material for the course will be drawn from papers and syntheses presented by participants in the 1997 Workshop on the Intensification of Shifting Cultivation in Southeast Asia and case studies developed by Cornell students in 1998 field studies in Asia, Africa and Latin America.

INTAG 694.2 Farmer Centered Research and Extension
Fall. 3 credits. Letter or S-U grades. R 2:20–4:25. D. Deshler and T. Tucker.
This course provides an introduction to participatory traditions in farming systems research, extension, evaluation of rural development, technology generation, gender analysis, participatory rural appraisal, and documentation of local and indigenous knowledge of community-based development. Case studies of farmer-centered research and extension will provide a focus for analysis. Appropriate roles of researchers and extensionists as partners with farmers will be examined. A major contribution of farmer-centered research and extension is its potential to legitimize people's knowledge by enhancing their capacity to critically analyze and research their own problems, and to empower them to take direct action to solve them.

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 director of graduate field studies in IARD. 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

How to Manage a Watershed (ABEN 754 and GOVT 644)
Economics for Business in a Global Economy (ARME 100)
International Trade Policy (ARME 430)
Economics of Agricultural Development (ARME 464)
Seminar on Agricultural Trade Policy (ARME 730)
[Macro Policy in Developing Countries (ARME 763) Not offered 1999–2000.]
Tropical Livestock Production (AN SC 400)
[Tropical Forages (AN SC 403) Next offered spring 2001.]
Southeast Asia Seminar: Country Seminar (ASIAN 601)
Southeast Asia Seminar: Country Seminar (ASIAN 602)
Food, Agriculture, and Society (B&SOC 469, BIO G 469, S&TS 469)
Seminar in International Planning (CRP 671)
Seminar in Project Planning in Developing Countries (CRP 675)
Communication in the Developing Nations (COMM 624)
Comparative Studies in Adult Education (EDUC 483)
International Postharvest Food Systems (FOOD 447)
International Environmental Issues (NTRES 400)
Religion, Ethics, and the Environment (NTRES 407)
National and International Food Economics (NS 457)
International Nutrition Problems, Policy, and Programs (NS 680)
International Nutrition Seminar (NS 698)
Special Topics in International Nutrition (NS 699)
Plants, Genes, and Global Food Production (PL BR 201)
Plant Diseases in Tropical Agriculture (PL PA 655)
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 1999–2000.]
Social Demography (R SOC 438)
Population, Environment, and Development in Sub-Saharan Africa (R SOC 495)
[Contemporary Sociological Theories of Development (R SOC 606) Not offered 1999–2000.]
[Land Reform, Old and New (R SOC 643) Not offered 1999–2000.]
[The Sociology of Third World States (R SOC 725) Not offered 1999–2000.]
Properties and Appraisal of Soils of the Tropics (SCAS 471)
[Ecology of Agricultural Systems (SCAS 473 and BIOES 473) Not offered fall 1999.]
Comparative Extension Education Systems (EDUC 783)
Tropical Cropping Systems: Biodiversity, Social and Environmental Impacts (SCAS 314)

LANDSCAPE ARCHITECTURE

H. W. Gottfried, chair; M. I. Adleman, S. Baugher, K. L. Gleason, P. H. Horrigan, R. Jaenson, D. W. Krall, L. J. Mirin, R. T. Trancik, P. J. Trowbridge, K. A. Wolf

LA 141 Grounding in Landscape Architecture
Fall. 4 credits. Limited to 15 students. Letter grade only. Cost of drafting supplies, about $200.
Introduction to the representation and design of landscapes and to working in a studio setting. Freehand drawing, measured drawing, and model making are used to understand design principles of the changing landscape.

LA 142 Grounding in Landscape Architecture
Spring. 4 credits. Limited to approximately 20 students; freshman landscape architecture majors or permission of instructor. Cost of basic drafting equipment, fees and supplies, about $250.
Fundamentals of landscape design applied to 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 Medium of the Landscape
Fall. 5 credits. Limited to landscape architecture majors. Cost of basic drafting equipment, supplies and fees, about $200; expenses for field trip, about $250.
This studio course emphasizes the design process and principles involved in organizing and giving form to outdoor space through the use of structures, vehicular and pedestrian circulation systems, earthform, water and vegetation.

LA 202 Medium of the Landscape
Spring. 5 credits. Prerequisite: LA 201 with a grade of C or better. Cost of supplies and fees, about $250; expenses for field trip, about $250.
This course will focus upon the role of materials in design, design theory, and design vocabulary associated with landscape architectural projects.

[LA 261 Urban Archaeology (also CRP 261)
Fall. 3 credits. Not offered fall 1999.
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 262 Laboratory in Landscape Archaeology (also ARKEO 262)
Spring. 3 credits. Prerequisites: LA 261 or CRP 261 or permission of instructor. Not offered spring 2000.
Various American Indian civilizations and European cultures have all altered the landscape to meet the needs of their cultures. Students will learn how to interpret the American Indian and Euro-American landscapes of specific archaeological sites by identifying and dating artifacts, studying soil samples, and creating site maps.]

[LA 282 The American Landscape
Fall. 3 credits. Next offered 2000.
An interdisciplinary study of the environmental and cultural history of the American landscape. Topics include the relation of landscape to culture, landscape use and ecological change, regional and national landscapes, and perceptions of landscape expressed in paintings, photographs and literature.]

[LA 292 Creating a Second Nature
Spring. 3 credits. Prerequisites: none, but ARKEO 100, ANTHR 100 or CLASSICS/ HISTORY OF ART 220 recommended. Offered alternate years. Not offered 1999–2000.
What can archaeological investigation tell us about the landscape of cultures that spent much of their civic and private lives out of doors? This course introduces the evidence for the markets, parks, gardens, fields and burial places central to daily life in the ancient Near East and Classical world.]

LA 301 Integrating Theory and Practice I
Fall. 5 credits. Prerequisite: LA 202 with a grade of C or better. Cost of supplies and fees, about $250; expenses for field trip, about $250.
Course participants will be engaged in the art and science of site-scaled design. This includes relating construction and planting details to concepts and program.

LA 302 Community Design Studio: Integrating Theory and Practice
Spring. 5 credits. Prerequisite: LA 301 with a grade of C or better. Cost of supplies and fees, about $250; expenses for field trip, about $250.
The studio will engage course participants in service-oriented community design projects. Theories of place-making, community and participatory design and planning, and sustainability will be explored through practice-based learning. Students will be expected to work independently and collaboratively on team projects in the community. One class period per week will be designated for community field work. Studio theme for 1999-2000: to be announced.

LA 315 Site Engineering I
Spring. 2 credits. Prerequisite: permission of instructor.
Lectures and studio projects focusing on the professional skills and knowledge required to competently and creatively develop grading plans for project-scale site design.

LA 316 Site Engineering II
Fall (2nd seven weeks of semester). 2 credits. Prerequisite: LA 315 or permission of instructor.
Lectures and studio projects dealing with earthwork estimating; storm water management, site surveys, site layout, and horizontal and vertical road alignment.

LA 317 Site Construction I
Fall (1st seven weeks of semester). 2 credits. Prerequisite: permission of instructor.
The detail design and use of landscape materials, used by landscape architects in project implementation is the focus of this course. The course format includes lectures, field trips, studio problems, and development of technical drawings leading to construction documentation for a wide variety of projects. Students will fabricate detail material prototypes and models and have the option of developing computer-generated drawings.

LA 318 Site Construction II
Spring (2nd seven weeks of semester). 2 credits. Prerequisite: LA 317 or permission of instructor.
Exploration of construction materials, including specifications, cost estimates, and methods used by landscape architects in project implementation is the focus for this course. The course includes lectures, studio problems, and development of drawings leading to construction documentation for a comprehensive project. Students will develop a process of self criticism related to measured drawings specific to the comprehensive project. Course participants will fabricate material prototypes in wood and metal.

LA 360 Pre-Industrial Cities and Towns of North America (also CRP 360 and CRP 666 and LA 666)
Fall. 3 credits. Offered alternate years.
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 402 Urban Design in Virtual Space
Spring. 5 credits. Cost of supplies and fees, about $250; basic expenses for field trip, about $250.
A sequence of projects introducing students to advanced skills in large-scale urban design, including 3-d computer modeling and digital design media as tools for shaping the form of the city.

LA 410 Computer Applications in Landscape Architecture
Fall or spring. 3 credits. Offered to landscape architecture students only. Limited to 15 students.
This course is designed to develop a working knowledge of various computer software applications with emphasis on Autocad. The course will explore other applications relative 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 481 and 581)
Fall. 3 credits. Not offered 1999–2000.
A lecture course that introduces the spatial and visual design vocabularies of cities. Aesthetic principles and theories of design are investigated for different types of urban spaces drawn from a variety of international examples, historic and modern. Included in the course are design methods and applications in the contemporary urban context of Europe and North America.]

LA 483 Design Criticism
Fall. 3 credits.
Writing design criticism. Emphasis on analytical descriptions and interpretations or works and on the role of criticism in design discourse.

[LA 486 Community Design Workshop
Spring. 3 credits. Permission of instructor. S-U grades optional. Not offered 1999–2000.
This class will offer hands-on learning of the design process through the designing and building of service-oriented community projects (parks, public spaces, school gardens, downtown revitalization). This course will enable students to both study and experience design and implementation skills at all levels of the design process. Students will learn and practice skills related to community design primarily through work on the participating design and planning phase of the project.]

[LA 487 Experiential Community Design
Fall. 3 credits. Permission of instructor. S-U grades optional. Not offered 1999–2000.
This class will offer the opportunity to learn, hands-on, the design process through the designing and building of service-oriented community projects (parks, public spaces, school gardens, downtown revitalization). This course will enable students to both study and experience design and implementation skills at all levels of the design process. Students will be engaged in the community-build phase of a community design project initiated the previous spring semester.]

LA 490 Rome Wasn't Built in a Day
Spring. 3 credits.
In this electronic course, students will learn about how the form and spatial structure of the city of Rome has evolved through time. Using the interactive CD-ROM "Layers of Rome" as a digital text, the course will engage participants in the investigations of urban design in Rome both as a case study and as a vehicle for exploring concepts applicable to many contemporary cities worldwide. The material focuses on the intersection between historical studies of urban space, architectural geography, urban landscape formation and the design of cities. Lectures, research, readings and exercises will be developed using the Layers of Rome CD, web searches, digital networking and various interactive learning technologies geared toward urban analysis and visual design media.

LA 491 Design and Plant Establishment in the Urban Environment (also HORT 491)
Fall. 3 credits. Prerequisites: HORT 230 or permission of instructor. Cost of supplies, about $50; expenses for field trips, about $50.
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 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. Field work includes chemical and physical analysis of soils, vegetation, and site assessment. A comprehensive project allows students to put into practice many technical and design aspects of the course.

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. 1–2 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).
Designed to give qualified undergraduates experience through actual involvement in planning and teaching courses under the supervision of department faculty.

LA 501 Composition and Theory
Fall. 5 credits. Limited to graduate students. Cost of drafting supplies and fees, about $250. Field trip about $250.
Basic principles of natural and cultural processes within contemporary design applied to the practice of landscape architecture. Projects focus on the relationship between measurement, process, experience and form at multiple scales of intervention.

LA 502 Composition and Theory
Spring. 5 credits. Limited to graduate students. Cost of drafting supplies and fees, about $250; 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 Landscape Representation I
Fall. 3 credits. Prerequisites: concurrent enrollment in LA 501 or permission of instructor.
This class introduces students to both conventional and unconventional modes of landscape architectural design representation. Drafting, orthographic drawing, axonometric project, lettering, analysis and concept drawing will be taught alongside more expressive modes of direct site study and representation.

[LA 506 Graphic Communication II
Spring. 3 credits. Prerequisites: LA 505 and concurrent enrollment in LA 502 or permission of instructor. Not offered 1999–2000.
Course 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.]

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 545 The Parks and Fora of Imperial Rome
Spring. 3 credits. Prerequisites: advanced standing in a design field, classics or history of art, or by permission of the instructor. Offered alternate years. Not offered spring 2000.
This advanced seminar is seeking students in classics, art history, archaeology, landscape architecture, and architecture to bring their knowledge of Latin, Greek, Italian, archaeology, drawing, design or computer modeling to a collaborative study of the ancient fora and public parks depicted on the Severan Marble plan of Rome.]

LA 569 Archaeology in Preservation Planning and Site Design (also CRP 569)
Spring. 3 credits. Offered alternate years. Next offered spring 2000.
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 Theory Seminar
Spring. 3 credits.
Seminar in contemporary landscape design theory. For graduate students and seniors.

LA 598 Graduate Teaching
Fall or spring. 1–3 credits. Prerequisite: permission of instructor. Students must register with an Independent Study form. Staff.
Designed to give qualified students experience through involvement in planning and teaching courses under the supervision of faculty members. The experience may include leading discussion sections, preparing, assisting in desk critiques, and presenting lectures. There will be assigned readings and discussion sessions on education theory and practice throughout the term. (Credit hours are determined by: 2 hours per week = 1 credit hour)

LA 601 Integrating Theory and Practice I
Fall. 5 credits. Limited to graduate students. Cost of supplies and fees, about $250; expenses for field trip, about $250.
The studio will focus on site-scaled projects that engage cultural and natural systems. Theories of place-making, sustainable design and landscape representation will be critically explored through design projects that derive from and affirm a sense of site and place. The integration of site knowledge and site construction aims to support a deepening level of correspondence between design and site.

LA 602 Integrating Theory and Practice II
Spring. 5 credits. Limited to graduate students. Cost of drafting supplies and fees, about $250; expenses for field trip, about $250.
The studio will build upon your prior course work with an expectation that course participants can creatively manipulate the program and conditions of a site with increased emphasis placed on how things are constructed and contemporary technology. This course will focus on the expression of design solutions that grow from and affirm an explicit sense of site and place. Social, cultural, physical and historic factors and their relationship to site design and planning will be critically explored through theory and practice in this studio.

LA 615 Site Engineering I
Spring. 2 credits. Prerequisite: permission of instructor.
Lectures and studio projects focusing on the professional skills and knowledge required to competently and creatively develop grading plans for project-scale site design.

LA 616 Site Engineering II
Fall. (2nd seven weeks of semester). 2 credits. Prerequisite: LA 615 or permission of instructor.
Lectures and studio projects dealing with earthwork estimating, storm water management, site surveys, site layout, and horizontal and vertical road alignment.

LA 617 Site Construction I
Fall (1st seven weeks of semester). 2 credits. Prerequisite: permission of instructor.
The detail design and use of landscape materials, used by landscape architects in project implementation is the focus of this course. The course format includes lectures, field trips, studio problems, and development of technical drawings leading to construction documentation for a wide variety of projects. Students will fabricate detail material prototypes and models and have the option of developing computer-generated drawings.

LA 618 Site Construction II
Spring. (2nd seven weeks of semester). 2 credits. Prerequisite: LA 617 or permission of instructor.
Exploration of materials, including specifications, cost estimates, and methods used by landscape architects in project implementation is the focus for this course. The course includes lectures, short studio problems, and the development of drawings leading to construction documentation for a comprehensive project. Students will develop a process of self-criticism related to measured drawings specific to the comprehensive project. Course participants will fabricate material prototypes in wood and metal.

[LA 619 Advanced Site Grading
Spring (2nd seven weeks of semester). 2 credits. Limited to 10 students. Prerequisite: LA 315 or LA 615. Not offered 1999–2000.
Grading skills and knowledge applied as a design component of site planning projects.]

LA 666 Pre-Industrial Cities and Towns of North America (also CRP 666)
Fall. 3 credits. Offered alternate years.
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 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: Designing Cities in the Electronic Age (also CRP 555)
Fall. 5 credits. Limited to graduate students. Cost of supplies and fees, about $250; 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. 3-D computer modeling and digital design media are introduced as tools for urban design. This is a specially arranged collaborative studio with the Department of City and Regional Planning.

LA 702 Advanced Design Studio
Spring. 5 credits.
This advanced studio provides the opportunity to explore issues of contemporary landscape architecture and integrate related fields. Topics examined include the influences of culture, history, and criticism, as well as reinterpretations of engineering and representation.

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

J. P. Lassoie, chair; R. A. Baer, M. B. Bain, B. L. Bedford, T. Brown, L. E. Buck, P. Curtis, D. J. Decker, T. J. Fahey, T. A. Gavin, J. W. Gillett, B. A. Knuth, C. Kraft, M. E. Krasny, C. C. Krueger, R. A. Malecki, R. J. McNeil, E. Mills, M. H. Olson, M. E. Richmond, L. Rudstam, J. Schelhas, R. Schneider, P. J. Smallidge, C. R. Smith, P. Sullivan, J. B. Yavitt

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 first-year students specializing in natural resources. Letter grade only. M W F 9:05; 1 hr disc to be arranged. R. J. McNeil.
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. 3 credits. M W F 12:20; 1 hr disc sec to be arranged. Staff.
As the end of the 20th century approaches, our lives are increasingly touched by questions about environmental degradation at local, regional, and global scales. Business as usual is being challenged. 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 weekend field trips required. Cost of field trips, approximately $12. Lec, W 9:05; labs, M W 1:25–4:25 or T R 1:25–4:25. T. Gavin and C. Smith.
Introduction to methods of inventorying, identifying, and studying plants and animals. Students are required to learn the taxonomy, natural history, and how to identify approximately 170 species of vertebrates and 80 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 those events are emphasized.

NTRES 253 Applied Ecology and Ecosystem Management
Spring. 3 credits. Prerequisites: introductory courses in biology and ecology. Lec M W 10:10–11:00; lab, T W or R 2:30–4:25.
The application of ecological principles to renewable resource and environmental problems. The perspective is the interactions of species within the ecosystem, which is the basic unit of study. Topics include fisheries, forests, the conservation and management of wild species, invaders and pests, and pollution. The discussion section emphasizes quantitative analysis and the use of microcomputers.

NTRES 270 Conservation of Birds
Spring or summer. 2 credits. Not offered every year. Check with department for availability. C. R. Smith.
A course for majors and nonmajors, focusing on science-based bird conservation and management at the organism, population, community and landscape levels. Current resource management issues relevant to birds will be explored in the contexts of agricultural practices, habitat management, tropical deforestation, the design and management of natural preserves, endangered species management, global climate change and the economic importance of bird study as an outdoor recreational activity.

NTRES 271 Conservation of Birds Laboratory
Spring or summer. 1 credit. Concurrent enrollment in NTRES 270 required. Not offered every year. Check with department for availability. C. R. Smith.
A field-oriented course designed to teach skills of bird observation and identification based on the integration of field marks, songs and calls, and habitat cues. Topics covered will include the choice and effective use of field guides, binoculars, and other tools for bird identification; procedures for taking and organizing field notes; the relationships of birds to their habitats and to other birds; and methods and procedures for censusing and surveying songbird populations.

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 Woodlot Management and Maple Syrup Production
Spring. 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 principles and practices of multiple purpose management of small nonindustrial private forest land in the northeastern United States, including the production of maple syrup.

NTRES 304/305 Wildlife Ecology Concepts/Applications
These courses are currently under revision. Please contact the Department for information on availability.

NTRES 306 Coastal and Oceanic Law and Policy
Summer. 2 credits. July 19–26. A special 1-week course offered at Cornell's Shoals Marine Laboratory (SML), on an island off Portmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $1,000.
Intended for persons interested in careers in management of marine or coastal resources or in the natural sciences. Subjects include law and policy related to ocean dumping, marine sanctuaries, environmental impact statements, water and air pollution, fisheries management, offshore gas and oil production, and territorial jurisdiction. Lectures on the status and history of law are accompanied by discussion of relevant policy and efficacy of various legal techniques. A case study that requires extensive use of the laboratory's library and personnel is assigned. The week concludes with a mock hearing.

NTRES 308 Natural Resources Management
Fall. 3 credits. Prerequisite: junior standing. M W F 10:10. B. A. Knuth.
Focus is on fish, wildlife, forest, and water resources. Concepts emphasized include the comprehensive planning process and human dimensions of resource management. Students integrate biological, social, and institutional dimensions of management through case studies. Grades are based on individual and group performance.

NTRES 309 Resource Management in American Indian Nations
Summer. 1 credit. Prerequisite: none; recommended: one course each in Natural Resources and American Indian Program. Consult Cornell University Summer Session Catalog for scheduling information. S. M. Penningroth.
This course examines resource management in territories belonging to American Indian nations. Topics include history, sovereignty, religious significance of the environment, and intellectual property. Case examples of traditional Indian management techniques as well as contemporary resource management issues are presented.

NTRES 321 Introduction to Biogeochemistry (also GEOL 321, SES 321)
Fall. 4 credits. Prerequisites: college-level chemistry, plus a course in biology and/or geology. Lec, T R 12:20–1:10; lab, to be announced. J. B. Yavitt and L. A. Derry.
Control and function of the Earth's global biogeochemical cycles. The course begins with a review of the basic inorganic and organic chemistry of biologically significant elements, and then considers the biogeochemical cycling of carbon, nutrients, and metals that take place in soil, sediments, rivers and the oceans. Topics include weathering, acid-base chemistry, biological redox processes, nutrient cycling, trace gas fluxes, bio-active metals, the use of isotopic tracers, and mathematical models. Interactions between global biogeochemical cycles and other components of the Earth system are discussed.

NTRES 340 Quantitative Population Analysis
Fall. 3 credits. Letter grade only. Prerequisites: Math 111, Math 171, BTRY 215 or permission of instructor. M W F 9:05–9:55. P. J. Sullivan.
The dynamics and demographics of aquatic and terrestrial populations are examined using statistical techniques and computer modeling. The course will emphasize (1) estimation of population abundance using statistical surveys, mark-recapture methods, cohort analysis, and other sampling techniques; and (2) characterization of population dynamics through mathematical and statistical models representing the fundamental processes of birth, death, growth and movement. Topics will include applications to aquatic and terrestrial organisms of resource and conservation interest.

NTRES 350 Ecological Dimensions of Global Change
Fall. 3 credits. Prerequisites: college-level courses in biology and chemistry. M W 12:20–1:10, disc sec, M or W 1:25–2:15. J. B. Yavitt.
Human accelerated environmental changes threaten the integrity of nature. This course explains the ecological principles that comprise this threat. Topics include increasing air temperature, atmospheric carbon dioxide and other gases, and pollution. Discussions explore the likely future behavior of nature given different global change scenarios.

NTRES 400 International Environmental Issues
Fall. 4 credits. Prerequisite: junior standing or above. T R 10:10–12:05.
Current international environmental issues are analyzed from an interdisciplinary perspective, with an emphasis on understanding the complex relationships between humans and the environment that underlie environmental problems and solutions. Topics covered include conceptualization of environmental issues, population, property rights, human behavior, environmental values, environmental education, international policies, international organizations, globalization, conservation and development projects, participation and community-based conservation, and social conflict and unrest. Environmental issues covered include endangered species, biodiversity, tropical forests, global climate change, protected areas, indigenous people, and ocean fisheries. Emphasis on systematic analysis of environmental issues; written and oral presentations.

NTRES 402 Natural Resources Policy, Planning, and Politics
Spring. 3 credits. Prerequisites: junior standing; special application process, and course fee (approx. $350). Lec, January two-week intersession; two 2 hr orientation sessions in fall semester and four 2 hr sessions in February and March. Completed applications due by October 14. Applications are available in 122D Fernow Hall or by contacting map10@cornell.edu.
An introduction to the environmental policy process and its conceptual framework. Recognition of phenomena identified as natural resources or environmental problems and issues; steps leading to legislation or regulations to solve problems; implementation and evaluation stages; role of the legal system; roles of citizens, lobbyists, government actors. Case studies; presentations by and discussions with about twenty prominent Washington policy makers appearing as guest lecturers. Required interviews, term paper, oral reports. Several meetings in Ithaca before and after intensive January session in Washington.

NTRES 404/405 Wildlife Populations Ecology/Applications
These courses are currently under revision. Please contact the Department for information on availability.

[NTRES 406 Ecology Risk Assessment (also Toxicology 406)
Spring. 3 credits. Prerequisites: BIOES 261 or equivalent; permission of instructor if not an advanced student in natural sciences of engineering. M W F 11:15–12:05. Offered alternate odd years. Next offered spring 2001. J. W. Gillett.
This course strives to develop understanding of and competence in the different 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 10:10–11:00; a hr disc to be arranged. R. A. Baer.
How religion, philosophy, and ethics influence our treatment of nature. Terms like religion, nature, fact, value, knowledge, and public interest are examined in detail. Particular themes include character and moral development, similarities and differences between moral and scientific claims, truth telling, public reason, and property. Also, animals rights vs. ecosystem concerns, responsibility to future generations, the limitations of rationalism in ethics, and discussion of whether women approach moral issues differently from men.

[NTRES 408 Resource Management and Environmental Law
Fall. 3 credits. For juniors, seniors, and graduate students. S-U grades optional. M W F 9:05–9:55. Not offered fall 1999. Staff.
A senior-level course that introduces the use of legal concepts, doctrines, and remedies in

natural resource and environmental management. For a variety of living resources and their habitats, it explores the common law and regulatory processes available for resolving conflicts between exploitation and protection and stresses a practical understanding of how public and private values, economic considerations, and constitutional limitations affect management techniques and objectives.]

NTRES 410 Wildlife Management Concepts and Applications

Spring. 3 credits. Prerequisites: senior standing or permission of instructor. NTRES 210 required and a broad background in biology or ecology is strongly recommended. Lecs, T R 11:15–12:05; lab, W 1:25–4:25.

An in-depth analysis of ecological and human dimensions for decision making in integrated wildlife management. This includes population and system modeling for evaluation of management decisions, adaptive management, and design of wildlife management plans. Afternoon labs and field trips are required to investigate areas of interest in wildlife management.

NTRES 411 Seminar in Environmental Ethics

Fall. 3 credits. For seniors, juniors and graduate students. S-U grades optional. W 1:25–3:50.

Moral concerns relative to the natural environment and agriculture. In successive years, the seminar will focus on such topics as (1) animal rights vs. ecosystem concerns, (2) natural resource management and the concept of the public interest, (3) applying environmental ethics in a democratic and pluralistic society, and, (4) land use ethics.

NTRES 415 Principles and Practices of Agroforestry (also Hort 415)

Spring. 3 credits. Prerequisites: senior or graduate standing or permission of instructor. S-U option. Lec, M W 10:10–11:00; lab, W 1:25–4:25. K. Mudge and J. Lassoie.

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 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).

NTRES 417 Wetland Resources

Summer. 2 credits. Prerequisite: one year of college biology. July 12–19. A special 1-week course offered at Cornell's Shoals Marine Laboratory (SML), on an island off Portmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $1,000.

An examination of coastal and adjacent freshwater wetlands from historical, disturbance, and preservation perspectives, including fresh and salt water-marsh ecology and management. Field trips to selected examples of the wetlands under discussion and follow-up laboratories emphasize successional features, plant identification and classification, and examination of the dominant insect and vertebrate associations.

NTRES 418 Wetland Ecology and Management-Lecture

Fall. 3 credits. (Students may not receive credit for NTRES 418 *and* NTRES 417 Wetland Resources, Shoals Marine Laboratory summer course.) T R 1:25–2:40. B. L. Bedford.

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.

NTRES 419 Wetland Ecology and Management-Laboratory

Fall. 1 credit. Optional. Concurrent enrollment in NTRES 418 is required. W or F 12:20–4:25. One weekend fieldtrip required.

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 identification and delineation. Some exercises will require written reports.

NTRES 420 Ecological Management of Water Resources

Spring. 3 credits. Prerequisites: introductory ecology and introductory chemistry or permission of instructor. M W F 9:05–9:55. R. Schneider.

In-depth analysis of those ecological and biological principles relevant to the management of fresh and marine water resources, with emphasis on the effects of water management on community ecology. Lectures and discussion will integrate scientific literature with current management issues. Topics include: linkages between hydrologic variability and communities; groundwater-surface connections, flow paths for dispersal, patchily distributed water resources, and water quality controls on organisms.

NTRES 428 Landscape Impact Analysis

Spring. 3 credits. Prerequisites: one introductory course in ecology or equivalent and junior standing; one advanced course in ecology or equivalent. T R 1:25–2:40. B. Bedford.

The course explores environmental impact assessment (EIA) from the perspective of the watershed, landscape, or region rather than the individual development project. It provides an overview of the EIA process and landscape analysis as they are implemented within various governmental and development agencies; examines diverse conceptual frameworks for landscape impact analysis; and exposes students to modern tools for evaluating landscapes.

NTRES 438 Fishery Management

Spring. 3 credits. Lec, T R 10:10; disc, T or R 11:15. Offered alternate years. Next offered spring 2000. C. C. Krueger.

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, reservoirs, the Great Lakes and Pacific halibut. Ecological, social, political, and economic aspects of those topics are discussed.

[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. Next offered fall 2000. T R 1:25–4:25; 2 or more weekend field trips and 1 mid-week field trip. C. C. Krueger.

Emphasis is on methods for collecting and analyzing data from fish populations and their habitats. Topics include passive and active fish-capture methods, tagging and marking, and physical and chemical habitat measurements. Assumptions and limitations inherent in data sets, research planning, and scientific report writing are also discussed. Several field trips provide hands-on experience in data collection on streams and lakes.]

NTRES 450 Conservation Biology

Fall. 3 credits. Prerequisite: a reasonable biology background. Limited to first 30 seniors, plus graduate students. Lec, T 10:10–12:05; disc, R 10:10 or 11:15. T. A. Gavin.

Emphasis will be on biological topics that are important to the maintenance of biological diversity. 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. This course is intended primarily for students with a background in college biology. Students with no college biology background should enroll in BIOES 257.

NTRES 456 Stream Ecology (also ENTOM 456, BIOES 456)

Spring. 4 credits. Limited to 45 students. Prerequisites: none; BIOES 261 recommended. Offered alternate years. Lec T R 9:05–9:55; lab T W or R 1:25–4:25. B. Peckarsky.

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 disturbances. **Lab**: A field project includes descriptive and experimental techniques and hypothesis testing related to environmental assessments.

NTRES 460 Quantitative Ecology of Fisheries Resources

Spring. 3 credits. S-U grades optional. Prerequisites: NTRES 304 recommended or permission of instructor. M W F 10:10–11:00. Offered alternate even years. P. J. Sullivan.

The dynamics of marine and freshwater fisheries resources are examined with a view towards observation, analysis, and decision making within a quantitative framework. Growing pressure on fisheries' resources, habitat modification, and increased uncertainty about the nature of biological systems are at the center of many fisheries' issues. Quantitative models are useful for integrating information needed by decision makers in addressing these issues. The course develops

analytical methods to assess the dynamics and status of fisheries' resources and then demonstrates how the information may be transformed into useful information for decision makers.

NTRES 471 Management of Terrestrial Habitats

Spring or summer. 2 credits. Prerequisites: NTRES 210, 304; statistics recommended; junior standing or above. Lec/lab, W 1:25–4:25. Not offered every year. Check with department for availability. 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. An introduction to use of the Global Positioning System (GPS) is included.

NTRES 493 Individual Study in Resource Policy, Management, and Human Dimensions

Fall, spring or winter. Credit to be arranged. S-U grades optional. Prerequisite: permission of instructor. R. A. Baer, T. Brown, L. E. Buck, D. J. Decker, J. Gillett, B. Knuth, R. McNeil, J. Schelhas.

Topics in environmental and natural resource policy, management, and human dimensions are arranged depending on the interests of students and availability of staff. Students must register with an Independent Study form (available in 140 Roberts Hall).

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 Individual Study in Fish and Wildlife Biology and Management

Fall or spring. Credit to be arranged. S-U grades optional. Prerequisite: permission of instructor. M. Bain, P. Curtis, T. Gavin, C. Kraft, C. Krueger, R. Malecki, E. Mills, A. Moen, M. Olson, M. Richmond, L. Rudstam, C. Smith, P. Sullivan.

Topics in fish and wildlife biology and management are arranged depending on the interests of students and availability of staff. Students must register with an Independent Study form (available in 140 Roberts Hall).

NTRES 496 Individual Study in Ecology and Management of Landscapes

Fall or spring. Credit to be arranged. S-U grades optional. Prerequisite: permission of instructor. B. Bedford, T. Fahey, M. Krasny, J. Lassoie, R. Schneider, P. Smallidge, J. Yavitt.

Topics in ecology and management of landscapes are arranged depending on the interests of students and availability of staff. Students must register with an Independent Study form (available in 140 Roberts Hall).

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 insight 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 601 Seminar on Selected Topics in Fishery Biology and Aquatic Science

Fall or spring. 1 credit. S-U grades only. T 3:35–4:25; disc sec, T 4:30–5:00.

Selected readings and discussions of research and/or current problems in fishery and aquatic sciences.

NTRES 604 Seminar on Selected Topics in Resource Policy and Management

Fall. 2 credits. S-U grades only. M 3:00–4:30.

Primarily for graduate students with a major or minor in resource policy and management and upper level undergraduates with a strong interest in resource policy analysis. Topics include the policy process, actors and stakeholders, ethical dimensions, and evaluation. Emphasis is placed on discussion, faculty-student interaction, communication skills, and current resource policy issues.

NTRES 607 Ecotoxicology (also Toxicology 607)

Spring. 3 credits. Prerequisites: graduate or senior status and two 300-level courses in chemistry, biological science, or toxicology. M W F 11:15–12:05. Offered alternate even years. Next offered spring 2000. J. W. Gillett.

Lectures, readings, and special guests focus on the principles of effects of toxic chemicals on natural ecosystems, their components, and processes. Major topics include fate and transport of chemicals (chemodynamics), comparative biochemical toxicology, ecosystem process analysis, simulation through mathematical and physical (microcosm) models, and relationships to regulation and environmental management.

NTRES 610 Introduction to Chemical and Environmental Toxicology (also Toxicology 610)

Fall. 3 credits. Prerequisites: biochemistry and animal physiology. Letter grade only. M W F 11:15–12:05. J. W. Gillett.

Introduction to the basic concepts of toxicology, exposure and biological responses to toxicants, methods of assessing toxicity; factors affecting outcomes, specific sources of toxicants (including air pollution, agriculture, industrial and commercial processes, natural occurring toxicants, and social poisons), risk assessment and regulation of toxic materials.

NTRES 612 Wildlife Science Seminar

Fall and spring. 1 credit. Prerequisite: permission of instructor. S-U grades only. Check with department for availability.

Discussion of individual research or current problems in wildlife science.

NTRES 615 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. L. E. Buck, J. P. Lassoie.

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 and spring. 1 credit. Permission of instructor. S-U grades only. Check with department for availability.

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 conceptual foundation for analyzing and addressing conservation and development issues from an interdisciplinary perspective. Engages students in the inherent conflicts between natural resource conservation and rural development. Students 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. Prerequisites: 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.

An interdisciplinary study of a conservation and development problem in Latin America. The course will use an interdisciplinary research methodology that includes group problem identification, individual or rapid appraisal projects, and synthesis of group work to identify key conservation and development issues and research priorities for a selected site.

NTRES 660 Quantitative Ecology of Fisheries Resources

Spring. 3 credits. S-U grades optional. Prerequisites: NTRES 304 recommended or permission of instructor. M W F 10:10–11:00. Offered alternate even years. P. J. Sullivan.

This course is taught in conjunction with NTRES 460 (see description above). Students taking the course for graduate credit will be asked, in addition to the 400-level projects and homework, to construct and document a model of population or community dynamics that reflects and extends the concepts covered in the course.

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 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 698 Current Topics: Environmental Toxicology (Toxicology 698)
Fall, spring. 1–3 credits. Prerequisites: graduate or senior standing in scientific discipline and permission of instructor.
A student-faculty colloquium on subjects of current interest, usually focusing on multidisciplinary aspects of topical problems (e.g., Superfund, oil spills).

NTRES 699 Graduate Individual Study in Natural Resources
Fall or spring. Credit to be arranged. S-U grades optional. Prerequisite: permission of instructor. NTRES graduate faculty.
Study of topics in natural resources more advanced than, or different from, other courses. Subject matter depends on interests of students and availability of staff.

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

Courses in many other departments are relevant to students majoring in Natural Resources. The following list includes some of the most closely related courses but is not exhaustive.

Environment and Society (R SOC 208, 324, 340, 410, 440, 495)

Ecology and Biology (ENTOM 456, 470, 471; BIOES 263, 274, 278, 452, 457, 461, 462, 463, 471, 472, 475, 476, 478)

Environmental Law, Ethics, and Philosophy (S&TS 206; CRP 451; PHIL 241, 246, 247, 381)

Human Systems and Communication (COMM 260, 285, 352, 421)

Physical Sciences (ABEN 435, 475; SCAS 260, 321, 365, 371, 483; GEOL 103, 104; CEE 432)

Public Policy and Politics (GOVT 427, 428; BIO & SOC 461; CEE 529)

Resource Economics (ARME 100, 250, 450, 451; ECON 309)

Spatial Data Interpretation (SCAS 420, 461, 620, 660)

PLANT BREEDING

E. D. Earle, chair; W. R. Coffman, S. Kresovich, M. M. Kyle Jahn, S. R. McCouch, M. A. Mutschler, W. D. Pardee, K. V. Raman, M. E. Smith, M. E. Sorrells, S. D. Tanksley, D. R. Viands

Emeritus Professors: R. E. Anderson, H. L. Everett, C. C. Lowe, H. M. Munger, R. P. Murphy, R. L. Plaisted and D. H. Wallace

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 Plants, Genes, and Global Food Production
Spring. 2 credits. Prerequisite: one year of introductory biology or permission of instructor. Lecs, T R 11:15.
S. R. McCouch.
This course provides an introduction to Plant Breeding. It offers a sense of the historical and social importance of the field, tracing its evolution from the pre-scientific days of crop domestication to modern applications of biotechnology. It offers specific examples of how breeding objectives are realized and raises questions about the environmental, social and economic consequences of intensive food production systems. This course may be used for partial fulfillment of the CALS distribution requirement GROUP B—Biological Sciences.

PL BR 401 Plant Cell and Tissue Culture
Fall. 3 credits. Prerequisites: a course in plant biology, cell biology, or genetics, or permission of instructor. Lecs, T R 10:10.
E. D. Earle.
Lectures and demonstrations dealing with the techniques of plant tissue, cell, protoplast, embryo, and anther culture and the applications of those techniques to biological and agricultural studies. Methods for plant improvement via manipulations of cultured cells will be discussed.

PL BR 402 Plant Tissue Culture Laboratory
Fall. 1 credit. Enrollment limited. Prerequisites: PL BR 401 (may be taken concurrently) or permission of instructor. W R 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 use a broad range of plant materials and include *Agrobacterium*-mediated gene transfer.

PL BR 403 Genetic Improvement of Crop Plants
Fall. 3 credits. Prerequisites: genetics (BIOGD 281 or other standard genetics course), and a course in crops, horticulture or floriculture. M W F 9:05–9:55.
M. E. Smith.
Genetic enhancement of crop value to humans began with domestication and continues with farmers' variety development and scientifically trained plant breeders' applications of Mendelian, quantitative, and molecular genetics. This course examines crop genetic improvement methods by discussing the history and current practice of plant breeding, tools available to breeders, choices and modifications of those tools to meet specific objectives, and challenges plant breeders face in developing varieties for the future.

PL BR 404 Genetic Diversity
Spring. 2 credits. S-U option. Prerequisites: a course in genetics, plant breeding or permission of instructor. T R 9:05–9:55.
S. Kresovich.
This course explores the structure of genetic variation through time and space and how it ultimately may be maintained and utilized. Case studies representing organisms of biological interest and agricultural importance are employed to highlight biological and genetic theories, technologies, and approaches essential to conservation genetics and the improvement of crop and animal species. In complement, underlying ethical, legal, and social issues affecting conservation and use of genetic diversity also are addressed.

PL BR 446 Plant Cytogenetics Laboratory
Spring. 1 credit. S-U only. Prerequisites: a course in genetics or permission of instructor. Will be offered as a two-week module at a time to be arranged in Spring 2000. Check with department for further information. K. N. Watanabe.
This course aims to provide fundamental knowledge and techniques in plant cytogenetics. Emphasis is on applications to research on plant genetics and plant breeding. Plant materials involve a wide range of crop species. In 2000 the module will deal with applied techniques and molecular cytogenetics. In 2001 it will cover basic techniques for examination of plant chromosomes.

PL BR 494 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 496 Internship in Plant Breeding
Fall or spring. Credits variable, may be repeated to a maximum of 6. Minimum of 60 on-the-job hours per credit granted. Prerequisites: permission of adviser and enrollment during the pre-enrollment period of the semester before the internship. Student must be a plant breeding junior or senior with a minimum 3.0 average in plant breeding courses. Students must attach to their course enrollment materials a "CALS Independent Study, Research, Teaching, or Internship" form signed by the faculty member who will supervise their study and assign their credits and grade. S-U grades only. Staff.
On-the-job learning experience under the supervision of professionals in a cooperating organization. A learning contract is written between the faculty supervisor and student, stating the conditions of the work assignment, supervision, and reporting.

PL BR 497 Individual Study in Plant Breeding
Fall or spring. Credits variable, may be repeated to a maximum of 6. S-U optional. Prerequisite: 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). Staff.
Undergraduate teaching assistance in a plant breeding course. Teaching experience may include leading a discussion section, preparing and teaching laboratories, and tutoring.

PL BR 499 Undergraduate Research
Fall or spring. Credits variable. S-U optional. Prerequisite: permission of instructor. Students must register with an Independent Study form (available in 140 Roberts Hall). Staff.
Undergraduate research projects in plant breeding.

PL BR 604 Methods of Plant Breeding Laboratory
Fall. 2 credits. Prerequisite: PL BR 403, 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, or equivalent. Lecs, T R 1:25–2:40. 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 607 Electronic Information Resources and Bioinformatics
Fall. 1 credit. Enrollment limited. S-U or letter grades optional. Prerequisites: basic biology, basic genetics, familiarity with PC working environment. Permission of instructor required. Times to be arranged—three times/week for one month. E. Paul and S. McCouch.
This course will focus on how to access information in public data bases such as GenBank, GRIN, and SWISSPROT, and on tasks such as BLAST searching, sequence alignment, primer design, and phylogeny analysis. The biological background of issues will be presented in lectures, and extensive on-line exercises will provide students with experience in accessing and analyzing diverse information in the computer environment.

PL BR 608 Comparative Genomics
Fall. 1 credit. Enrollment limited. S-U or Letter grades optional. Prerequisites: PL BR 607 or equivalent experience. Permission of instructor required. Times to be arranged—three times/week for one month. E. Paul, S. McCouch and M. Sorrells.
This course will emphasize how to access and integrate different types and sources of data using computer databases and a variety of querying mechanisms. Students will learn to integrate information derived from analysis of phenotypes, biochemical and metabolic pathways, DNA sequences and genetic and physical maps using plant genome databases, and a variety of software packages.

PL BR 610 Advanced Plant Breeding Methods
Spring. 3 credits. Prerequisites: PL BR 403, (603), or equivalent, BIOGD 281, or equivalent. M W F 12:20–1:10. M. Mutschler.
This is a capstone course that integrates information from a variety of disciplines to provide a current comprehensive examination of modern plant breeding. Plant breeding methods used for a variety of crops are considered, including selection techniques, strategies for self- and cross-pollinated crops, population improvement, and utilization of wild germplasm for crop improvement in private or public programs. The effect of crop and breeding objectives on the success of breeding strategies will be considered. Integration of biochemical and molecular techniques into an applied breeding program will be addressed.

PL BR 622 Seminar
Fall or spring. 1 credit. S-U grades only. T 12:20. Staff and graduate students.

PL BR 650 Special Problems in Research and Teaching
Fall or spring. 1 or more credits. Prerequisite: permission of instructor supervising the research or teaching. Staff.

PL BR 653.2 Plant Biotechnology (also Plant Pathology 663 and BIO PL 653.2)
Fall. 1 credit. S-U grades optional. Prerequisite: BIO PL 653.1 or permission of instructor. Lecs, M W F 1:25–2:15 (12 lecs) Sept. 29-Oct. 27. E. D. Earle and M. Zaitlin.
This course deals with production and use of transgenic plants for agricultural and industrial purposes. Topics include procedures for gene introduction and control of gene expression, as well as strategies for obtaining transgenic plants that are resistant to insects, diseases, and herbicides, produce useful products, or have improved nutritional and food processing characteristics. Regulatory and social issues relating to plant biotechnology are discussed.

[PL BR 653.3 Plant Genome Organization (also BIO PL 653.3)
Fall. 1 credit. Prerequisites: BIO PL 653.1. M W F 10:10–11:00. Offered alternate years. Next offered fall 2000. S. D. Tanksley.
The structure and variation of plant nuclear genomes, including changes in genome size, centromere/telomere structure, DNA packaging, transposable elements, genetic and physical mapping, positional gene cloning, genomic sequencing and comparative genomics.]

PL BR 653.6 Molecular Breeding and Genetic Diversity (also BIO PL 653.6)
Fall. 1 credit. S-U grade or letter option. Lecs, M W F 10:10–11:00. (12 lecs) Sept. 29–Oct. 27. Offered alternate years. S. Kresovich and S. Tanksley.
Application of DNA markers to the evaluation of genetic diversity in natural populations and germplasm collection as well as the identification, manipulation and isolation of genes important to plant and animal productivity using molecular genetic techniques. Students will learn how to design and execute experiments to identify quantitative trait loci (QTLs), as well as how to apply molecular markers to plant and animal breeding programs. Strategies for the use of DNA polymorphisms in the management of genetic resources will also be taught.

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
Spring. 3 credits. S-U grades optional. Prerequisite: PL BR 403 or 603. W 3:35–5:15, F 3:35–4:25. Offered odd years. Not offered 1999–2000. M. E. Sorrells.
Emphasis is on discussion and evaluation of selected benchmark papers and current literature. Selection techniques and breeding objectives, methods, and strategies for both self- and cross-pollinated crops are reviewed and discussed. Extensive outside reading is required.]

PL BR 717 Quantitative Genetics in Plant Breeding
Spring. 3 credits. S-U grades only. Prerequisites: PL BR 403, (603), and BTRY 601 or equivalent. M W F 2:30–3:20. Offered even years. D. R. Viands and M. E. Sorrells.
Discussion about quantitative genetics and quantitative trait loci (QTLs) for more efficient plant breeding. Specific topics include components of variance (estimated from various mating designs): theory and computer analysis for QTL, population structure, multiple locus regressions, and interval analysis; heritability; theoretical gain from selection; and genotypic and phenotypic correlation coefficients. During one period, plants in the greenhouse will be evaluated to provide data for computing quantitative genetic parameters.

[PL BR 718 Breeding for Pest Resistance
Spring. 3 credits. Prerequisites: BIOGD 281 and PL BR 403, (603). An introductory course in Plant Pathology and/or Entomology also highly recommended. Lec, T R 10:10–11:30. Not offered 1999–2000. M. A. Mutschler.
A multidisciplinary examination of the challenge of incorporating disease and insect resistance into crop plants. Topics covered include national and international germplasm collections, identification of sources of resistance, resistance mechanisms in plants, monogenic and polygenic control of resistance, approaches to breeding for resistance stability of genetic resistance mechanisms, and the use of biochemical/physiological/molecular tools in breeding for pest resistance.]

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
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

S. A. Slack, chair; J. R. Aist, P. A. Arneson, S. V. Beer, G. C. Bergstrom, B. B. Brodie, A. R. Collmer, T. P. Delaney, W. E. Fry, S. M. Gray, K. T. Hodge, R. K. Horst, G. W. Hudler, R. P. Korf, J. A. Laurence, S. G. Lazarowitz, J. W. Lorbeer, R. Loria, G. B. Martin, M. T. McGrath, M. G. Milgroom, E. B. Nelson, W. A. Sinclair, H. D. Thurston, B. G. Turgeon, O. C. Yoder, M. Zaitlin, T. A. Zitter

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
Spring. 3 credits. Limited to 17 students. Lecs, M W F 8:00. Offered spring 2000. P. A. Arneson.
This seminar examines the use of pesticides, their impact on human health and the environment, and their regulation. Beginning with Rachael 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
Fall. 3 credits. Limited to 17 students. Lecs, T R 8:40. Not offered fall 1999.
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, Mischievous Molds
Spring. 2 credits. S-U optional. Lecs, T R 11:15. G. W. Hudler.
A presentation of the fungi and their roles in nature and in shaping past and present civilizations. The historical and practical significance of fungi as decayers of organic matter, as pathogens of plants and animals, as food, and as sources of mind-altering chemicals are emphasized.

PL PA 241 Plant Diseases and Disease Management
Spring. 4 credits. Prerequisite: one year of biology. Lecs, M W F 11:15; lab, T or W 1:25. W. E. Fry.
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. R. Aist.
An introduction to fungi, emphasizing biology, comparative morphology, and taxonomy.

PL PA 319 Field Mycology
Fall. 1 credit. Prerequisite: permission of instructor. Offered fall 1999. K. T. Hodge.
Study of mushrooms and other fungi on 7 field excursions followed by 7 evening labs devoted to lectures and identification and study of collections under the microscope. Emphasis on ecology, biology, and means of identification. Grades are determined on basis of laboratory final.

PL PA 401 Basic Plant Pathology
Fall. 4 credits. Prerequisite: one year of biology and BIO PL 241 or equivalent. Recommended: general microbiology, plant physiology. Lecs, T R 11:15, F 12:20; lab, T or W 1:25. W. A. Sinclair.
Principles and practice of plant pathology. Lectures and labs are coordinated to consider types of plant pathogens and their population dynamics, disease cycles, diagnostic criteria and procedures, mechanisms of pathogen attack and plant defense, vector relationships, epidemiology, disease forecasting, loss assessment, and disease control. This course prepares students for graduate-level work in plant pathology.

PL PA 407 Nature of Sensing and Response (Also BIO G 407)
Spring. 3 credits. Prerequisites: BIO BM 330 or 333 or 331 and previous or concurrent registration in 332. Recommended: BIO GD 281. Lec, T R 10:10–11:25. T. P. Delaney.
The responses of organisms and cells to their surroundings are examined to illustrate how biological systems: sense their biotic and abiotic environment and communicate sensing into appropriate responses. A wide variety of response systems will be explored to identify their unique features and to illustrate how similar processes are utilized by widely divergent organisms. Examples are drawn from prokaryote, plant and animal systems for environmental sensing, control of development and responses during disease. Discussion will also examine the role of genetics and biochemistry in understanding signal transduction pathways, as well as the way these systems are perturbed by mutation and disease.

PL PA 411 Plant Disease Diagnosis
Fall. 3 credits. Limited to 18 students. Prerequisites: PL PA 241 or equivalent and permission of instructor. Lec, T R 10:10; lab T R 1:25–4:25. Offered fall 1999. G. W. Hudler.
A method of diagnosing plant diseases caused by infectious and noninfectious agents is taught with emphasis on application of contemporary laboratory techniques and effective use of the literature. After 7 weeks of formal lecture and laboratory sessions, students will spend the rest of the semester working on their own to determine the causes of plant diseases on samples that have either been received by the Plant Disease Diagnostic Lab or that have been prepared by instructors.

[PL PA 443 Pathology of Trees and Shrubs
Fall. 3 credits. Prerequisites: PL PA 241 or equivalents. Lecs, M W 11:15; labs, F 1:25–4:25. Not offered fall 1999. Next offered fall 2000 and alternate years. G. W. Hudler.
For students preparing for careers in horticulture, urban forestry, and pest management. Deals with the nature, diagnosis, assessment, and treatment of diseases of trees and shrubs. Forest, shade, and ornamental plants are considered.]

PL PA 444 Integrated Pest Management
Fall. 4 credits. Prerequisites: BIO ES 261, ENTOM 212 or 241, or PL PA 241 or their equivalents or permission of instructor. P. A. Arneson and J. Losey.
Lectures integrate the principles of pest control, ecology, and economics in the management across multiple 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 472 Microbial Control of Plant Diseases
Spring. 3 credits. Limited to 20 students. Prerequisites: PL PA 241 or PL PA 401, BIOMI 290, or equivalent. Lecs, M W 9:05; disc F 9:05–9:55. E. B. Nelson.
This course is intended to provide students with a broad exposure to the field of biological disease control. The basic ecological concepts and principles underlying microbial interactions with plants, as well as plant pathogens, and the role of these interactions in the suppression of fungal and bacterial diseases will be discussed. Emphases will be placed equally on biological control processes in rhizosphere and phylloplane habitats. Topics will address aspects of root and leaf microbial ecology, plant pathogen ecology and behavior, ecological and molecular mechanisms of biological disease control, and manipulation and enhancement of biological control processes. Applied aspects such as delivery approaches, commercialization and registration of biological control organisms, and implementation of biological disease control practices in agriculture will also be covered. One student-driven discussion session per week will provide opportunities to explore timely topics related to biological control that may fall beyond the central focus of the course.

PL PA 494 Special Topics in Plant Pathology
Fall or spring. 4 credits maximum. S-U grades optional.
The department teaches "trial" courses under this number. Offerings vary by semester, and are 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.

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 assistance in a mycology or plant pathology course by mutual agreement with the instructor.

PL PA 499 Undergraduate Research
Fall or spring. 3–5 credits. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grades optional.
An opportunity for research experience under the direction of a faculty member.

PL PA 642–661 Special Topics Series
Unless otherwise indicated, the following description applies to courses 642–661.
Fall or spring. 1 credit. Prerequisite: permission of instructor. S-U grades only.
Weekly discussions of current topics in special areas of plant pathology and mycology. Students are required to do extensive reading of current literature and to present oral and written reports.

PL PA 642 Plant Disease Epidemiology
Fall. TBA. M. G. Milgroom.

PL PA 644 Ecology of Soil-Borne Pathogens
Fall. R 12:20. E. B. Nelson.

PL PA 645 Plant Virology
Fall. F 12:20. S. M. Gray.

PL PA 647 Bacterial Plant Diseases
Fall and spring. M 9:05. S. V. Beer.
Emphasizes current research in phytobacteriology undertaken in laboratories at Cornell.

PL PA 648 Molecular Plant Pathology
Fall. R 12:20. T. P. Delaney.

[PL PA 649 Mycology Conferences
Fall. 1 credit. Not offered 1999–2000. K. T. Hodge.]

PL PA 650 Diseases of Vegetable Crops
Fall. TBA. Hours to be arranged. J. W. Lorbeer and T. A. Zitter.

PL PA 652 Field Crop Pathology
Spring. W 8:00. G. C. Bergstom.

PL PA 654 Diseases of Florist Crops
Spring. F 12:20. R. K. Horst.

PL PA 655 Plant Diseases in Tropical Agriculture (also ENTOM 644)
Spring. T 12:20. P. A. Arneson.

PL PA 661 Diagnostic Lab Experience
Summer and fall. 1 or 2 credits. S-U grades only. Requires 3 hrs/wk per credit hour. Hours to be arranged. T. A. Zitter.
For graduate students and advanced undergraduates with a special interest in diagnosing plant diseases. Students work in the Diagnostic Laboratory (Plant Pathology Department) under supervision of the diagnostician. Coursework or experience in diagnostic techniques is strongly advised. Priority will be given to graduate students in plant pathology and plant protection.

PL PA 662 Molecular Plant-Pathogen Interactions
Spring. 1 credit. Prerequisites: BIOGD 281, BIOBM 330 or 331, and BIOMI 653.1. Lecs, M W F 10:10 (12 lecs) Jan. 26–Feb. 21. T. P. Delaney, A. R. Collmer.
An examination of the molecular properties that control the development of host-parasitic interactions in both microorganisms (bacteria and fungi) and higher plants. Contemporary theories describing the genetic mechanisms of pathogenesis and resistance are discussed.

PL PA 663 Plant Molecular Biology 1
Fall. 1–5 credit. Prerequisites: BIO GS 281, BIO BM 330 or 331.

Section 01 Concepts and Techniques in Plant Molecular Biology (BIO PL 653.1)
1 credit. Lecs, M W F 10:10 (12 lecs) Sept. 1-Sept. 27. T. Delaney, G. B. Martin.
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, plant transformation, mutant production, and use of sequence databases.

Section 02 Plant Biotechnology (BIO PL 653.2 and PL BR 653.2)
1 credit. Lecs, M W F 1:25 (12 lecs) Sept. 29-Oct. 27. M. Zaitlin, E. D. Earle.
This course deals with production and uses of transgenic plants for agricultural and industrial purposes. Topics include procedures for gene introduction and control of gene expression, as well as strategies for obtaining transgenic plants that are resistant to insects, diseases, and herbicides, produce useful products, or have improved nutritional and food processing characteristics. 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. W 12:20–1:10.

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. Offerings vary by semester, and are 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.

PL PA 701 Concepts of Plant Pathology: Organismal Aspects
Spring. 3 credits. For graduate students with majors or minors in plant pathology; others by permission. Prerequisites: PL PA 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 exemplary host-pathogen systems are considered. Historical perspectives and recent research are 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. Prerequisite: PL PA 401 or permission of instructor. Some background in statistics is recommended. Lab=discussion section. Lec, T R 10:10; disc, 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 pathogen and plant populations, and population genetics of pathogens. The discussion section is 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. Prerequisite: PL PA 401 or equivalent. Not offered spring 2000. S. G. Lazarowitz.
This course considers plant viruses and the diseases they cause. Consideration is given to virus structure and composition, classification, replication, effects on hosts, modes of transmission, and the relationships of these aspects to principles of diagnosis and control.]

PL PA 706 Phytonematology
Fall. 2 credits. For graduate students with a major or minor in plant pathology; others by permission. Prerequisite: PL PA 401 or equivalent or permission of instructor. J. Esnard.
The course deals with plant-parasitic and plant-associated nematodes, their biology, morphology and systematics; ecology and role in ecosystem health; physiology and molecular aspects of nematode-plant interactions; population dynamics; interactions with other plant pathogens; and management options. Bioengineering, breeding for resistance, genetic mechanisms of host resistance, biological control, and technical methods of handling nematodes will also be covered. Emphasis will be placed on the nematode as an animal system.

[PL PA 707 Phytobacteriology
Fall. 2 credits. Prerequisites: general microbiology, lectures and laboratory; introductory plant pathology. Offered alternate years. Not offered fall 1999. S. V. Beer.
A consideration of the prokaryotes that cause disease in plants and examples of the diseases they cause. The course emphasizes properties of bacterial pathogens that affect disease, methods for manipulation of the pathogens,

and recent developments in phytobacteriology. The current state of knowledge of important phytopathogenic genera including their genetics and mechanisms of pathogenesis is reviewed. Laboratory practice in isolation, inoculation, identification, genetics, and physiology is included.]

PL PA 709 Phytomycology
Spring. 2 credits. For graduate students with a major or minor in plant pathology or mycology; others by permission. Prerequisites: PL PA 401 and 309 or equivalents, or permission of instructor. Lec, F 1:25–2:30; lab, 2:30–4:30. J. W. Lorbeer.
Provides basic information on the biology of plant pathogenic fungi with emphasis on the structure, ecology, genetics, life cycles, and disease cycles of representative genera and species.

[PL PA 715 Phytovirology Laboratory
Spring. 2 credits. Limited to 12 students. Prerequisite: permission of instructor. S-U grades only. Not offered spring 2000. S. G. Lazarowitz.]

[PL PA 735 Advanced Plant Virology
Spring. 3 credits. Prerequisite: permission of instructor. 3 lecs, hours to be arranged. Not offered spring 2000. S. G. Lazarowitz.
Topics in plant virology, with an emphasis placed on student discussion of current literature. Topics included are viral infection process, viral and viroid replication, viral recombination, viral movement, viral genes and their products, cross protection, detection of viruses, molecular approaches to resistance and the use of viruses as vectors for introducing genetic material into plants.]

[PL PA 738 Genetics and Development of Filamentous Fungi
Fall. 2 credits. Prerequisite: BIOGD 281 or equivalent. Hours to be arranged. Next Offered 2000–2001. B. G. Turgeon, O. C. Yoder.
Molecular genetic and genomic approaches to the study of fungal biology. Applications of contemporary methodology to genetic dissection of developmental processes, such as plant pathogenesis (including host and tissue specificity) and reproduction, both sexual and asexual, are described. Experimental evidence supporting various hypotheses to explain fungal pathogenicity is evaluated. Examples are chosen from investigations of model plant pathogenic fungi such as *Cochliobolus heterostrophus*, *Magnaporthe grisea*, and *Ustilago maydis* 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 odd-year fall semesters. Not offered 1999–2000. K. T. Hodge.
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 before beginning research. S-U 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. 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 students 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.

POMOLOGY (FRUIT SCIENCE)

See Horticultural Sciences.

RURAL SOCIOLOGY

D. L. Brown, chair; P. R. Eberts, S. Feldman, J. D. Francis, C. C. Geisler, P. K. Gellert, D. T. Gurak, T. A. Hirschl, W. B. Lacy, T. A. Lyson, P. D. McMichael, M. J. Pfeffer, J. M. Stycos, L. B. Williams

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 Indian America to 1890 (also American Indian Studies 100)
Fall. 3 credits. S-U optional. Enrollment limited to 550. W 7:30–10 p.m. R. W. Venables.
Slide lectures survey the rich cultures and complex histories of the Indian nations north of Mexico. Indian arts and philosophies are compared and contrasted with those of Europe, Africa, Asia, Canada, and the United States. The origins of today's major legal issues involving American Indians are also discussed. The course begins with a survey of Indian America before Columbus and ends at Wounded Knee in 1890, the event which marks the end of the conquest of Indian America. Guest lecturers, including American Indian leaders, provide additional perspectives.

R SOC 101 Introduction to Sociology (also Sociology 101)
Fall, spring or summer. 3 credits. Enrollment limited to 300 in the fall, 400 in the spring. Lecs, T R 10:10–11:00; sec, various times. Staff.
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.

R SOC 103 Introduction to Sociology: Microsociology (also Sociology 103)
Fall. 3 credits. S-U optional. Lec, T R 8:40–9:55. W. Burkhard.
An introduction to microsociology, focusing on social processes within small groups, including the family. Emphasis is on leadership, conformity, social influence, cooperation and competition, distributive justice, and micro analyses of interaction.

R SOC 105 Economic Sociology (also Sociology 105)
Fall. 3 credits. S-U optional. T R 11:30–12:45. C. Leuenberger.
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 focus their writings on emergent capitalist economies and societies. Contemporary social theorists likewise have sought to understand the interaction between capitalism and the social forces reacting against and emerging from modern economic development. From exchange and rational choice theories to network analysis and institutional theory, a central theme in contemporary social thought has been the relationship between the economy and society, economic action and social structure, rationality and fundamental social processes. This course provides an introduction to social thought and research seeking to understand and explain the relationship between economy and society in the modern era.

R SOC 175 Issues in Contemporary American Indian Societies (also American Indian Studies 175)
Spring. 3 credits. S-U grades optional. Lecs, W 7:30–9:30 p.m.; sec, various times. Staff.
American Indian cultural and political history from 1890 to the present will be the primary focus of this course, with a review of important earlier events in U.S./Native American national relations. Emphasis will be on Native American perspectives, with guest lectures and media presentations.

R SOC 200 Social Problems (also Sociology 200)
Fall. 3 credits. S-U grades optional. Enrollment limited to 100. T R 10:10–11:25. T. A. Hirschl.
This course investigates a variety of current social problems from a sociological perspective. The course begins with an overview of sociological theories that may account for social problems and identifies common as well as competing elements of these theories. The theoretical framework is then applied to analyze a variety of social problems, which may vary semester to semester. Examples of social problems are homelessness, teenage pregnancy, deindustrialization, and homicide, among others. Emphasis in the course will be given to how social problems are measured, and students will be given an opportunity to test theories with data analysis.

R SOC 201 Population Dynamics (also Sociology 202)
Spring. 3 credits. S-U grades optional. Enrollment limited to 35. ALS students must register for this course as R SOC 201. T R 2:55–4:10 or 8:40–9:55 (depending on instructor). J. M. Stycos or 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 ones. 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 202 Religion and Family in the U.S. (also Sociology 201)
Fall. 3 credits. S-U optional. Lec, M W 2:55–4:10. Not offered 1999–2000. P. Becker.
This course will examine how two fundamental social institutions—religion and the family—are interlined in American society. As recently as the 1950s, religious institutions were organized around the needs of one dominant family form, the male-breadwinner family with a stay-at-home mother. But since the 1950s, that family form is no longer statistically dominant or culturally normative. How have religious institutions adapted to new family forms? How do religious beliefs influence behavior within families, for example, the raising of children? How do religious groups foster ideals of family life, or influence our beliefs about what are "good" families? How do people's family experiences and family values influence their participation in organized religion? What models of family life are religious groups organized around? We will begin to answer these questions by drawing on readings that explore the religion-family link in a variety of religious, ethnic, and social class contexts within the contemporary United States.]

R SOC 205 International Development (also Sociology 206)
Spring. 3 credits. Enrollment limited to 74. 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 global food systems, new forms of export production, development agencies, multilateral institutions, local bureaucracies, transnational corporations, the debt crisis, and new technologies. We will also examine the new social movements, such as environmentalism, feminism, and grassroots activism.

R SOC 206 Gender and Society (also Women's Studies 206)
Spring. 3 credits. Enrollment limited to 100. Lecs, M W 11:15–12:05; sec, various times. B. Wejnert.
Course will familiarize students with origin of gender hierarchies, social and behavioral similarities/differences between females and males, and degree that biological, psychoanalytic, psychological and sociological perspectives help to understand the differences. United States and cross-cultural comparisons of the consequences of gender inequality will be a major focus of the course. Objectives will be met through lectures, readings, films, participant observation and personal experiences.

R SOC 208 Technology and Society
Fall. 3 credits. Offered odd years. M W F 10:10–11:00. C. C. Geisler.
The relationship between technology and society is among the most pervasive concerns of our time. Ultimately, what makes a technology useful or "appropriate" is a sociological question. Lectures and readings review classical debates regarding technology and society. Herein, students compare high technologies and appropriate technologies, identify problems associated with technology transfer to other societies, and create a list of important criteria by which technologies are judged appropriate or inappropriate using numerous case studies.

[R SOC 209 Social Inequality (also Sociology 208)
Spring. 3 credits. S-U optional. Not offered 1999–2000. M. Brinton.
This course examines the nature and processes of social inequality in industrial societies. The principal focus is on the contemporary United States, with some comparisons to other industrial societies with different educational and class structures. Readings include theoretical and empirical materials on urban inequality and stratification along race, class, and gender lines. The course includes ethnographies of schools and workplaces as well as more quantitative research.]

R SOC 213 Social Indicators, Data Management, and Analysis
Fall. 3 credits. Offered alternate years (opposite of R SOC 214). T R 11:40–12:55. P. R. Eberts.
A survey of definitions of social indicators and general principles of social indicators research will be illustrated from data on both developed and less-developed countries. Data management and analysis of measures of poverty, level of living, inequality, quality of life, etc., based on census data, household surveys, and key-informant and other low-cost techniques, will be examined using personal computers.

[R SOC 214 Research Methods for the Social Sciences
Fall. Offered even years (opposite of R SOC 213). 3 credits. Enrollment limited to 25. T R 11:40–12:55. Not offered fall 1999 and 2001; next offered fall 2000. L. B. Williams.
A survey of approaches to conducting research in the social sciences will be presented. These include observation techniques, unstructured, semi-structured, and structured interviews, experiments, and focus groups. Some statistical techniques for data analysis will be discussed. A background in elementary statistics, although not required, is preferred.]

R SOC 215 Organizations: An Introduction (also Sociology 215)
Fall. 3 credits. S-U optional. Lec T R 10:10–11:25. 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 a Boston neighborhood, General 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 inside and outside perspectives. The focus of the course is upon research scholarship, not the training of managers. Nonetheless, the analytical skills you will acquire are applicable to work in firms, government agencies, and nonprofit organizations.

R SOC 220 Sociology of Health of Latinos and Ethnic Minorities (also Latino Studies Program 220)
Fall. 3 credits. S-U grades optional. Enrollment is limited to 40. T R 10:10–11:25. P. A. Parra.
Discusses the health status of minorities in the United States. This course explores intragroup diversity such as migration, economic status and the influence of culture and the environment on health status and access to health care. Although special attention is given to Latino populations, discussion encompasses other minorities who face similar problems.

R SOC 301 Theories of Society
Spring. 3 credits. Prerequisites: rural sociology or sociology course. S-U grades optional. Enrollment is limited to 30. M W F 11:15–12:05. P. K. Gellert.
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 302 Evaluating Statistical Evidence (also Sociology 301)
Fall. 3 credits. S-U optional. Lec, M W 10:10–11:00. 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.

R SOC 318 Ethnohistory of the Northern Iroquois (also American Indian Studies 318)
Spring. 3 credits. S-U grades optional. Enrollment limited to 20. M 7:30–10:30 p.m. R. W. Venables.
The development of Iroquois (Houdenosaunee) history and culture is traced to the present day.

R SOC 324 Environment and Society (also Science and Technology Studies 324 and Sociology 324)
Spring or summer. 3 credits. Enrollment limited to 100. 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 like 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. A sociological framework is applied to evaluate interrelationships of substantive and philosophical/theoretical issues.

R SOC 331 Demographic Analysis in Business and Government (also Agricultural, Resource, and Managerial Economics 416)
Fall. 3 credits. S-U with permission of instructor. Prerequisite: R SOC 213 or a statistics course. Enrollment limited to 50 students (10 R SOC students, 40 ARME students). Lec, W F 1:25–2:15. Sec, M 1:25, 2:30. 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, and health services.

R SOC 336 Rural Areas in Metropolitan Society
Fall. 3 credits. S-U grades optional. Prerequisite: a social science course. T R 11:40–12:55. Offered alternate years. D. L. Brown.
This course analyzes the changing structure and role of small towns and rural areas in developed nations. The focus is on adaptation of rural communities and populations 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. Students participate in group research projects in rural communities.

R SOC 340 Food and Agriculture in Modern Society
Spring. 3 credits. Prerequisite: one course in social science (CALS Group C). S-U optional. Enrollment limited to 30. T R 8:40–9:55. G. W. Gillespie.
Our changing food and agriculture system will be examined from a sociological perspective. What are its major trends as we enter the twenty-first century? What are its social, human health, and environmental issues? What are its potential development strategies and what do these imply for rural communities, urban areas, and the environment?

[R SOC 360 Sociology of American Indians (also American Indian Studies 361)
Spring. 3 credits. Prerequisite: R SOC 101/SOC 101 or approval of the instructor. Enrollment limited to 20. T R 10:10–11:25. Offered odd years. Not offered spring 2000. B. Baker.
This course is designed to emphasize the role of theory and research in our understanding of American Indians. Towards that end, the relationship between the nation-state and indigenous populations will be emphasized. Students will be exposed to the following theoretical perspectives; world systems and dependency, internal colonialism, social disintegration, the social construction of reality, political mobilization, and ethnic reorganizations. The course is also historical and comparative as students will study different Indian tribes located in the United States and Canada.]

R SOC 367 American Indian Tribal Governments (also American Indian Studies 367)
Fall. 3 credits. S-U option. Enrollment limited to 20. Lecs, W 2:00–4:25. B. Baker.
This course focuses on the structure of contemporary tribal governments and the ways in which these governments approach the issues confronting their constituents. The effects of European contact on traditional political organizations are detailed, as are the present day relationships of tribal governments to federal and state governments.

R SOC 370 Comparative Issues in Social Stratification (also Sociology 371)
Fall. 3 credits. Prerequisite: an introductory social science course. T R 1:25–2:40 or T R 8:40–9:55 (depending on professor). T. A. Lyson or S. Feldman.
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, meaning and experiences 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. Staff.
Students should select a faculty adviser and begin proposal development during the junior year. Students must submit written proposals by the third week of the semester of their senior year to the departmental honors committee representative.

[R SOC 408 Human Fertility in Developing Nations (also Biology and Society 404)
Spring. 3 credits. Enrollment limited to 15. T R 2:55–4:10. Offered alternate years. Not offered 1999–2000. Staff.
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 410 Population and Environment
Spring. 3 credits. Enrollment limited to 15. T R 10:10–11:25. Offered alternate years. J. M. Stycos.
A voluminous new literature is emerging, attempting to trace the connections between population dynamics and environmental change. The seminars will be devoted to a critical examination of this literature, stressing population change both as cause and consequence of environmental factors. In addition, the social and economic forces that mediate the population-environment relation will be examined.

[R SOC 418 Population Policy (also Biology and Society 414)
Spring. 3 credits. Prerequisite: R SOC 201 or permission of instructor. Enrollment limited to 15. T R 10:10–11:25. Offered alternate years. Not offered 1999–2000. Staff.
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. R 1:25–4:25. Offered alternate years. Not offered 1999–2000. S. Feldman.
Drawing on feminist and sociological theory and methods, and employing a comparative and global analytic framework, this course examines how gender ideologies, work-family linkages and the transformation of work and the labor process are based on and help transform gender relations. The course gives attention to the particularity of place and time as these help to situate gender relations in the different state, regional, and global configurations that contextualize and configure everyday life.]

[R SOC 430 Migration and Population Redistribution
Fall. 3 credits. Prerequisite: undergraduates, one demography course or permission of instructor. T R 8:40–9:55. Offered even years. Not offered fall 1999 and 2001; next offered 2000. 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 interrelationships 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
Spring. 3 credits. S-U option. Enrollment limited to 30. M W 8:40–9:55. Not offered 1999–2000. D. T. Gurak.
Ethnic conflict and accomodation is examined in diverse settings (societies and historical periods). Demographic indicators (such as residential segregation, marital patterns, mortality and fertility differentials, and occupational mobility) of underlying social conditions serve as the principal vehicle for evaluating the status of ethnic relations.]

R SOC 434 Sociology of Health and Human Behavior (also Policy Analysis & Management 430)
Summer 3-week session. 3 credits. S-U optional. Prerequisite: RS 103 or Soc 103, permission of instructor. Limited to 30. M-F 2–4:40 p.m. L. Morton.
This course examines the socially constructed meanings of health, illness, and death by the application and comparison of theoretical perspectives: biomedical vs. community; personal vs. population; public vs. privatized; and economic efficiency vs. distributive justice. It will focus on structural determinates of health inequality with attention to gender, age, ethnicity and race, culture, geographic location, and income.

[R SOC 436 Successful Aging: Issues and Social Policy in the 1990s
6-week summer session. 3 credits. M-F 10:00–11:15. Not offered summer 2000. P. Taietz.
This course aims to correct the misconceptions about aging and to free ourselves of the stereotypic viewpoint that older persons are members of a single, homogeneous category. Successful aging in the 1990s and beyond is the central focus of the course. The response of the public and private sectors to the rapidly growing older population is examined in view of the imbalance between the strengths and capacities of older persons and the lack of roles and opportunities in society to utilize and reward their talents and abilities. Films and fieldtrips.]

[R SOC 437 Aging and Aging Social Policy in the 1990s
Fall. 3 credits. Prerequisite: R SOC 101 or its equivalent. Enrollment limited to 30. T R 11:40–12:55. Not offered 1999–2000. Staff.
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 for the elderly.]

R SOC 438 Social Demography (also Sociology 437)
Fall. 3 credits. Enrollment limited to 30. M W 8:40–9:55. D. T. Gurak.
This course surveys the methods, theories, and problems of population studies. Attention is directed to the social, economic, and cultural determinants and consequences of population growth, distribution, and change. The core areas of demography, fertility, mortality, and migration are studied. Comparisons are made between developed and developing areas and between Africa, Asia, and Latin America.

[R SOC 440 The Social Impact of Resource Development
Spring. 3 credits. S-U grades optional. Offered alternate years. Not offered 1999–2000. C. C. 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 (also American Indian Studies 442)
Spring. 3 credits. S-U grades optional. Prerequisite: permission of instructor. Enrollment limited to 15. W 7:30–10:30. R. W. Venables.
This course provides an opportunity for students to read and discuss a wide range of American Indian philosophies.

[R SOC 490 Society and Survival
Fall. 3 credits. Prerequisite: introductory sociology course or permission of instructor. Enrollment limited to 30. T R 2:55–4:10. Not offered 1999–2000. D. T. Gurak.
Course surveys existing theories, methodological techniques, and research results relating to how social, economic and cultural structures and processes affect survival chances in diverse societies. A comparative framework is presented, and the utility of existing knowledge for policy-related applications in different societies is assessed. Attention is given to the problems associated with imputing causality in morbidity and mortality data.]

R SOC 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 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 495 Population, Environment, and Development in Sub-Saharan Africa
Fall. 3 credits. Offered alternative years. Enrollment limited to 30. M W 2:55–4:10. D. T. Gurak.
In the past three decades, countries in sub-Saharan Africa have experienced rapid population growth, weak economic growth, and growing environmental problems. This course examines how these problems are interrelated and looks at possible solutions. After reviewing trends in population, environment and development within the region, the course focuses on specific problems, including: urbanization, health and survival, population pressure and sustainable agriculture, refugees, and gender/family/community structures.

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 560 Managing Local Environmental Systems: Social Perspectives and Research Bases
Fall. 3 credits. S-U optional. Enrollment limited to 15. W 1:25–4:25. J. D. Francis.
Course is for students with diverse backgrounds: undergrads, grads, people in professional careers, others with interest in environmental issue identification, resolution and management. Course discussions include ecological, social, economic and local government perspectives. Via lab exercises throughout the semester, student will have opportunities to apply the concepts and principles of these perspectives to analysis of specific local environmental management problems. Readings, lectures, and a course project are mandatory.

R SOC 599 MPS Project
Fall and spring. 1–6 credits. S-U optional. Lec: TBA. Graduate faculty.
For students admitted specifically to a MPS program.

R SOC 601 Theoretical and Methodological Approaches to Community and Rural Development
Fall. 3 credits. Letter grade only. Prerequisite: graduate student. Lec, R 7:00–10:00 p.m. P. R. Eberts.
A survey of three general approaches for conducting analysis and practice in community and rural development. These approaches include examinations of: 1) community structural changes and policymaking; 2) participatory processes for generating community development; and 3) planning strategies as mechanisms for creating community development opportunities.

R SOC 602 Community Development Seminar
Spring. 1 credit. Prerequisite: R SOC 601. M 6:30–9:30 p.m. (Meets triweekly.) P. R. Eberts.
A participatory seminar for feedback, collective learning, and guidance as MPS students apply community and rural development theory and methods in thesis project work with local and regional communities.

R SOC 603 Classical Sociological Theory
Fall. 4 credits. S-U grades optional. Prerequisites: open to graduate students only. T R 2:55–4:10. 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. Important objectives of the course will be to identify the philosophical and conceptual core of the discipline and to critically evaluate the relevance of the classical theories to contemporary social change and development.

[R SOC 604 Theories of Social Change
Spring. 3 credits. S-U grades optional. T R 2:55–4:10. Not offered 1999–2000. P. D. McMichael.
This course surveys major twentieth-century social theories, focusing on lineages from classical theory and on theories relevant to understanding the processes of social change. Major topics covered will include mid-century functionalism, conflict theories, neo-Marxism, neo-Weberianism, substantive economic sociology, and world-systems theory. Other topics, such as the "new sociology of culture,"

critical theory, structuration theory, neofunctionalism, the new methodological individualism, and the macro-micro link, will be covered briefly.]

R SOC 606 Sociological Theories of Development
Spring. 3 credits. T 2:30–5:30. P. K. Gellert.
This course is a critical examination of a historical range of theories and research in the sociology of development from the post-war period through the present. Major topics include modernization theory, dependency theory, world-system theory, the developmental state, global commodity chains, and globalization. Throughout the course, the concept of development itself is questioned and critiqued both theoretically and in terms of practical challenges from environmental, indigenous and other social movements.

R SOC 607 Sociology of Natural Resources and Development
Fall. 3 credits. S-U optional. Offered odd years. R 1:25–4:25. P. Gellert.
Building on theories in the sociology of development, this seminar will examine the role of natural resource extraction, processing, and exports to global markets in the developmental trajectories of nations in Asia, Africa and Latin America. Engages students in both theoretical debates and practical implications of resource access, control, and conflict amongst various social actors ('stakeholders'). Detailed historical cases will be examined, primarily from Southeast Asia (Indonesia, Malaysia, Philippines).

[R SOC 612 Population and Development in Asia (also WMNS 612)
Spring. 3 credits. Offered odd years. Not offered spring 2000 and 2003; next offered spring 2001. W 10:10–1:10. L. B. Williams.
This graduate seminar considers population and development issues in Asia. Case studies pertaining to Southeast Asia will be highlighted. We will discuss the linkages between population and development and consider both from a historical perspective. Recent social, economic, and demographic change in the region will be considered in depth. Evolving gender roles in the family, labor force, and broader social context will also be examined.]

R SOC 618 Research Design I
Fall. 4 credits. Prerequisite: a statistics course. 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
Spring. 4 credits. Prerequisite: an introductory methods course and a statistics course. T R 12:20–2:15. J. D. Francis.
The second part of the two-semester sequence in introductory graduate methods, with emphasis on an intermediate-level treatment of the following topics: regression, analysis of variance, analysis of covariance. Special attention is given to use of categorical variables in regression. Students develop and examine several analytical models using actual data to familiarize themselves with data handling and processing. Extensive use of computers.

[R SOC 621 Foundations of Environmental Sociology
Fall. 3 credits. Open to graduate students only. S-U optional. Enrollment limited to 20. W 10:10–12:35. Offered even years. Not offered fall 1999 and 2001; next offered fall 2000. M. J. Pfeffer.
Foundations of Environmental Sociology provides graduate students with a broad survey of the literature in this disciplinary specialty area. Students will review the history of thought in environmental sociology as well as key literature in the various substantive foci of this specialty. The principle objective of this course is to provide graduate students specializing in environmental sociology with a firm grasp of the content, controversies, and trends in the area. Sessions are conducted in a seminar style, and discussions are focused on close review of assigned readings.]

R SOC 625 State, Economy, and Society
Spring. 3 credits. Enrollment limited to 25. W 1:25–4:25. Offered even years. P. D. McMichael.
Reviews major issues 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 political-economic restructuring in world regions, and the interaction between national and global processes.

R SOC 630 Field Research Methods and Strategies
Fall. 3 credits. Enrollment limited to 20. T R 8:40–9:55. Offered odd years. L. B. Williams.
This course will cover a variety of methods: focus groups, in-depth interviews, participant observation, archival record analysis, structured surveys, among others. Frameworks by which research questions can be matched with appropriate field methodologies, choice of sample, data collection, approaches, etc. will be discussed and we will assess the strengths and weakness of various strategies of field research. We will also discuss practical matters such as fieldworker recruitment and training, data processing issues, and we will highlight the ethics of field work.

[R SOC 640 Community and Changing Property Institutions
Fall. 3 credits. R 1:25–4:25. Offered even years. Not offered fall 1999. C. C. Geisler.
The seminar acquaints students with the evolution of property rights, from antiquity to the present, and features a number of property debates (the biological basis of ownership; private versus public ownership; property and value; the so-called "tragedy of the commons"; the "new" property). Readings explore land use regulation and property rights, common property issues, opposing land ethics, and new property forms in the future.]

R SOC 641 Politics and Economics of Rural and Regional Development
Fall. 3 credits. Limited to upperclass or graduate students. S-U grades optional. M 12:20–2:50. Offered alternate years. T. A. Lyson.
A survey of social, political, and economic factors in local and regional development. Theories of community and regional development and underdevelopment are explored. Neoclassical, Marxist, and civil society theories are examined within local and global contexts.

[R SOC 643 Land Reform Old and New
Spring. 3 credits. S-U grades optional. R 1:25–4:25. Offered odd years. Not offered 1999–2000. C. C. Geisler.
Land reform continues to be a major cornerstone of development planning. Between 1980 and 2000 the number of landless and near-landless in the Third World will approach one billion. Though land reform is a principal source of hope for the landless, its meanings are many and its models are controversial. The seminar acquaints students with land reform in antiquity as well as in contemporary settings (among others, Japan, the Philippines, Israel, India, 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
Fall. 3 credits. W 1:25–4:25. Offered alternate years. Not offered 1999–2000. S. Feldman.
The structure and dynamics of rural communities are examined in a comparative historical framework focusing on continuities and divergences among imperialist and post colonial settings. Major topics include classical theories of rural social organization and their retheorization 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: CEH 606, graduate standing or permission of instructor. Enrollment limited to 25. M 7:30–10:30 p.m. Offered alternate years. Not offered 1999–2000. 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 661 Sustainable Agriculture and Development
Spring. 3 credits. S-U grades optional. Prerequisites: graduate standing or instructor's permission. Offered alternate years. M 10:10–12:35. 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, agricultural diversification strategies, community agriculture development, and the political and policy contexts of more sustainable agricultural systems.

R SOC 671 Epistemological Challenges to Social Science Paradigms: A Feminist Inquiry (also Women's Studies 671)
Fall. 3 credits. W 1:25–4:25. Offered alternate years. S. Feldman.
This course will review and analyze contemporary themes in feminist epistemological critiques of sociological methods and knowledge systems. It identifies mainstream explanations within the social sciences, introduces early feminist challenges to androcentric paradigms, and explores philosophical assumptions of postmodern and poststructural analyses. Substantive foci assess various approaches to field, archival, and survey research, and the theoretical presuppositions of approaches from rationalism to postpositivism. We also address the linkages between theory and questions of political practice, individualism, and autonomy.

[R SOC 675 Global Patterns of International Migration
Fall. 3 credits. Enrollment limited to 20. M 7:30–10:30 p.m. Offered alternate years. Not offered 1999–2000. Staff.
International migration to the United States and other countries has increased in recent decades. What accounts for that trend in an era when large-scale international migration is supposed to have ended and what are the implications of immigration for receiving countries? Theories and research on these issues are examined in the course from a comparative and interdisciplinary perspectives. Several migration systems are examined, including those of North America and the European Community. Policies shaping immigration are also reviewed.]

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 715 Comparative Research Methods
Spring. 3 credits. M 12:20–2:50. Offered odd years. Not offered spring 2000 and 2002; next offered spring 2001. T. A. Lyson.
This seminar focuses on the comparative method in the social sciences. The logic of comparative inquiry forms the substantive base of the course. Topics include cross-national and cross-regional research design and an analysis of the comparative case study approach. Illustrations of the comparative research approach will cover a range of data types and problems.]

[R SOC 718 Multidimensional Measurement and Classification
Fall. 4 credits. Prerequisite: previous course work in scaling and statistics. T R 12:20–2:15. Offered odd years. Next offered 2001–2002. J. D. Francis.
An advanced course in measurement and scaling, building from work by Thurstone, Guttman and Coombs to multidimensional measurements. Topics include philosophy of factor analysis, factor-analysis models, factoring design, factoring techniques, and comparison with factor-analysis models. Cluster analysis and multidimensional scaling are the other major techniques 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
Spring. 4 credits. Prerequisites: two courses in statistics and one in methods. T R 12:20–2:15. Offered even years. Next offered 2001–2002. J. D. Francis.
The first part of the course reviews multiple regression theory and procedures, after which extensions of these models to categorical data are discussed. Consideration is given to violations of assumptions and their effects. Then more advanced regression concepts and estimation techniques are discussed. The main focus of the course is on logit and log linear models. Computerized labs are an integral part of the course.]

[R SOC 725 The Sociology of "Third World" States
Fall. 3 credits. W 1:25–4:25. Offered alternate years. Not offered 1999–2000. S. Feldman.
This course examines how processes of political and economic restructuring have reshaped state capacities and processes of state formation. Particular attention is paid to questions of class formation, corporatist alliances, transnational interests, and alternative development strategies with the emergence of austerity, privatization and trade liberalization and its neoliberalist ideology. Critical to this discussion are the contours of authoritarianism, nationalism, communalism and fundamentalism as these reconfigure national and regional alliances and practices and shape interpretations of current processes of resistance, change, and terms of intervention and exchange.]

[R SOC 730 Sociology of Global Change
Spring. 3 credits. S-U grades optional. Enrollment limited to 20. W 1:25–4:25. Offered odd years. Not offered spring 2000 and 2002; next offered spring 2001. P. D. McMichael.
Analyses of social change and development are increasingly sensitive to global context. They include the sociology of the world economy as a multi-layered entity anchored in an evolving international division of labor and the system of nation states, and the sociology of transnational political, economic, and cultural processes (e.g., food regimes, commodity chains, diasporas and transnational identities, the new regionalism, and transnational social movements). The seminar examines the substantive and methodological questions generated by research on these global processes, including questions of relevant units of analysis, situating global process in local events and subjectivities and vice versa, and examining the ways in which national structures and cultures interact with global structures and cultures.]

[R SOC 741 Community Development and Local Control
Spring. 3 credits. W 1:25–4:25. Offered alternate years. Not offered 1999–2000. C. C. Geisler.
Theories of community growth and decline and the current debate over the place of local control in community development in general are considered. Salient themes include the role of neopopulism in community development, changing institutions of property as community development occurs, and changing definitions of "community."]

R SOC 791 Teaching Experience
Fall or spring. 1–3 credits. Limited to graduate students. S-U grades only. Graduate faculty.
Participation in the ongoing teaching program 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 Master's program.

R SOC 872 Development Sociology
Limited to master's and doctoral degree candidates with permission of the graduate field member concerned. S-U grades optional. Graduate faculty.

R SOC 900 Graduate-Level Thesis 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.

R SOC 901 Doctoral-Level Thesis 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.

Related Courses in Other Departments

(Others may be added)

Population Dynamics (SOC 205)

Gender Relations, Gender Ideologies, and Social Change (WMNS 524)

Summer Session Courses

Introduction to Sociology (6-week session)

Environment and Society (3-week session).

Sociology of Health and Human Behavior (3-week session)

SOIL, CROP, AND ATMOSPHERIC SCIENCES

J. M. Duxbury, chair; M. Alexander, P. C. Baveye, D. R. Bouldin, R. B. Bryant, J. H. Cherney, S. J. Colucci, K. H. Cook, W. J. Cox, S. D. DeGloria, E. C. Fernandes, G. W. Fick, D. L. Grunes, R. R. Hahn, S. D. Klausner, W. W. Knapp, L. V. Kochian, T. A. LaRue, M. B. McBride, J. Mt. Pleasant, R. L. Obendorf, W. D. Pardee, W. S. Reid, S. J. Riha, T. W. Scott, T. L. Setter, P. L. Steponkus, H. M. van Es, A. Van Wambeke, R. M. Welch, D. S. Wilks, M. W. Wysocki

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: 131, 250, 331, 332, 334, 341, 342, 352, 353, 435, 444, 447, 451, 456, 457, 635, 652, 692, 850, 950, 951

Crop Science: 311, 312, 314, 315, 317, 608, 610, 612, 613, 614, 642, 691, 820, 920, 921

Environmental Information and Analysis: 398, 411, 420, 620, 660, 675

Soil Science: 260, 321, 362, 363, 365, 371, 372, 373, 471, 473, 483, 663, 667, 669, 671, 693, 880, 980, 981

General Courses

SCAS 190 Sustainable Agriculture
Fall. Credits variable, 2 or 3. Limited to 60 students. S-U grades optional. Lec, R 10:10; 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 (soils, crops, and climates), and it emphasizes scientific principals of management that conserve or renew those resources for continuing benefit to society. The information is of general value for non-majors and students new to the field. Laboratories include several field trips and stress hands-on experience with soils, crops, and descriptive climatology. Written assignments are prepared for the World Wide Web. An extra credit can be earned by participation in team preparation and delivery of a lesson in sustainable agriculture.

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
Fall or spring. 1–5 credits. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grades optional.
Teaching experience in soil science, crop science, or atmospheric science is obtained by assisting in the instruction of a departmental course.

SCAS 499 Undergraduate Research
Fall or spring. Credit to be arranged. Students must register with an Independent Study form (available in 140 Roberts Hall).
Independent research on current problems selected from any phase of crop science, atmospheric science, or soil science.

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 research and reporting research results. Emphasis is given to literature reviews, scientific writing and reviewing (either thesis proposals, grant proposals, or manuscripts for publication), and slide and poster presentations. Students are expected to work closely with their major professor as well as the instructor of the course.

Atmospheric Science

SCAS 131 Basic Principles of Meteorology
Fall. 3 credits. Lecs, T R 11:15; lab, T W or R 1:25–4:25 and M W 7:00–9:30 p.m. M. W. Wysocki.
A simplified treatment of the structure of the atmosphere: heat balance of the earth; general and secondary circulations; air masses, fronts, and cyclones; and hurricanes, thunderstorms, tornadoes, and atmospheric condensation. In the laboratory, emphasis is on techniques of analysis of weather systems.

SCAS 250 Meteorological Observations and Instruments
Spring. 3 credits. Prerequisite: SCAS 131. Lecs, M W 12:20; lab, R 1:25–3:20. M. W. Wysocki.
Methods and principles of meteorological measurements and observations, including surface, free-air, and remote systems. Instrument siting, mounting, and protection. Instrument response characteristics, calibration, and standardization. Recorders and data logging systems. Laboratory exercises in observation and data analysis. Intended to serve as preparation for Observers Examination. Lab fee, $50.

SCAS 331 Climate Dynamics (also ASTRO 331)
Fall. 4 credits. Prerequisites: MATH 112 or 192 or equivalent. Lecs, M W F 1:25–2:15; disc, W 2:30. K. H. Cook, P. J. Gierasch.
Processes that determine climate and contribute to its change are discussed, including atmospheric radiation, ocean circulation and atmospheric dynamics. Contemporary climate change issues are investigated and discussed in the context of natural variability of the system.

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, to be announced; disc, to be announced. 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
Spring. 3 credits. Recommended: a course in physics. T R 10:10–11:25. D. S. Wilks.
This course treats relationships of radiant energy, temperature, wind, and moisture in the local environment. The interplay between physical processes of the atmosphere, plant canopies, and soil is examined, with emphasis on the energy balance.

SCAS 341 Atmospheric Thermodynamics and Hydrostatics
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 342 Atmospheric Dynamics
Spring. 3 credits. Prerequisites: one year each of calculus and physics. M W F 10:10. W. Knapp.
Introduction to atmospheric dynamics and to the methods of description and quantitative analysis used in meteorology. Topics considered include equations of atmospheric motion, motion in the free atmosphere, vertical variations of wind and pressure fields, mathematical representation and characteristics of fronts, mechanisms of pressure change, concepts of circulation and vorticity, and effects of friction on atmospheric motion.

SCAS 352 Synoptic Meteorology I
Spring. 3 credits. Prerequisites: SCAS 341 and concurrent enrollment in SCAS 342. Lecs, T R 9:05; lab, M 1:25–3:25. M. W. Wysocki.
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 353 Application of FORTRAN in Meteorology
Fall. 3 credits. Prerequisites: SCAS 131 plus one computer programming course. Lec, T R 12:20–1:10; lab, T 1:25–3:20. M. W. Wysocki.
An introduction to numerical techniques using FORTRAN to solve meteorological problems. No previous experience with FORTRAN is expected.

SCAS 435 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
Spring. 3 credits. Prerequisites: SCAS 342 or instructor's approval. M W F 11:15–12:05. Offered alternate years. Not offered spring 2001. K. H. Cook.
Structure and dynamics of the tropical atmosphere on a wide range of time and space scales ranging from meso-scale convective systems to planetary waves. Topics include hurricanes, monsoonal circulation, and El Nino.

SCAS 447 Physical Meteorology
Fall. 3 credits. Prerequisites: a year each of calculus and physics. M W F 10:10. Offered alternate years. Offered fall 1999. W. W. Knapp.
Primarily a survey of natural phenomena of the atmosphere, with emphasis on their underlying physical principles. Topics include composition and structure of the atmosphere, atmospheric optics, acoustics and electricity, solar and terrestrial radiation, and principles of radar probing of the atmosphere.

SCAS 451 Synoptic Meteorology II
Fall. 3 credits. Prerequisites: SCAS 341 and SCAS 342. 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, with consideration of processes that contribute to temperature changes and precipitation. Laboratory sessions involve real-time weather forecasting and the computer application of a numerical model of the atmosphere to the study of selected large-scale mid-latitude weather events.

SCAS 456 Mesoscale Meteorology
Spring. 3 credits. Prerequisites: SCAS 341 and SCAS 342 or permission of instructor. T R 11:40–12:55. Offered alternate years. Next offered spring 2000. S. J. Colucci.
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 457 Atmospheric Air Pollution
Fall. 3 credits. Prerequisites: SCAS 341 or one course in thermodynamics and one semester of chemistry or permission of instructor. M W F 11:15–12:05. Offered alternate years. Next offered fall 2000. M. W. Wysocki.
Course will examine sources, effects, transport, measurement, and controls of air pollution. The basic principles in each area will be discussed with an emphasis on their local, regional, and global impacts.]

SCAS 635 Advanced Statistical Meteorology
Fall. 3 credits. Prerequisites: coursework in or elementary knowledge of statistics, calculus, matrix algebra, and computer programming. Lec, T R 10:10–11:25, R 11:35–12:05. D. S. Wilks.
Lectures and topics concurrent with SCAS 435, plus an extra 30-minute session per week in which selected topics from SCAS 435 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 Advanced Atmospheric Dynamics (also Astronomy 652)
Spring. 3 credits. Prerequisites: SCAS 341 and SCAS 342 or permission of instructor. T R 11:40–12:55. Offered alternate years. Offered spring 2001. S. J. Colucci.
Quasiqeostrophic theory, atmospheric waves, hydrodynamic instability, the general circulation of the atmosphere, and topics selected from among numerical weather prediction and tropical, mesoscale, and middle atmosphere processes according to student interest.]

SCAS 692 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 covered 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 950 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 BIOPL 241. Lecs, M W F 10:10; lab, M 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 in the context of food systems for improved health. Laboratory utilizes living plants, extensive crop garden, and computer simulation.

SCAS 312 Forage Crops
Spring. 4 credits. Prerequisites: introductory course in crop and/or soil science. Recommended: course in animal nutrition. 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 Tropical Cropping Systems: Biodiversity, Social & Environmental Impacts
Fall. 3 credits. Prerequisite: an introductory course in crop science or soil science or biology or permission of instructor. Lec, T R 8:40–9:55. E. C. Fernandes.
Characterization and discussion of traditional shifting cultivation, lowland rice-based systems, upland cereal-based systems, smallholder mixed farming including root crops and livestock, plantation fruit and oil crop systems, and agroforestry. In addition to species diversity and domestication, factors such as climate, land quality, soil management, land tenure, labor, and markets are considered. The impact of tropical cropping systems on the environment are evaluated.

SCAS 315 Weed Science
Fall. 3 credits. Prerequisite: introductory course in biology or botany. Lecs, T R 9:05; lab, T W 2–4:25. 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: BIOPL 241 or equivalent. Lecs, T R 11:15; lab, R 1:25–4:25. 2 all-day field trips will be scheduled during the semester. Offered alternate years. Offered fall 1999. Not offered fall 2000. 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. Lec, 1 hour to be arranged; lab, first class meeting R 1:25–4:25. Offered alternate years. Not offered fall 1999. Offered fall 2000. 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: BIOPL 242 or 341. Lecs, T R 10:10–11:25. Offered alternate years. Offered spring 2000. 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 and Biotechnology
Spring. 3 credits. Prerequisite: plant physiology. T R 8:30–9:55. R. L. Obendorf.

This course in seed biology describes the molecular, biochemical, physiological, environmental, and genetic regulation of seed development, maturation, and germination events including the deposition and mobilization of seed reserves with illustrations from the world's major food and feed seeds. Illustrations extend the principles to practical situations, industrial uses, and food systems for improved health.

SCAS 613 Physiology and Ecology of Yield
Spring. 3 credits. Prerequisite: plant physiology. M W F 12:20. T. L. Setter.
A study of environmental constraints on crop-plant productivity from a physiological perspective. Acclimation responses and genetic adaptation are examined for temperature, light, water, compacted soil, and mineral nutrient environments. Topics include photosynthesis and nitrogen assimilation, translocation and partitioning; canopy-scale influences on solar radiation use efficiency; regulation of growth processes in leaf, root and floral sinks in response to environment; seed set; water transport and stomatal regulation; root growth in flooded and compacted soils; and drought responses. Emphasis on growth processes of vegetative plant organs.

SCAS 614 Research Methods in Weed Physiology
Spring. 2 credits. Prerequisite: SCAS 315 or equivalent. Offered alternate years. Next offered spring 2000. 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 soils. Laboratories will be accompanied by short lectures pertinent to experimental topics.

[SCAS 642 Plant Mineral Nutrition (ALSO BIO PL 642)
Spring. 3 credits. Prerequisite: BIO PL 341 or equivalent. Lecs, M W F 10:10–11. Offered alternate years. Not offered spring 2000. Next offered spring 2001. 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; rool-soil interactions; metabolism of mineral elements; the involvement of mineral nutrients in various physiological processes; and nutrition of plants adapted to extreme environmental stresses (e.g., acid soils). Specific mineral elements will be emphasized to illustrate the above topics.]

SCAS 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 820 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.

Environmental Information and Analysis

SCAS 398 Environmental Microbiology
Spring. 3 credits. Prerequisite: BIOES 261 or BIOMI 290 or SCAS 260 or permission of instructor. Lecs, M W F 10:10. W. C. Ghiorse.
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.

SCAS 411 Resource Inventory Methods (also Civil and Environmental Engineering 411)
Spring. 3 credits. Prerequisite: permission of instructor. S. D. DeGloria.
A survey of resource inventory methods applied to field-based studies of environmental systems. Laboratory emphasis is on using maps, spatial databases, global positioning systems, and aerospace imagery to discriminate, measure, inventory, and monitor environmental resources.

SCAS 420 Geographic Information Systems
Fall. 4 credits. Prerequisite: SCAS 411 or instructor's approval. Lecs, T R 9:05–9:55; lab, M T W R 1:25–4:25. S. D. DeGloria.
Principles and applications of geographic information systems for the characterization and assessment of environmental process. Methods for accessing, updating, analyzing, and mapping spatial data and information are emphasized. Needs assessment, coordinate systems, database design and maintenance, data transformations, and map accuracy assessment are considered.

SCAS 620 Spatial Modeling and Analysis
Spring. 3 credits. Prerequisites: SCAS 420, SCAS 461, or permission of instructor. Lecs, T R 9:05–9:55; lab, T W 1:25–4:25. S. D. DeGloria.
Theory and practice in the development, integration, and visualization of spatial data for resource inventory, environmental process modeling, land classification and evaluation. Application and evaluation of advanced spatial analytical methods applied to environmental systems and databases of interest to the student are emphasized.

[SCAS 660 Remote Sensing Fundamentals (also Civil and Environmental Engineering 610)
Fall. 3 credits. Prerequisite: permission of instructor. Lecs, M W 12:20–1:10; lab, T 2:30–4:25. Not offered 1999–2000. 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.]

SCAS 675 Modeling the Soil-Plant-Atmosphere System
Spring. 3 credits. Prerequisite: SCAS 483 or equivalent. Not offered spring 2001. Lecs, T R 8:40–9:55. S. J. Riha.
Introduction to the structure and use of soil-plant-atmosphere models. Topics covered will include modeling plant physiology, morphology, and development; potential crop production and crop production limited by moisture and nutrient availability; plant-plant competition; and land surface processes as well as model data requirements, validation and scale. Use of soil-plant-atmosphere models for teaching, research, extension, and policy formation will be discussed.

Soil Science

SCAS 260 Soil Science
Fall. 4 credits. S-U grades optional. Lecs, M W F 9:05; lab, M T W or R 1:25. S. Riha.
Designed for students interested in a comprehensive introduction to soil science from both an environmental and plant management perspective, this course is divided into three units. A unit on soil information introduces students to soil characterization, testing, mapping, classification, GIS and land evaluation. A soil management unit addresses fertility, pest management, water, and microclimate, as well as erosion, conservation, pollution and soil health. The unit on the role of soils in ecosystems considers topics such as biodiversity, soils as sinks and sources of greenhouse gases, and the impact of soils on land use. Labs will initially be field-oriented with an emphasis on learning practical skills needed to evaluate and manage soils. Subsequent labs will focus on accessing, interpreting and applying soil information.

SCAS 321 Soil and Water Management
Fall. 4 credits. Prerequisites: SCAS 260. S-U grades optional. Lecs, T R 10:10–11:25; lab, R 2:30–4:30. H. M. van Es.
Course introduces students to the principles of soil and water interaction and to the effects of human intervention on these processes. Aspects of soil and water management, including hydrology, soil erosion and conservation, water management, contaminant movement, tillage, soil compaction and water quality are examined. Case studies and policy approaches from both the United States and abroad are discussed.

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.
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 Soil Genesis, Classification, and Survey
Fall, weeks 1–7. 2 credits. Prerequisite: SCAS 260. Lecs, M W F 10:10; lab, W 1:25–4:25. One all day field trip is required. R. B. Bryant.
Factors and processes of soil formation. Principles of field identification, classification, survey, and interpretation. Laboratory exercises and field trips provide practical training in soil morphology and landscape relations. Course ends at mid-semester and is part of a sequence of three Intermediate Soil Science courses.

SCAS 365 Environmental Chemistry: Soil, Air, and Water
Spring. 3 credits. Prerequisites: CHEM 207–208. Lecs, M W F 10:10–11:00. M. B. McBride.
An overview of the chemical processes that control the concentrations and bioavailability of nutrients and pollutants in soil, air, and water. Particular attention is given to soil's function as a filter for contaminants. The history of environmental contamination and its impact on agricultural soils and ecosystems is described.

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. Steenhuis, 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. Staff.
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 organic nutrient sources in crop production.

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. Lecs, T R 12:20; disc, W 1:25–3:25. A. VanWambeke.
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 are recognized, their management properties described, and methods to alleviate the constraints to crop production and the preservation of the environment 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, French, 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. Lectures include slides of soils, landscapes, and cropping systems.

[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. Lec and disc, T R 2:30–3:45. During the first 6 weeks of class, the Thursday meetings may run to 5:30 because of field trips. Offered alternate years. Not offered fall 1999. A. G. Power and E. C. Fernandes.
Analysis of the ecological processes operating in agricultural systems, with an emphasis on the interactions between organisms. Topics include nutrient dynamics in agroecosystems, plant competition and facilitation, intercropping, the ecology of species invasions, mutualism in agroecosystems, plant-herbivore relations, plant-pathogen interactions, biological pest control, and evolutionary processes in agriculture. Case studies from both the tropics and the temperate zone are used to illustrate important concepts.]

SCAS 483 Environmental Biophysics
Spring. 3 credits. Prerequisite: SCAS 260 or equivalent or permission of instructor. Lecs, M W F 11:15. S. J. Riha.
Introduction to basic principles of energy and mass transfer and storage in soil-plant systems. Energy budgets, soil heat flow, water movement in saturated and unsaturated soils, evapotranspiration, water, gas, and nutrient dynamics in the soil-plant-atmosphere continuum will be covered. Applications to agronomic and environmental problems and instrument design and use are considered through discussion and problems sets.

SCAS 663 Pedology
Spring. 3 credits. Prerequisite: SCAS 361 or permission of instructor. Textbook recommended, not required. Offered even spring semesters. R. B. Bryant.
Weathering, reactions, and processes of soil genesis. Principles of soil classification and the rationale and utilization of soil taxonomy. Development and significance of major groups of soils of the world.

SCAS 667 Advanced Soil Physics
Spring. 3 credits. Prerequisites: one year of college physics and SCAS 483 or permission of instructor. S-U grades optional. Hours to be arranged. Offered alternate years. P. C. Baveye.
A detailed study of measurement processes and of the hydrostatics of aqueous solutions in soils and porous media, with emphasis on fundamental principles. Examination of the molecular aspects of water-solid interactions, including shrink-swell phenomena and the properties of absorbed water. Analysis of equilibrium water adsorption from thermodynamical and mechanistic (molecular) standpoints. Mechanical and thermodynamical analysis of the equilibrium status of aqueous solutions in deformable soils. Formal lectures are complemented by tutorial sessions.

SCAS 669 Organic Matter—Soils, Sediments, and Waters
Spring. 2 or 3 (with discussion) credits. Prerequisites: SCAS 260 and CHEM 357–358 or equivalent. T R 9:05; disc, W 1:25–2:15. J. M. Duxbury.
A discussion of current concepts on the chemical nature, dynamics, and properties of natural organics and organo-mineral associations in terrestrial and aquatic environments. Interaction with anthropogenic organics and effects of anthropogenic activities on natural organics are considered.

SCAS 671 Soil Chemistry
Fall. 3 credits. Prerequisite: one year of physical chemistry or permission of instructor. Offered alternate years. Offered fall 1999. Lecs, M W F 10:10. M. B. McBride.
A detailed examination of the structure and surface chemistry of colloidal particles common to soils. Ion exchange, mineral-solution equilibria, and adsorption reactions of silicate clays, oxides, and organic matter will be emphasized. The behavior of environmental contaminants in soils, particularly metals and toxic organics, will be described.

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

Abawi, George S., Ph.D., Cornell U. Prof., Plant Pathology (Geneva)
Acree, Terry E., Ph.D., Cornell U. Prof., Food Science, and Technology (Geneva)
Adleman, Marvin I., M. L. A., Harvard U. Prof., Landscape Architecture
Agnello, Arthur M., Ph.D., North Carolina State U. Assoc. Prof., Entomology (Geneva)
Ahner, Beth A., Ph.D., Massachusetts Institute of Technology. Asst. Prof., Agricultural and Biological Engineering
Aist, James R., Ph.D., U. of Wisconsin. Prof., Plant Pathology
Albright, Louis D., Ph.D., Cornell U. Prof., Agricultural and Biological Engineering
Aldwinckle, Herbert S., Ph.D., U. of London (England). Prof., Plant Pathology (Geneva)
Allee, David J., Ph.D., Cornell U. Prof., Agricultural, Resource, and Managerial Economics

Altman, Naomi S., Ph.D., Stanford U. Assoc. Prof., Biometrics Unit
Andersen, Robert L., Ph.D., U. of Minnesota. Prof., Horticultural Sciences (Geneva)
Anderson, Bruce L., Ph.D., U. of California at Berkeley. Assoc. Prof., Agricultural, Resource, and Managerial Economics
Aneshansley, Daniel J., Ph.D., Cornell U. Assoc. Prof., Agricultural and Biological Engineering
Arneson, Phil A., Ph.D., U. of Wisconsin. Assoc. Prof., Plant Pathology
Austic, Richard E., Ph.D., U. of California at Davis. Prof., Animal Science
Baer, Richard A., Ph.D., Harvard U. Prof., Natural Resources
Bain, Mark B., Ph.D., U. of Massachusetts. Assoc. Prof., Natural Resources
Barbano, David M., Ph.D., Cornell U. Prof., Food Science
Barrett, Christopher B., Ph.D., U. of Wisconsin. Assoc. Prof., Agricultural, Resource, and Managerial Economics
Bartsch, James A., Ph.D., Purdue U. Assoc. Prof., Agricultural and Biological Engineering
Bassuk, Nina L. Ph.D., U. of London (England). Prof., Floriculture and Ornamental Horticulture
Batt, Carl A., Ph.D., Rutgers U. Prof., Food Science
Baugher, Sherene, Ph.D., SUNY Stonybrook. Asst. Prof., Landscape Architecture
Bauman, Dale E., Ph.D., U. of Illinois. Prof., Animal Science
Baveye, Philippe C., Ph.D., U. of California at Riverside. Assoc. Prof., Soil, Crop, and Atmospheric Sciences
Beer, Steven V., Ph.D., U. of California at Davis. Assoc. Prof., Plant Pathology
Bell, Alan W., Ph.D., U. of Glasgow (Scotland). Prof., Animal Science
Bellinder, Robin R., Ph.D., Virginia Polytechnic Inst. and State U. Prof., Fruit and Vegetable Science
Bergstrom, Gary C., Ph.D., U. of Kentucky. Prof., Plant Pathology
Bills, Nelson L., Ph.D., Washington State U. Prof., Agricultural, Resource, and Managerial Economics
Bjorkman, Thomas N., Ph.D., Cornell U. Assoc. Prof., Horticultural Sciences (Geneva)
Blake, Robert W., Ph.D., North Carolina State U. Prof., Animal Science
Blossey, Bernd, Ph.D., Christian-Albrechts U., Germany. Asst. Prof., Natural Resources
Boisclair, Yves R., Ph.D., Cornell U. Asst. Prof., Animal Science
Boisvert, Richard N., Ph.D., U. of Minnesota. Prof., Agricultural, Resource, and Managerial Economics
Boor, Kathryn J., Ph.D., U. of California at Davis. Asst. Prof., Food Science
Brady, John W., Jr., Ph.D., SUNY at Stonybrook. Assoc. Prof., Food Science
Broadway, Roxanne M., Ph.D., U. of California at Davis. Assoc. Prof., Entomology (Geneva)
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. Prof., Soil, Crop, and Atmospheric Sciences
Burr, Thomas J., Ph.D., U. of California at Berkeley. Prof., Plant Pathology (Geneva)
Butler, Walter R., Ph.D., Purdue U. Prof., Animal Science
Calderone, Nicholas W., Ph.D., Ohio State U. Asst. Prof., Entomology
Carlsen, William S., Ph.D., Stanford U. Assoc. Prof., Education
Casella, George, Ph.D., Purdue U. Prof., Biometrics Unit
Castillo-Chavez, Carlos, Ph.D., U. of Wisconsin. Prof., Biometrics Unit
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COLLEGE OF ARCHITECTURE, ART, AND PLANNING

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Reginald D. Ryder, director of minority educational affairs

Donna L. Kuhar, registrar

Elizabeth A. Cutter, director of student services and admissions

Margaret Webster, curator of visual resources facility

Susan Lewis, director of career services

FACULTY ADVISERS

Architecture students are assigned faculty advisers for their first year. Upperclass students have one assigned adviser but are encouraged to seek assistance and advice from the most appropriate faculty member or college officer.

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:

Mark Cruvellier, chair, Department of Architecture

John Forester, chair, Department of City and Regional Planning

Roberto Bertoia, chair, Department of Art

DEGREE PROGRAMS

	Degree
Architecture	B.Arch.
	B.F.A.
Fine Arts	B.F.A.
History of Architecture and Urbanism	B.S.
Urban and Regional Studies	B.S.

The college offers programs leading to the bachelor's degree—the five-year program in architecture leads to the Bachelor of Architecture; four-year programs in art and architecture lead to the Bachelor of Fine Arts. In addition, four-year programs with a concentration in either urban and regional studies or history of architecture lead to the Bachelor of Science.

Graduate-level programs are offered in art, architectural design and urban design, architectural sciences, history of architecture and urbanism, historic preservation planning, city and regional planning, regional science, and landscape architecture.

Students in each of these programs work in physical proximity to one another and thus gain a broader understanding of their own special area of interest through contact with the students and faculty in other disciplines.

Early in its development, the college set a limit on the number of students it would enroll and devised a selective method of admission. There are now more than 650 students and a full-time teaching staff of over fifty-five, supplemented by visiting professors and critics, part-time lecturers, and assistants. Teachers and students mix freely, and much instruction and criticism is on an individual basis.

The college's courses are integral parts of the professional curricula. Fundamental subjects are taught by faculty members whose experience provides them with professional points of view. The concentration of professional courses within the college is balanced by the breadth of view gained from courses and informal learning in the rest of the university. The college believes that this breadth is an essential element of professional education. This conviction is evident in the form of the curriculum, the methods of teaching, and the extracurricular life of teachers and students.

FACILITIES

The college occupies Sibley Hall, Olive Tjaden Hall, Rand Hall, and the Foundry. 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 173,000 books, is capable of supporting undergraduate, graduate, and research programs. Some 1,800 serials are currently received and maintained.

The Visual Resources Facility, made possible through gifts from George and Adelaide Knight, is located in Sibley Hall and 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 425,000 slides.

The facilities of the libraries of other schools and departments on campus and the John M. Olin Library, designed primarily as a research library for graduate students, are also available.

Museums and Galleries

The Herbert F. Johnson Museum of Art was formally opened in May 1973. Although many of its exhibitions and activities relate directly to academic programs of the university, the museum has no administrative affiliation with any department. In this way, its programs freely cross academic boundaries, stimulating interchange among disciplines. With a strong and varied collection and a continuous series of high-quality exhibitions, it fulfills its mission as a center for the visual arts at Cornell. Art galleries are also maintained in Willard Straight Hall, where loan exhibitions of paintings and graphic work by contemporary artists are held. Throughout the year, works of students, faculty, and staff in the College of Architecture, Art, and Planning and of guest artists may be viewed 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 restored 17th century Palazzo Lazzaroni in the center of the eternal 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 architecture, fine arts, planning, and liberal arts. 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 or contact the Rome Program Office, 149 Sibley Hall.

COLLEGE ACADEMIC POLICIES

Ownership of Student Work

All drawings, models, paintings, graphic art, and sculpture done in the studios and drafting rooms as a part of the instructional program are the property of the college until they have been graded and released by the instructor. Certain works may be selected by the college for retention for academic purposes.

Exhibitions of Student Work

Exhibitions of student work are held each semester as part of the yearly schedule of the Olive Tjaden Hall Gallery and the John Hartell Gallery in Sibley Dome. 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 an average for the term of not less than C (2.0). The record of each student who falls below the standard will be reviewed by the Student Records Committee for appropriate action, as described below:

1) Warning means that the student's performance is not up to expectations. Unless improvement is shown in the subsequent term, the student may be placed on final warning or required to take a leave of absence from the college.
2) Final Warning indicates that the student's record is unsatisfactory. Unless considerable improvement is shown in the subsequent term, the student shall be required to take a leave of absence from the college.
3) Required leave of absence: academic deficiency. The student is dismissed from the college and may not continue studies in the college. A student who has been placed on a required leave of absence may apply for readmission after an absence of at least two semesters. Application for readmission is made by letter, addressed to the Student Records Committee. 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 Student Records 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 in the College of Architecture, Art, and Planning. The student is dismissed from the college and is permanently prohibited from continuing studies in it. This dismissal does not preclude the possibility of applying for admission to another division of the university.

The above actions are not necessarily sequential. A student who has received a warning may be placed on a required leave of absence for academic deficiency at the end of the next term if performance during that time is deemed to be grossly deficient.

A cumulative average of at least C– (1.7) is required for graduation.

ARCHITECTURE

Mark Cruvellier, chair; L. Briggs, L. Chi, M. Curry, W. Goehner, D. P. Greenberg, G. Hascup, K. Hubbell, B. G. MacDougall, A. B. Mackenzie, J. C. Miller, L. Mirin, V. Mulcahy, J. Ochshorn, C. F. Otto, A. Ovaska, C. W. Pearman, H. W. Richardson, M. Schack, A. Simitch, V. K. Warke, J. Wells, M. Woods, J. Zissovici

Professional Degree Program

The first professional degree in architecture is the Bachelor of Architecture. This degree counts toward the professional registration requirements established by the various states, National Architectural Accrediting Board, and the National Council of Architectural Registration Boards. The professional program is normally five years in length and is designed particularly for people who, before they apply, have established their interest and motivation to enter the field. It therefore incorporates both a general and professional educational base.

The program is oriented toward developing the student's ability to deal creatively with architectural problems on analytical, conceptual, and developmental levels. The sequence courses in design, consisting of studio work augmented by lectures and seminars, are the core of the program. Sequences of studies in the history of architecture and cities, culture and society, architectural theory, visual studies, environmental controls, structures, construction and computer graphics and applications 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 further detailed 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.

Note on Professional Accreditation

Most states require that an individual intending to become an architect hold an accredited degree. There are two types of degrees that are accredited by the National Architectural Accrediting Board: (1) the Bachelor of Architecture, which requires a minimum of five years of study, and (2) The Master of Architecture, which requires a minimum of three years of study following an unrelated bachelor's degree or two years following a related pre-professional bachelor's degree. These professional degrees are structured to educate those who aspire to registration and licensure to practice as architects. The four-year, pre-professional degree, where offered, is not accredited by NAAB. The pre-professional degree is useful to those wishing a foundation in the field of architecture, as preparation for either continued education in a professional degree program or for employment options in fields related to architecture.

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 assistant for architecture. Students accepted into the program may not normally begin until the fall of their fifth year and, once enrolled, may not transfer back into the 501–502 sequence.

Following admission into the Overlap Program, students may petition to apply toward the requirements of the master's degree a maximum of 30 credits, including ARCH 601–602 or 603–604 and other advanced courses taken in excess of distribution requirements for the Bachelor of Architecture degree.

Curriculum

First Year

Fall Term	*Credits*
101 Design I	6
181 History of Architecture I	3
151 Drawing I	2
Math 111 Calculus or Math 106 or out-of-college elective	3–4
Out-of-college elective	3
	17–18

Spring Term	
102 Design II	6
182 History of Architecture II	3
152 Drawing II	2
Math 111 or out-of-college elective	3–4
Out-of-college elective (freshman writing seminar suggested)	3
	17–18

Second Year

Fall Term	*Credits*
201 Design III	6
263 Structural Concepts	4
231 Architectural Analysis I	2
261 Site Planning	3
Out-of-college elective	3
	18

Spring Term	
202 Design IV	6
232 Architectural Analysis II	2
262 Building Technology, Materials, and Methods	3
264 Structural Elements	3
College elective	3
	17

Third Year

Fall Term	
301 Design V	6
361 Environmental Controls I—Lighting and Acoustics	3
363 Structural Systems	3
Departmental elective	3
Out-of-college elective	3
	18

Spring Term	
302 Design VI	6
342 Architecture as a Cultural System	3
362 Environmental Controls II—Mechanical and Passive Solar Systems	3
Departmental elective	3
College or out-of-college elective	3
	18

Fourth Year

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

Spring Term	
402 Design VIII	6
Departmental elective	3
Departmental elective	3
College or out-of-college elective	3
Out-of-college elective	3
	18

Fifth Year

Fall Term	*Credits*
501 Design IX or 601 or 603 Overlap Program	6
Departmental elective	3
College or out-of-college elective	3
Out-of-college elective	3
Out-of-college elective	3
	18

Spring Term	
502 Design X or 602 or 604 Overlap Program	8
Departmental elective	3
College or out-of-college elective	3
College or out-of-college elective	3
	17

Required Departmental Courses

Terms	*Course Subject*	*Numbers*	*Credits*
10	design	101–502	62
1	mathematics	Math 111, Math 106, or approved equivalent	3–4
3	structures	263, 264, 363	10
4	technology	261, 262, 361, 362	12
2	architectural theory	231, 232	4
2	history of architecture	181, 182	6
1	architecture, culture and society	342	3
1	professional practice	411	3
2	drawing	151, 152	4
			107–108

Electives

Departmental Terms		*Credits*
3	history of architecture: 300-level	9
1	visual studies	3
2	architectural theory or 600-level design-related course	6
1	architectural structures, construction, or environmental controls	3
1	computer programming or applications (may also be taken out of college)	3
		21

College Terms		*Credits*
2	art: any studio courses	6

Out-of-College Terms		*Credits*
1	computer programming or applications	3
1	freshman seminar	3
1	mathematics, or physical or biological sciences	3
1	humanities	3
		12

Free	
Of the electives, 15 credits are to be taken outside the College of Architecture, Art, and Planning, and 15 credits may be taken either in or outside the college.	30
Total credits	176

Architecture Concentrations for Majors

It is often advantageous for undergraduates to concentrate in specific sub-disciplines of architecture, especially if they anticipate application to specialized graduate programs. Therefore, the following concentrations in architecture are offered within the department for B.Arch. and B.F.A. in Architecture candidates only:

Architecture, Culture, and Society 342 (or equivalent), plus 9 credits in this area.

Architectural Science and Technology 261, 262, 263, 264, 361, 362, 363, distribution requirement (3 credits), plus 6 credits in this area.

History of Architecture 181, 182, distribution requirements (9 credits), plus 7 credits (including a 4 credit hour seminar course) in this area.

Theory of Architecture 231, 232, distribution requirements (6 credits), plus 6 credits in this area.

Visual Studies in Architecture 151, 152, distribution requirement (3 credits), plus 9 credits in this area.

Students wishing to receive recognition for a concentration, must submit a Concentration Request form to the Architecture Department Office. In order for a course to count toward a concentration, the grade must be C or better.

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.

Procedure. Students from Cornell may transfer to the program at the beginning of the fall term of their third or fourth year of study. They submit a short application as prospective internal transfer students. Before applying, all prospective internal transfer students meet with a history of architecture faculty member 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, 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 includes the B.S. prerequisites and curriculum requirements and 100 credits of the usual distribution and major requirements in the College of Arts and Sciences. Further information about this option is available at the Admissions Office, 135 East Sibley Hall, and at the Academic Advising Center of the College of Arts and Sciences, 55 Goldwin Smith Hall.

Students may also elect to continue toward a Master of Arts degree in the history of architecture. The M.A. ordinarily requires a minimum of two years of graduate work beyond the bachelor's degree; with this special sequential degree arrangement that time is shortened to one year.

Summer Term in Architecture

The summer term offers students the opportunity of a concentrated period of design work. Design is offered at both undergraduate and graduate levels; the term is six to eight weeks in duration.

Undergraduate design sequence courses, excluding 101 and 502, are offered 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.

Other department courses may be offered as elective courses, contingent upon student interest, faculty availability and departmental approval.

The department offers a Career Explorations in Architecture Program for high school students and college students considering a professional education in architecture.

Concentration in Architecture For Non-Majors

This special concentration has been formulated specifically for those students not enrolled in the Department of Architecture and who are interested in complementing their current academic program with an introduction to various facets of architectural studies. Some students may wish to use the Concentration in Architecture for Non-Majors as a means of investigating possible graduate studies in architecture. Some may wish to develop architectural specialties within other disciplines. Students are admitted to this program through application to the Department of Architecture.

The curriculum for students accepted to the Concentration in Architecture Program totals 15 credit hours. Grades received must be C or better in all courses.

9 credits of required courses, including one semester each of:

ARCH 130, 131, or 132: Introduction to Architecture	3 credits
ARCH 151: Drawing I	2 credits
ARCH 111: Concentration in Architecture: Design Studio	4 credits

(ARCH 110: Introduction to Architecture: Design Studio, offered in the summer only, may substitute for ARCH 111.)

And 6 credits of elective department courses, chosen, for example from among the following:

ARCH 130, 131, 132: Introduction to Architecture	3 credits
ARCH 152: Drawing II	2 credits
ARCH 181, 182: History of Architecture I, II	3 credits each
ARCH 342: Architecture as a Cultural System	3 credits
ARCH 231, 232: Architectural Analysis I, II	2 credits each
ARCH 263, 264, 363: Structures	3 credits each
ARCH 261, 361, 362: Environmental Controls	3 credits each
ARCH 262: Building Technology	3 credits
ARCH 476: Computer Applications	3 credits

Architectural Design

Courses in brackets are not offered this year.

A fee of $65 is charged each semester to every student registered in Architecture (undergraduate, graduate and in the Rome Program). 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: ARCH 101 and ARCH 151. A continuation of ARCH 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 ARCH 231–232 and completion of ARCH 151–152 required. Limited to department students. Prerequisite for ARCH 201 is ARCH 102 and ARCH 152. Prerequisite for ARCH 202 is ARCH 201.

ARCH 301–302 Design V and VI
Fall and spring. 6 credits each term. Limited to department students. Prerequisite for ARCH 301 is ARCH 202. Prerequisite for ARCH 302 is ARCH 301.

ARCH 401–402 Design VII and VIII
Fall and spring. 6 credits each term. Limited to department students. Prerequisite for ARCH 401 is ARCH 302. Prerequisite for ARCH 402 is ARCH 401 or ARCH 309.
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: ARCH 402.
Programs in architectural design, building typology investigations, and research leading to complete development of the student's thesis program. General instruction in the definition, programming, and development of a thesis.

ARCH 502 Design X—Thesis
Fall or spring. 8 credits. Prerequisite: ARCH 501 or ARCH 500 and ARCH 510. Required of B.Arch. candidates who must satisfactorily complete a thesis. Students accepted for admission to the Overlap Program are exempt from the thesis requirement.

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. 9 credits. Prerequisite: ARCH 701 and ARCH 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: ARCH 703 and ARCH 704.
Second-year design course for graduate students whose major concentration is urban 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 ARCH 103: permission of instructor required. Prerequisite for ARCH 104: ARCH 103 and permission of instructor.

ARCH 200, 300, 400 Elective Design Studio
Fall or spring. 6 credits. This course is for students who are not architecture majors at Cornell. Prerequisite: permission of department office. Each student is assigned to a class of appropriate level.
For descriptions, see ARCH 201–202, ARCH 301–302 and ARCH 401–402.

ARCH 309 Elective Design Studio
Fall, spring or summer. 6 credits. Foreign summer and Rome Programs only. Prerequisite: C or better in ARCH 202.
ARCH 309 is a design studio that, upon completion, will be credited as an elective design studio. With the successful completion of ARCH 302, ARCH 309 may be used as a substitute for ARCH 401.

ARCH 500 Design IX Alternate Studio
Fall, spring or summer. 6 credits. Foreign summer and Rome Programs only. Prerequisite: C or better in ARCH 402. Corequisite: ARCH 510. ARCH 500 will be considered equivalent to ARCH 501 when taken concurrently with ARCH 510. In order to take ARCH 502, one must have a grade of C or better in ARCH 500 and a passing grade in ARCH 510.
For description, see ARCH 401–402.

Related Courses and Seminars

ARCH 110 Introduction to Architecture: Design Studio
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 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 the 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 Concentration in Architecture: Design Studio
Spring. 4 credits. Not open to architecture majors. Prerequisite: acceptance into the Concentration in Architecture Program.
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 interrelationship of the architectural concepts of space, form, function, and technology. Instruction includes critiques of individual student work by department faculty as well as by periodic reviews by guest critics.

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. This course does not count for design sequence credit.

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.
An examination of organizational and management theories and practices for delivering professional design services. Included is a historic overview of the profession and a review of the architect's responsibilities from the precontract phase through construction. Application of computer technology in preparing specifications.

ARCH 412 Professional Seminar
Fall or spring. 3 credits. Prerequisite: ARCH 411.
Visits to public and private agencies and architectural firms. Discussions relative to the various aspects of each firm's practice and the identification of agency roles.

ARCH 510 Thesis Introduction
Foreign summer programs and Rome program only. 3 credits. Must be taken in conjunction with ARCH 500. Prerequisite for ARCH 500 is ARCH 402. ARCH 500 will be considered equivalent to ARCH 501 when taken concurrently with ARCH 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 605 Special Problems in Design
Fall and spring. Variable credit (maximum 3). Prerequisite: permission of instructor.
Independent study. This course does not count for design sequence credit.

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.

ARCH 611–612 Urban Housing Developments
611, fall; 612, spring. 3 credits each term. Limited to fourth- and fifth-year students in architecture and graduate students. Prerequisite: permission of instructor. Not offered every year.

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: Lectures
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, preservations, 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. ARCH 131 is not a prerequisite for ARCH 132.
Intended to familiarize non-architecture students with the art and science of architecture. Fundamentals of plan, section, and elevation, the primary elements that comprise an architectural form; basic organizational principles; the ways in which we perceive architectural space; and the various concepts of function in relation to form will be included among the topics to be covered, using examples from numerous times and cultures as well as from the contemporary Cornell campus.

ARCH 132 An Introduction to Architecture
Spring. 3 credits. Open to out-of-department students only. ARCH 131 is not a prerequisite for ARCH 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 in the student a degree of fluency in the languages of architectural discourse.

ARCH 231 Architectural Analysis I
Fall. 2 credits. Architecture students must register concurrently in ARCH 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 ARCH 202.
Advanced analytical studies focusing on complex architectural spaces, objects, images, and representations.

ARCH 334 Column, Wall, Elevation, Facade: A Study of the Vertical Surface in Architecture (also ARCH 634)
Fall or spring. 3 credits. Limited to third-year level students and above.
Field and figure relationships (interrelation of parts dominated by the general character of the whole) are the general themes for studying numerous issues relevant to the design of elevations and facades.

The first part of the seminar is lecture/seminar format. Students are required to research and present a paper for discussion. In the latter part of the semester, students do exercises to demonstrate their understanding of the issues addressed.

ARCH 335 Theory of Architecture
Fall or spring. 3 credits. Prerequisite: ARCH 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, "DOM-INO" theory.

ARCH 337 Special Investigations in the Theory of Architecture I
Fall or spring. Variable credit (maximum, 3). Prerequisite: permission of instructor and approved independent study form.
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 addressed 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 ARCH 231–232. Not offered every year.
A study of architecture as it functions as a representational art, referring to its past while inferring its present.

ARCH 634 Column, Wall, Elevation, Facade: A Study of the Vertical Surface in Architecture (also ARCH 334)
Fall or spring. 3 credits. Limited to third-year level students and above.
For description, see ARCH 334.

ARCH 635 Critical Theory in Architecture
Spring. 3 credits. Prerequisite: permission of instructor. Not offered every year.
An inquiry into the fundamental principles of architectural criticism in theory and practice, with emphasis on the structures of criticism in the twentieth century.

ARCH 637 Special Investigations in the Theory of Architecture II
Fall or spring. Variable credit (maximum, 4). Prerequisite: permission of instructor and approved independent study form.
Independent study.

ARCH 638 Special Topics in the Theory of Architecture II
Fall or spring. 3 credits. Prerequisite: permission of instructor. Not offered every year.
Topic to be announced before preregistration.

Architecture, Culture, and Society

ARCH 342 Architecture as a Cultural System
Spring. 3 credits. ARCH 445, 446, 447, or 448 can substitute with permission of instructor.
What have been the major issues in the theory and practice of architectural design through time and across cultures, and how is aesthetic judgment related to more general systems of ordering within a particular society or group? This course draws on concepts, methods, and findings from the broad field of cultural anthropology to address these questions. Case studies and examples are drawn from a wide range of architectural traditions around the world for which there is significant ethnographic literature, with special emphasis on sub-Saharan Africa, India, and the United States. Topics include the ideational and formal relationships between folk and monumental traditions in complex societies, the structure of the ideal social order and its refraction in the material world, cosmological models and architectural form, geometries of non-Western traditions, and the relationship between indigenization and culture change.

ARCH 349 Undergraduate Investigations in Architecture, Culture, and Society
Fall or spring. Variable credit (maximum 3). Prerequisite: permission of instructor and approved independent study form.
Independent study.

ARCH 441–442 Special Topics in Architecture, Culture, and Society
Fall and spring. 3 credits each term. Prerequisite: permission of instructor.
Topic to be announced before preregistration.

ARCH 445 Architecture and the Mythic Imagination
Fall. 3 credits. Prerequisite: ARCH 342 or permission of instructor. Not offered every year.
This course focuses on traditional societies in which beliefs about architectural order are borne out of the mythic and religious imagination. Certain themes that are common to a range of cultures are explored in detail. They include the model of the human body as a source of architectural knowledge, the sacred center, the cosmic mountain, and architectural rituals as enactments of myths. Such themes are traced across cultures, through time and into contemporary theory.

ARCH 446 Topics in Architecture, Culture, and Society
Fall or spring. 3 credits. Prerequisite: ARCH 342 or permission of instructor.

ARCH 447 Architectural Design and the Utopian Tradition
Fall. 3 credits. Prerequisite: ARCH 342 or permission of instructor. Not offered every year.
This course explores the relationship between visionary architecture of the late 19th and 20th centuries and the wider utopian literature of the time. It first explores themes in utopian fiction as well as in anti-utopian tracts and then turns to the attempts of architects, planners, and artists to concretize visions of the ideal world. The course will devote special attention to the ways in which ideals grounded in the utopian tradition have emerged in the social criticism of housing and neighborhood design in the urban setting in recent times.

ARCH 448 The Indian Example and the Visual Tradition in Culture
Spring. 3 credits. Prerequisite: ARCH 342 or permission of instructor. Not offered every year.
This course provides a concise chronological summary of the major building traditions of Hindu India and explores the relationship between form and more general beliefs about the power of vision to reveal and transform. Topics include the sculptural program of the Hindu temple as a vehicle for the preservation and transmission of mythic texts, the oculus as an element and the eye as a motif, darshan, the spiritually transforming vision, and the destructive power of vision as revealed in myth and beliefs about "evil eye."

ARCH 647–648 Architecture in its Cultural Context I and II
647, fall; 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: ARCH 151.
Freehand drawing as a means of conceiving and expressing spatial form; line weight, shades and shadows, and figure drawing.

ARCH 251 Introductory Photo I (also ART 161)
Fall or spring. 3 credits each term.
For description see ART 161.

ARCH 351 Photography II (also ART 261)
Spring. 4 credits. Prerequisites: ARCH 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: ARCH 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 or spring. 3 credits. Prerequisite: ARCH 264.
Concepts and procedures for the design of overall structural framing systems in steel, concrete, and timber construction.

ARCH 364 Vertigo Structures (also ARCH 664)
Fall or spring. 3 credits. Prerequisite: ARCH 363 or equivalent. Limited enrollment. Not offered every year.
A course in which students examine and experiment with the design of tall vertical structures, principally in terms of overall structural form and behavior, but also in the context of aesthetic, perceptual, historic, economic, and social considerations. Weekly meetings include lectures, discussion seminars, and studio-type design reviews.

ARCH 365 Bridge Design (also ARCH 665)
Fall or spring. 3 credits. Prerequisite: ARCH 363 or equivalent. Limited enrollment. Not offered every year.
There can be no denying the major visual impact of bridges on the built environment. And yet, during the past century, architects

have virtually abandoned the role that they have historically had in the design of these structures. Engineers, on the other hand, have claimed bridge design as their responsibility and have hailed it as evidence of Structural Art. Are the basic principles of bridge design such that this situation makes sense for our society? Or is a rethinking of the manner in which bridges are designed called for? Students in this course examine and experiment with the design of bridge structural forms, not only in terms of what is technically feasible but also, with equal emphasis, in the context of aesthetic, historical, and social considerations. Weekly meetings include lectures, discussion seminars, and studio-type design reviews.

ARCH 463 Special Topics in Structures
Fall or spring. 3 credits. Limited to 30 students. Prerequisites: ARCH 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.

ARCH 664 Vertigo Structures
Fall or spring. 3 credits. Prerequisite: ARCH 363 or equivalent. Limited enrollment. Not offered every year.
For description, see ARCH 364.

ARCH 665 Bridge Design
Fall of spring. 3 credits. Prerequisite: ARCH 363 or equivalent. Limited enrollment. Not offered every year.
For description, see ARCH 365.

Construction

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.

ARCH 465 Special Topics in Construction
Fall or spring. 3 credits. Limited to 30 students. Prerequisites: ARCH 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 as well as 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: ARCH 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). Prerequisite: permission of instructor 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. Not offered every year.
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 (also COM S 417)
For description, see COM S 417.

ARCH 375 Practicum in Computer Graphics (also COM S 418)
For description, see COM S 418.

ARCH 378 Microcomputer Applications in Design
Fall. 3 credits. Prerequisites: previous knowledge of PC-based CAD or permission of instructor.
This course covers advanced principles, concepts, and applications of microcomputer-aided design, synthetic imaging, and animations. It combines seminar-style presentation with hands-on laboratory sessions. The course uses IBM PC platforms exclusively.

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 compatability with the computer, and the role of computers in design. Lecture with CAD lab.

ARCH 476 Special Topics in Computer Applications
Fall or spring. 3 credits. Limited to 30 students. Prerequisites: ARCH 374 or 379 or permission of instructor. Not offered every year.
Topic to be announced by preregistration.

ARCH 477–478 Special Projects in Computer Graphics
477, fall; 478, spring. Variable credit (maximum, 4). Limited to third-year students and above. Prerequisites: ARCH 374 plus concurrent registration in Computer Science 314 or equivalent, and permission of instructor.
Advanced work in computer graphics input and display techniques, including storage tube, dynamic vector and color raster displays.

ARCH 479 Micro-Computer Applications in Design (also ARCH 679)
Fall. 3 credits. Prerequisites: an introductory course in computer graphics or computer science, or permission of instructor; upper level undergraduate or graduate status.
The course explores the role of synthetic imaging and computer graphics in architectural design. The first half of the course is devoted to examining the new possibilities that information technologies offer for multimedia visualization of architecture, from abstract conceptual drawings, to sketching, photorealistic rendering, and multimodal representation, including motion and sound. The second part of the course explores the uses of information technologies to model and simulate the creative design process. These explorations include: developing a library of design ideas as building blocks for design; creating multimodal, multidimensional, immersive, virtual environments; interactive transformation and synthesis of design concepts; and "reverse architecturing" of canonical works. The emphasis of this course is on concepts as well as methods and techniques of computer graphics and their application to simulating the creative design process in architecture.

Graduate Courses

ARCH 679 Micro-Computer Applications in Design
For description, see ARCH 479

ARCH 761–762 Architectural Science Laboratory
761, fall; 762, spring. 6 credits each term. Open to architectural science graduate students only.
Projects, exercises, and research in the architectural sciences.

ARCH 763–764 Thesis or Research in Architectural Science
763, fall; 764, spring. Variable credit (maximum, 12). Limited to architectural science graduate students.
Independent study.

Architectural History

The history of the built domain is an integral part of all aspects of the architecture curriculum, from design and theory to science and technology. Incoming students take ARCH 181–182 in the first year, and three additional courses from the 380–399 series, preferably in the third and fourth years. Seminars are intended for advanced undergraduate and graduate students and do not satisfy undergraduate history requirements. Courses with the same number may only be taken once to satisfy history of architecture or in-college requirements.

Sequence Courses

ARCH 181 History of Architecture I
Fall. 3 credits. Required of all first-year students in architecture; open to all students in other colleges with an interest in the history of the built domain.
The history of the built environment as social and cultural expression from the earliest to more recent times. Themes, theories, and ideas in architecture and urban design are explored, beginning with the earliest written records.

ARCH 182 History of Architecture II
Spring. 3 credits. Required of all first-year students in architecture. Open to all students in other colleges with an interest in the history of the built domain; may be taken independently of ARCH 181.
The history of the built environment as social and cultural expression from more recent times to the present. Architecture and urban design themes, theories, and ideas are addressed in greater detail leading to the present time.

Directed Electives

ARCH 380 History of Theory
Fall or spring. 3 credits. Prerequisites: ARCH 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: ARCH 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 (also ART H 332 and RELST 332)
Fall. 4 credits. Prerequisites: ARCH 181–182 or permission of instructor. Not offered every year.
For description, see ART H 332.

ARCH 383 The City
Fall or spring. 3 credits. Prerequisites: ARCH 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: ARCH 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: ARCH 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 387 The Nineteenth Century—Style, Technology, and Individuality in the West
Fall or spring. 3 credits. Prerequisites: ARCH 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 388 Modernism
Fall or spring. 3 credits. Prerequisites: ARCH 181–182 or permission of instructor. Not offered every year.
Precursors and proponents of the modern movement from the late nineteenth century into the 1940s are considered in this course. The cultural intents of the modern are examined in architectural and urban design for individuals, groups, and institutions, from Mies van der Rohe, Le Corbusier, and Frank Lloyd Wright to de Stijl, the Bauhaus, and design education. Attention is paid to the politics of design in serving the state during the 1930s.

ARCH 389 Architecture, Revolution and Tradition
Fall or spring. 3 credits. Prerequisites: ARCH 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 foment architectural revolution within inherited traditions and ends with attempts to establish design traditions within revolutionary settings.

ARCH 390 American Architecture and Building I
Fall or spring. 3 credits. Prerequisites: ARCH 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: ARCH 181–182 or permission of instructor. Not offered every year.
A continuation of Architecture 390 but may be taken independently. An account of American architecture, building, 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: ARCH 181–182 or permission of instructor. Not offered every year.
An exploration of certain 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 emphases 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: ARCH 181–182 or permission of instructor. Not offered every year.
Well established cities were transformed by radical and unimagined change in the nineteenth and twentieth centuries. 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: ARCH 181–182 or permission of instructor. Not offered every year.
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 396 Special Topics in the History of Architecture and Urbanism
Fall or spring. 3 credits. Prerequisites: ARCH 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: ARCH 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: ARCH 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: ARCH 181–182 or permission of instructor. Not offered every year.
Topic to be announced.

Courses in Preservation

ARCH 583 Measured Drawing (also CRP 567)
For description, see CRP 567.

ARCH 584 Problems in Contemporary Preservation Practice (also CRP 563)
For description, see CRP 563.

ARCH 585 Perspectives on Preservation (also CRP 562)
For description, see CRP 562.

ARCH 586 Documentation for Preservation (also CRP 560)
For description, see CRP 560.

ARCH 587 Building Materials Conservation (also CRP 564)
For description, see CRP 564.

ARCH 588 Historic Preservation Planning Workshop: Surveys and Analyses (also CRP 561)
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 686 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 688 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 696 Seminar in Special Topics in the History of Architecture and Urbanism
Fall or spring. 4 credits. Prerequisites: 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.

Independent Study, Thesis, Dissertation

ARCH 299 Undergraduate Independent Study in the History of Architecture and Urbanism
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 (maximum, 12). 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 680.

ARCH 999 Ph.D. Dissertation in the History of Architecture and Urbanism
Fall or spring. Variable credit (maximum, 12).
Independent study for the doctoral degree.

ART

R. Bertoia, chair; Z. Blum, V. G. Kord, J. N. Locey, M. Lyons, T. McGrain, E. Meyer, G. Page, B. Perlus, S. Poleskie, J. L. Squier, W. S. Taft, K. WalkingStick, director of graduate studies; and visiting critics.

Undergraduate Program

The curriculum in art is a program of study within the College of Architecture, Art, and Planning.

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.

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 four 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 of the last two years. Beginning with the third year, students concentrate in painting, sculpture, photography, printmaking, or combined media.

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.

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 may also earn a Bachelor of Arts degree from the College of Arts and Sciences or the College of Human Ecology, in a 5-year dual degree program. This decision should be made early in the candidate's career (no later than the third semester) so that he or she can apply to be registered in both colleges simultaneously. Each student will be assigned an adviser in both colleges of their dual degree program, to provide needed guidance. A candidate for two degrees must satisfy all requirements for both degrees. At least 67 of the total credits must come from courses offered in the Department of Art and an additional 6 credits of History of World Art. In addition, all Department of Art requirements for freshman writing seminars, art history, and distribution must be met.

It is expected that a dual degree candidate will complete the pre-thesis and thesis requirements for the B.F.A. degree during the fifth year.

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. No more than three studio courses may be taken in any one semester. Studio courses may be repeated for elective credit. All students must take at least one studio course a semester unless there are exceptional circumstances expressed in the form of a petition. **Any request to deviate from the standard curriculum must be petitioned prior to the act.**

Specific Course Requirements

By the end of the second year, students must have completed an introductory course in each of the areas of painting, sculpture, printmaking, photography, and four drawing courses. By the end of the third year, all students must have completed an additional 12 credits beyond the introductory level in three of the four areas.

Concentration

Students must plan their programs to complete 27 credits in one of the studio areas of painting, sculpture, or photography or printmaking. Declaration of the area of concentration must be made during the second semester of the sophomore year. B.F.A. students complete a senior thesis in one area of concentration and are required to participate in the Senior Exhibition in the semester the thesis is taken.

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)

Printmaking: ART 131/132/133 (2 of 3); 231, 232, 233 (1 of 3); 331, 431, 432 (Thesis)

Photography: ART 161, 261, 263, 461, 462 and one of the following: ART 264, 265, 361

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 and thesis must be taken in the first area of concentration. Students take 23 credits in the first area of concentration and 15 credits in the second area of concentration. Drawing is only available as a second area of concentration.

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
Printmaking: ART 131/132/133 (2 of 3) 231/232/233 (1 of 3) 431, 432	22
Photography: ART 161, 261, 263/264/265 (1 of 3), 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
Printmaking: ART 131/132/133 (2 of 3) 231/232/233 (1 of 3); 331	14
Photography: ART 161, 261, 263/264 265 (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.

Combined Media Concentration

The combined media 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.

The required courses for the concentration in **Combined Media** (33 credits) are:

100 and 200 level studios ART 1__, 2__	7
200 and 300 level studios ART 2__, 2__, 3__, 3__ (2 of 4)	8
Pre-Thesis and Thesis	12
ART 481, 482	
Out-of-college studio electives (minimum of 2)	6
OCE Studio, OCE Studio	
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 combined media concentration.

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. Applications are submitted to the Rome Program coordinator. Students applying to the Rome Program must meet with their faculty adviser, the art department Rome Program adviser, and the department chair to obtain signatures of approval for admission to the program. Students in the department wishing to attend the Rome Program must register for a full semester of credits. The department recommends that students attend the program during the first or second semester of their junior year. Under special circumstances, seniors may also attend the Rome Program. 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 Fulfills 4 credits of concentration	4
ART 312*	Modern Art in Italy	3
ART 317	History of Art in Rome: Early Christian to the Baroque Age	4
or		
ART 318	History of Art in Rome: Renaissance in Rome and Florence	4
ITALA 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. Only four studio credits may be taken in any one semester. Students may study in Rome for one or two academic semesters.

*Fulfills 300-level Theory and Criticism requirement.

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 (minimum of three courses, of at least 3 credits each); and, Humanities and Expressive Arts (minimum of three 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:

Modern: 260, 265, 270, 360, 361, 362, 364, 366, 367, 370, 376, 464.

Non-Western: 280, 378, 380, 381, 383, 384, 385, 386, 389, 396.

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.

For those students matriculating in fall of 1999:

Students are required to take ART 111, Introductory Art Seminar; ART 121, Introductory Painting; or ART 141, Introductory Sculpture; 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, ART 171, Electronic Imaging in Art, and an additional Freshman Writing Seminar must be taken during the spring semester of the freshman year. A 300-level course in Theory and Criticism must be taken sometime during the junior or senior year.

Courses that will fulfill Theory and Criticism requirement:

ART 312

ARCH 447

ART H 370, 464, 494, 594

ENGL 395

GERST 660

AS&RC 304, 503

ANTHR 453, 320, 322

First Year

Fall Term (Required Curriculum)	*Credits*
111 Introductory Art Seminar	1
112 History of World Art*	3
121 Introductory Painting	3
or	
141 Introductory Sculpture	3
151 Drawing I	3
Freshman Writing Seminar	3
In/Out College Electives	3
	16
Spring Term (Required Curriculum)	
113 History of World Art*	3
121 Introductory Painting	3
or	
141 Introductory Sculpture	3
152 Drawing II	3
171 Electronic Imaging in Art	3
Freshman Writing Seminar	3
	15

Second Year

Fall Term (Required Curriculum)	
One of the following:	3
131 Introductory Etching	
132 Introductory Graphics	
133 Introductory Lithography	
161 Introductory Photography	3
251 Drawing III	3
Out-College Elective (OCE)/Art History	4
OCE	3
	16
Spring Term	
200 Level Studio	4
200 Level Studio	4
252 Drawing IV	3
OCE/Art History	4
OCE	3
	18

Third Year

Fall Term	
200 Level Studio	4
Art Studio concentration	4
300-level course in Theory and Criticism	3
OCE	3
In/OCE	3
	17
Spring Term (Rome)	*Credits*
Art Studio concentration	4
OCE/Art History	4
In/OCE's	8
	16

Fourth Year

Fall Term	
Pre-Thesis	6
In/OCE's	10
	16
Spring Term	
Thesis	6
In/OCE's	9
	15

*ART 112, 113, may not be offered every year.

ART 112 may be substituted with a classical art history course; ART 113 may be substituted with a Renaissance/Baroque Art History course.

The M.F.A. Program

The Master of Fine Arts program requires four terms of full-time study, equal to a minimum of sixty credits. Transfer credit for graduate work done elsewhere or in the summer session is not acceptable. The curriculum leading to the master's degree is flexible to accommodate the needs of the individual student and to enable the student to partake of the greater Cornell community. The ratio of graduate faculty to students is greater than one-to-one, allowing exceptional opportunity for individual mentoring. Graduate students are provided individual studios and have 24-hour access to specialized studios and labs.

Graduate students in art may enroll in introductory or advanced courses in any field of study offered at the university: specialty courses in writing, stagecraft, cinema, and music are available as well as general education courses in the history of art, philosophy, anthropology, and so forth. Fifteen credits are required in each term; of these, nine credits are in studio work, and three credits are in Graduate Seminar (ART 611, 612, 613, 614). Students are required to take at least twelve credits of academic work outside the Department of Art during their four terms in residence. Candidates for the Master of Fine Arts degree must have completed eighteen credits in the history of art in the course of their graduate and/or undergraduate study. Every M.F.A. candidate must prepare a written thesis, offer a thesis exhibition of studio work completed during residency, and give an oral defense of the written and visual thesis. Gallery space is provided for a one-week solo thesis exhibition during the final spring semester.

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.

Guidelines for Independent Study

A student who wants to undertake Independent Study must be a junior in good standing. Fine Arts students must have completed two years of the curriculum, **including all first- and second-year studios and four semesters of drawing.** An independent study cannot be used to fulfill any of the four drawing requirements. All students must have taken a minimum of one Cornell Art Department course in the area of the proposed independent study. It is recommended that the student take the independent study with a professor with whom they have previously studied. Out-of-department students may be exempt from the studio sequence requirement at the discretion of the supervising professor. Independent studies do NOT count toward studio requirements. Credit hours are variable up to a maximum of four.

Courses in Theory and Criticism

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. Not offered every year.
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 art 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
Spring. 3 credits. Not offered every year.
Continuation of ART 112.

ART 214 Art and the Multicultural Experience
Fall. 3 credits.
This course will investigate selected topics related to art and the multicultural experience. Students will study the basic vocabulary and tools used in the expression of art. They will question the nature of the visual arts as a discipline and survey art created by under-represented American minority cultural groups.

ART 312 Modern Art in Italy
Fall or spring. 3 credits. Rome Program only.
This course is designed to introduce students 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. Post-war painting and sculpture will be emphasized. Visits with artists in studios, galleries and museums will introduce students to the exchange between artists, dealers and critics. Fulfills 300-level Theory and Criticism requirement for Fine Arts majors.

ART 317 History of Art in Rome: Early Christian to the Baroque Age
Fall. 4 credits. Rome Program only.
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 History of Art in Rome: Renaissance in Rome and Florence
Spring. 4 credits. Rome Program only.
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 419 Independent Study/Supervised Readings in Art
Fall, spring or summer. 4 credits variable. Prerequisite: student must be a junior in good standing and have the written permission of the instructor.
Independent reading and research allows a student the opportunity to investigate special interests that are not treated in regularly scheduled courses. The student develops a plan of study to pursue under the supervision of a faculty member.

ART 611 Professional Skills for the Visual Artist
Fall. 3 credits. Limited to MFA students.
This seminar will help fine arts graduate students build professional skills that will assist them in their careers as practicing artists and in their work at art-related employment. Students will complete a resource notebook that should be useful to them in the years after they graduate. Topics will include: funding resources, exhibition opportunities, employment options, documentation of work, health, safety, and legal issues.

ART 612 Recent Practice in the Visual Arts
Spring. 3 credits. Limited to MFA students.
This seminar is designed to provide graduate students with an overview of recent visual artwork. Students will study work from a wide range of artists who have received significant recognition within the visual arts community. Reviews of major exhibitions such as Documenta, La Biennale di Venezia, and the Whitney Biennial will be discussed. Students will be encouraged to travel to nearby cities to look at contemporary work.

ART 613 On-Line Publication for the Visual Artist
Fall. 3 credits. Limited to MFA students.
This course is designed to introduce graduate students to the basic principles of electronic imaging. As a major project, each student will interview a contemporary visual artist These interviews will be illustrated with digital images of each artist's work and combined in an on-line magazine. Additionally each student will learn to create a home page on the World Wide Web.

ART 614 Contemporary Theory in the Visual Arts
Spring. 3 credits. Limited to MFA students.
This seminar explores selected writings on the current issues represented within the visual arts. It is designed to introduce graduate students to several approaches to critical inquiry and analysis of contemporary visual practice. Topics will vary but may include related criticism in areas such as visual culture, semiotics, identity politics, and institutional frames.

Studio Courses in Painting

Fees for painting courses: 121, 221, 321, 322, 421, 422, 429: $40

ART 121 Introductory Painting
Fall, spring, or summer. 3 credits.
The study of the language of painting through color, form, materials and techniques. Aspects of traditional and modern pictorial composition are studied including proportion, space, and color theory through the representation of a variety of subjects.

ART 221 Painting II
Fall or spring. 4 credits. Prerequisite: ART 121 or permission of instructor.
A continuation of the study of aspects of pictorial composition initiated in ART 121, focussing on problems relating to the depiction of the figure, space, and light. Topics are explored within the context of historical and contemporary artistic expression.

ART 321 Painting III
Fall or spring. 4 credits. Prerequisite: ART 221 or permission of instructor.
An intensive study of painting materials and techniques to express pictorial ideas. A variety of traditional painting techniques are explored including egg tempera, fresco, gouache, encaustic and oil. In addition, paints and associated techniques developed in the 20th century are used as well as developing technologies applicable to the painting process.

ART 322 Painting IV
Fall or spring. 4 credits. Prerequisite: ART 321 or permission of instructor.
An advanced course centered on issues of artistic expression. A variety of painting media are used to address conceptual issues through representation as well as abstraction.

ART 421 Pre-Thesis in Painting
Fall or spring. 6 credits. Prerequisite: ART 322.
Advanced study of painting through assigned and independent projects utilizing a variety of materials leading to the formulation of a thesis project.

ART 422 Thesis in Painting
Fall or spring. 6 credits. Prerequisite: ART 421.
A focussed independent project demonstrating creative ability and technical proficiency. The project will be exhibited in an appropriate space at the end of the term.

ART 429 Independent Studio in Painting
Fall, spring, or summer. 4 credits variable. Prerequisite: student must be a junior in good standing and have the written permission of the instructor.
Independent studio in painting allows students the opportunity to pursue special interests not treated in regularly scheduled courses. The student plans study and projects under the supervision of a faculty member selected to guide their progress and evaluate their results.

ART 721–722, 821–822 Graduate Painting
721, fall; 722, spring; first-year M.F.A. students. 9 credits. 821, fall; 822, spring; second-year M.F.A. students. 9 credits.
Students are responsible, under faculty direction, for planning their own projects and selecting the media in which they are to work. All members of the faculty are available for individual consultation.

Studio Courses in Printmaking

Fees for printmaking courses:

Art: 131, 132, 133:	$55
Intaglio: 231, 431.1, 432.1, 439.1:	$65
Lithography: 233, 431.2, 432.2, 439.2:	$85
Screenprinting: 232, 431.3, 432.3, 439.3:	$45

ART 131 Introductory Intaglio
Fall and spring. 3 credits.
A basic introduction to etching techniques, with emphasis on engraving, lift ground, relief printing, monotypes, and experimental techniques.

ART 132 Introductory Graphics
Fall and spring. 3 credits.
An introduction to the two-dimensional thought process and the language of vision. Students will explore design projects and the use of graphic materials, including collage, pochir, and screen printing.

ART 133 Introductory Lithography
Fall and spring. 3 credits.
The theory and practice of lithographic printing, using limestone block and aluminum plate. Basic lithographic techniques of crayon, wash, and transfer drawing are studied.

ART 231 Intaglio II
Spring. 4 credits. Prerequisite: ART 131.
A studio course in advanced etching techniques. Refinement of processes and ideas through the uses of acquatint, spit bite, lift ground, soft ground, and dry point in black and white with an introduction to multiple plate color printmaking.

ART 232 Advanced Screen Printing
Fall. 4 credits. Prerequisite: ART 132.
An exploration of the screen printing process as it applies to the Fine Arts. Students will develop skills in multicolor printing using transparent inks and additives. Stencils will be made by the handcut and the photo process.

ART 233 Lithography II
Spring. 4 credits. Prerequisite: ART 133.
The theory and practice of lithographic printing using lithographic stones and aluminum plates. Traditional techniques in crayon, tusche wash, and color printing as well as photolithography using kodalith and computer-generated transparencies.

ART 331 Printmaking III
Fall or spring. 4 credits. Prerequisite: ART 231, 232, or 233 or permission of instructor.
Study of the art of graphics through both assigned and independent projects. Work may concentrate in any one of the graphic media or in a combination of media.

ART 332 Printmaking IV
Fall. 4 credits. Prerequisite: ART 331 or permission of instructor.
Continuation and expansion of ART 331.

ART 431 Pre-Thesis in Printmaking
Fall or spring. 6 credits. Prerequisites: ART 332.
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 431.
Advanced printmaking project to demonstrate creative ability and technical proficiency.

ART 439 Independent Studio in Printmaking
Fall, spring, or summer. 4 credits variable. Prerequisite: student must be a junior in good standing and have the written permission of the instructor.
Independent studio in printmaking allows the student the opportunity to pursue special interests not treated in regularly scheduled courses. The student plans study and projects under the supervision of a faculty member selected to guide their progress and evaluate their results.

ART 731–732, 831–832 Graduate Printmaking
731, fall; 732, spring; first-year M.F.A. students. 9 credits. 831, fall; 832, spring; second-year M.F.A. students. 9 credits.
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 Sculpture

Fees for sculpture courses:

141	$50
241, 341, 342, 343, 441, 442	$75

ART 141 Introductory Sculpture
Fall, spring, or summer. 3 credits.
A series of studio problems introduce the student to the basic considerations of artistic expression through three-dimensional design, i.e., modeling in Plasteline, building directly in plaster, casting in plaster, and constructing in wood and metal.

ART 241 Sculpture II
Fall or spring. 4 credits. Prerequisites: ART 141, or an architecture design studio, 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 341 Sculpture III
Fall or spring. 4 credits. Prerequisite: ART 241 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
Fall or spring. 4 credits. Prerequisite: ART 341 or permission of instructor.
Continuation and expansion of ART 341.

ART 343 Sculpture V
Fall or spring. 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 or spring. 6 credits. Prerequisite: ART 343.
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 441.
Advanced sculpture project to demonstrate creative ability and technical proficiency.

ART 449 Independent Studio in Sculpture
Fall, spring, or summer. 4 credits variable. Prerequisite: student must be a junior in good standing and have the written permission of the instructor.
Independent studio in sculpture allows the student the opportunity to pursue special interests not treated in regularly scheduled courses. The student plans study and projects under the supervision of a faculty member selected to guide their progress and evaluate their results.

ART 741–742, 841–842 Graduate Sculpture
741, fall; 742, spring; first-year M.F.A. students. 9 credits. 841, fall; 842, spring; second-year M.F.A. students. 9 credits.
Students are responsible, under faculty direction, for planning their own projects and selecting the media in which they are to work. All members of the faculty are available for individual consultation. Weekly discussion sessions of works in progress are held.

Studio Courses in Photography

Darkroom fees for photography courses:

Fee for B & W courses:	$105.00
Fee for color courses:	$185.00
Fee for an additional B & W course taken the same term:	$50.00
Fee for an additional color course taken the same term:	$130.00

ART 161 Photography I (also ARCH 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 168 Black-and-White Photography
Summer. 3 credits. Three-week session only.
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. Three-week session only.
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 ARCH 351)
Fall, spring, or summer. 4 credits. Prerequisites: ART 161 or ARCH 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 ARCH 251, or permission of instructor.
A studio course in color photography with emphasis on camera skills, darkroom techniques, and the content of color photography.

ART 264 Photo Processes
Fall, spring, or summer. 4 credits. Prerequisite: ART 161 or ARCH 251, or permission of instructor.
A studio course in alternative 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 ARCH 251, 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.
Continued study of creative use of photography, with emphasis on specialized individual projects.

ART 461 Pre-Thesis in Photography
Fall or spring. 6 credits. Prerequisite: ART 261, 263.
A studio course intended for photography majors and other qualified students.

ART 462 Thesis in Photography
Fall or spring. 6 credits. Prerequisite: ART 461.
A studio course intended for photography majors and other qualified students. Advanced photography project to demonstrate creative ability and technical proficiency.

ART 469 Independent Studio in Photography
Fall, spring or summer. 4 credits variable. Prerequisite: student must be a junior in good standing and have the written permission of the instructor.
Independent studio in photography allows the student the opportunity to pursue special interests not treated in regularly scheduled courses. The student plans study and projects under the supervision of a faculty member selected to guide their progress and evaluate their results.

ART 761–762, 861–862 Graduate Photography
761, fall; 762, spring; first-year M.F.A. students. 9 credits. 861, fall; 862, spring; second-year M.F.A. students. 9 credits.
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

Fees for drawing courses: $25

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 Drawing II
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 and concentrate 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 Drawing III
Fall. 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
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 459 Independent Studio in Drawing
Fall, spring, or summer. 4 credits variable. Prerequisite: student must be a junior in good standing and have the written permission of the instructor.
Independent studio in drawing allows the student the opportunity to pursue special interests not treated in regularly scheduled courses. The student plans study and projects under the supervision of a faculty member selected to guide their progress and evaluate their results.

Special Studio Courses

Course fees:

171, 271, 272, 479	$105
391, 392	$ 50
481, 482, 489	$ 70

ART 171 Electronic Imaging in Art
Fall or spring. 3 credits.
An introductory studio course using the computer as a tool for making art. Students will explore various approaches to 2- and 3-D image creation using software programs for imaging generation and processing. Intro to the World Wide Web.

ART 271 Electronic 3-D Modeling and Animation
Fall or spring. 4 credits. Prerequisite: ART 171.
A studio course in creating 2- and 3-D still and animated visualizations using computers and 3-D software for object modeling, animation, and rendering. Concentration on the World Wide Web.

ART 272 Digital Video and Sound
Fall or spring. 4 credits. Prerequisite: ART 171.
A studio course that introduces students to digital video including capture stills, animation, video, and sound with an introduction to interactive presentation and CD ROM production. Concentration on the World Wide Web.

ART 372 Special Topics in Art Studio
Fall, spring, or summer. Variable credit.
An exploration of a particular theme or project.

ART 379 Independent Studio in Rome
Fall and spring. 4 credits variable. Prerequisite: student must be a junior in good standing, and have the written permission of the instructor. Rome Program only.
Independent studio in Rome allows non-art majors the opportunity to pursue special interests in Fine Arts not treated in regularly scheduled courses. The student plans a course of study or projects that meet the approval of the faculty member selected to guide their progress and evaluate the results.

ART 391 Media Arts Studio I
Fall. 3 credits. Prerequisite: one of the following courses: ART 171, THETR 277, 377, MUSIC 120, or equivalent. Also student must be a junior and have permission of instructor. Lab fee $50.
A collaborative interdisciplinary studio course in a variety of digital and electronic media, including art, architecture, music, film and video, dance. Group projects and discussions will also investigate the artistic and interactive potential of a high-speed intranet connecting arts spaces on campus, including virtual and performative events.

ART 392 Media Arts Studio II
Spring. 3 credits. Prerequisite: one of the following courses: ART 171, THETR 277, 377, MUSIC 120, or equivalent. Also student must be a junior and have permission of instructor. Lab fee $50.
A continuation of ART 391. A collaborative interdisciplinary studio course in a variety of digital and electronic media, including art, architecture, music, dance, film and video. Group projects and discussions will also investigate the artistic and interactive potential of a high-speed intranet connecting arts spaces on campus, including virtual and performative events.

ART 400 Rome Studio
Fall or spring. 4 credits. Prerequisite: permission of instructor. Fee: $25. Rome Program only.
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 400 fulfills four credits of the concentration requirement.

ART 479 Independent Studio in Electronic Imaging
Fall, spring or summer. 4 credits variable. Prerequisite: student must be a junior in good standing and have the written permission of the instructor.
Independent studio in electronic imaging allows the student the opportunity to pursue special interests not treated in regularly scheduled courses. The student plans study and projects under the supervision of a faculty member selected to guide their progress and evaluate their results.

ART 481 Pre-Thesis in Combined Media
Fall or spring. 6 credits. Prerequisite: written permission of instructor on a combined media thesis form must be received in the art department, prior to enrollment in this course.
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. Students select a faculty member from the area of concentration most appropriate to their area of combined media.

ART 482 Thesis in Combined Media
Fall or spring. 6 credits. Prerequisite: ART 481 and written permission of instructor on a combined media thesis form must be received in the art department prior to enrollment in this course.
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. Students select a faculty member from the area of concentration most appropriate to their area of combined media.

ART 489 Independent Studio in Combined Media
Fall, spring, or summer. 4 credits variable. Prerequisite: student must be a junior in good standing and have the written permission of the instructor.
Independent studio in combined media allows the student the opportunity to pursue special interests not treated in regularly scheduled courses. The student plans study and projects under the supervision of a faculty member selected to guide their progress and evaluate their results.

CITY AND REGIONAL PLANNING

P. Olpadwala, chair; I. Azis (visiting), S. Baugher, L. Beneria, R. S. Booth, S. Christopherson, P. Clavel, S. Czamanski (emeritus), M. Drennan, A. M. Esnard, J. F. Forester, W. W. Goldsmith, director, URS; T. Hanchett, W. Isard (emeritus), D. Lewis, J. Lobo, B. Lynch, K. C. Parsons, R. Pendall, J. W. Reps (emeritus), S. Saltzman, S. W. Stein (emeritus), M. A. Tomlan, R. T. Trancik, T. Vietorisz (visiting), M. Warner

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 who graduate from the program receive a Bachelor of Science degree. The program provides 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 provide students with a broad understanding of relevant issues, the ability to assess those issues, and technical analysis skills. The URS Program is truly interdisciplinary. Students learn to evaluate urban and regional problems by using a wide range of analytic tools and disciplinary perspectives.

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 follow the College of Arts and Sciences guidelines specifying courses that 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, if they complete at least one science course during their undergraduate career. They may apply no advanced placement credit toward the distribution requirement in Groups 3 and 4. Grades of S-U courses cannot be applied to the distribution requirements.

2. Required Courses for the Major in Urban and Regional Studies: 5 courses

CRP 100: The American City

CRP 101: The Global City: People, Production, and Planning in the Third World

CRP 223: Introduction to Statistical Reasoning for Urban and Regional Analysis (statistics course)

Microeconomics course (at least 3 credits, from approved list)

Architecture course (at least 3 credits, from approved list)

Approved List of Microeconomics and Architecture Courses

Micro Economics:

CE&H 110: Introductory Microeconomics

CE&H 210: Intermediate Microeconomics

ECON 101: Introduction to Microeconomics

ECON 301: Microeconomics

ECON 313: Intermediate Microeconomics Architecture

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 the Major in Urban and Regional Studies: 11 courses

A. Students must take one listed CRP course in each of the following 6 areas: Design, Economics, Environment, History, Politics/Policy, Quantitative Analysis

a. Design

CRP 381: Principles of Spatial Design and Aesthetics

CRP 415: Gender Issues in Planning and Architecture

CRP 482: Urban Land Use Concepts

b. Economics

CRP 400: Introduction to Urban and Regional Theory

CRP 401: Seminar in Urban Political Economy

CRP 404: Urban Economics

CRP 417: Industrial Restructuring: Implications for State and Local Policy

NOTE: This requirement ***may not*** be satisfied with the same course taken to complete the micro-economics course requirement under B.

c. Environment

CRP 380: Environmental Politics

CRP 451: Environmental Law

d. History

CRP 261: Urban Archaeology

CRP 360: Pre-Industrial Cities and Towns of North America

CRP 361: Seminar in American Urban History

CRP 461: Methods of Archival Research

CRP 462: The American Planning Tradition

e. Politics/Policy

CRP 314: Planning, Power, and Decision Making

CRP 318: Politics of Community Development

CRP 363: American Indians, Planners, and Public Policy

CRP 413: Planning and Political Economy I

CRP 448: Social Policy and Social Welfare

f. Quantitative Analysis

CRP 321: Introduction to Quantitative Methods for the Analysis of Public Policy

B. Students must take any additional 5 CRP courses (of at least 3 credits each, letter grade only)

4. **Free Electives: 6–9 courses**
5. **Physical Education (2 terms of PE)**

Required courses for graduation: 34

Required credits: 120

Honors Program

Each year a few well-qualified junior-year students may join the honors program. Each honors student will develop and write an honors thesis under the guidance of his or her faculty adviser.

Off-Campus Opportunities

Cornell-in-Washington Program. Students in good standing may 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 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. Cornell faculty members teach these seminars, which provide credit toward fulfillment of major, distribution, and other academic requirements.

Cornell Abroad. We encourage qualified undergraduates to study abroad because exposure to foreign cultures can be an eye-opening aspect of a university education. In an increasingly interdependent world, the experience of living and learning in a foreign country is invaluable. We work continually to develop study abroad opportunities. Current programs are available in Great Britain, Spain, and Germany. Opportunities in Asia, the Mideast, and France should be forthcoming. We encourage URS 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 can earn degree credits through courses taken 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 may earn both a Bachelor of Science degree and a Master of Regional Planning (M.R.P.) degree in a fifth year of study. Ordinarily the professional M.R.P. degree requires two years of work beyond that for the bachelor's degree. Under this option, a minimum of 30 credits and a master's thesis or thesis project are required for the M.R.P. degree. Interested students apply to the Graduate School, usually in the senior year.

Dual degree option. A student accepted in the Cornell College of Arts and Sciences may earn both a B.A. in a College of Arts and Sciences major and a B.S. in urban and regional studies in a total of five years. Special requirements have been established for this dual degree program. Cornell students interested in pursuing the dual degree program should contact either the director of the Urban and Regional Studies Program or the appropriate dean of the College of Arts and Sciences for further information.

Admissions Requirements and Procedures

Among the most important criteria for admission to the Urban and Regional Studies Program are intellectual potential and commitment—a combination of ability, achievement, motivation, diligence, and use of educational and social opportunities. Nonacademic qualifications are important as well. The department encourages students with outstanding personal qualities, initiative, and leadership ability. Above all, the department seeks students with a high level of enthusiasm and depth of interest in the study of urban and regional issues. Applicants must complete a university admission application.

Transfer Students

In most cases, transfer applicants should no longer be affiliated with a high school and should have completed no fewer than 12 credits of college or university work at the time of application. High school students who have completed graduation requirements at midyear and are taking college courses for the rest of the academic year should apply as freshmen. Prospective candidates who believe that their circumstances are exceptional should consult with the Director of Admissions in the Cornell division of interest to them before filing an application.

Forms for transfer application and financial aid are available from the Cornell University Office of Admissions, 410 Thurston Avenue, Ithaca, New York 14850–2488. Official transcripts of all high school and college work must be submitted along with SAT or ACT scores and letters of recommendation.

Prospective transfers should have taken at least 6 credits in English. In addition, students should have taken basic college-level courses distributed across the natural and social sciences, humanities, and mathematics. Applicants whose previous course work closely parallels the "General Education" requirements of the Urban and Regional Studies curriculum will have relative ease in transferring. Nevertheless, students with other academic backgrounds, such as engineering, architecture, fine arts, management, and agriculture, are eligible to apply.

Although an interview is not required, applicants are urged to visit the campus. Applicants who want further information regarding the Urban and Regional Studies Program, may contact Professor William W. Goldsmith, Program Director, Urban and Regional Studies, Cornell University, 106 West Sibley Hall, Ithaca, New York 14853–6701 (telephone: 607–255–4613).

The Graduate Program in City and Regional Planning

The major concentrations of course work in city and regional planning are in the following areas:

Built environment and urban development planning is concerned with physical facilities; the social, economic, and environmental forces that affect their design; and the process of development, plan making and administration.

History and historic preservation planning is a special program of study preparing students for work in history, analysis, and preservation of buildings, urban environments, and neighborhoods, including downtown business areas.

Regional planning and regional science are concerned with socioeconomic issues and functional planning at the regional level, the forces that generate economic growth and social development, and the ways in which resources can best be used.

Local and regional economic development is concerned with understanding and influencing how economic change may be harnessed to the benefit of communities, counteracting plant closings and more general regional decline and stimulating more equitable programs of socioeconomic change and development.

International planning offers a broad range of courses in international economic development, development planning, and political economy.

Quantitative methods and policy analysis courses are offered to prepare planners and researchers for a variety of situations and problems.

Complementing these concentrations, planning theory and political economy courses examine the organizational and planning processes and the political and economic conditions in which planning and international development operate.

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

Off-Campus Opportunities

Rome Program. Graduate students have the opportunity to spend one or two semesters in Rome, studying at Cornell's center at the Palazzo Massimo. Instruction is given by Cornell professors-in-residence and by other faculty. The program is structured to include work assignments in one of the international development organizations headquartered in Rome.

Course Information

Most courses in the Department of City and Regional Planning are open to students in any college of the university who have fulfilled the prerequisites and have the permission of the instructor.

The department attempts to offer courses according to the information that follows. However, students should check with the department at the beginning of each semester for late changes.

Undergraduate Program in Urban and Regional Studies

CRP 100 The American City
Fall. 3 credits. S-U grades optional for out-of-department students only.
An introductory course on the evolution of urban problems and opportunities facing the majority of this country's population as we approach the last decade of the twentieth century. Readings, discussions, and brief papers exploring topics ranging from suburban development to central city poverty, from environmental threats to downtown revitalization, and from municipal finance to the new position of women in the urban economy.

CRP 101 The Global City: People, Production, and Planning in the Third World
Spring. 3 credits. S-U grades optional for out-of-department students only.
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 223 Introduction to Statistical Reasoning
Fall. 4 credits. Letter grade.
An introduction to the role and use of quantitative methods in the study of urban and regional issues. Emphasis will be on statistical and related computer methods for the formulation, analysis, and testing of hypotheses and models of social, economic, and physical phenomena of cities and regions. This course will cover applicable methods in probability, descriptive statistics, estimation, hypothesis testing, and regression.

[CRP 261 Urban Archaeology
Not offered 1999–2000.
For description, see LA 261.]

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 318 Politics of Community Development (also CRP 518)
Spring. 3 credits. Letter grade.
A seminar on city economic development and community institutions. Attention to issues of local politics, planning, housing and economics. Term papers on field investigations are encouraged. Topics will vary from year to year.

CRP 321 Introduction to Quantitative Methods for the Analysis of Public Policy (also CRP 545)
Spring. 3 credits.
An introduction to the role and use of quantitative methods in the study of urban and regional issues. This course will focus on various types of models commonly used to analyze urban and regional policy, including regression models, cost-benefit analysis, and simulation, and others. Strengths and weaknesses of those methods will also be considered.

CRP 360 Pre-Industrial Cities and Towns of North America (also LA 360)
Fall. 3 credits. S-U grades optional.
For description, see LA 360.

CRP 361 Seminar in American Urban History (also CRP 662)
Fall or 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, LA 363, and LA 547)
Spring. 3 credits.
For description, see LA 363.

CRP 370 The Regional Question: The Case of Italy
Fall. 3 credits. For majors in urban and regional studies only. Rome Program only.
The "southern problem" in Italy has long interested regional planners, economists, sociologists, and political scientists. This course will make use of field trips to the Mezzorgiorno and Emilio-Romagna to explore practical aspects of regional inequality. Special attention will be paid to theories that purport to explain why the south remains underdeveloped and why the "Third Italy" is thought to be one of the world's most successful regions—in economics, politics, and social life. We will examine how Italy's integration into the European Union affects and is affected by its regional issues.

CRP 371 Cuba: The Search for Development Alternatives
Fall. 3 credits. Open to sophomores, juniors, seniors.
Cuba is a symbol; it is also a society. This course looks beyond the symbol to Cuban society, environment, and political economy within a Caribbean context. Cuba's relations with other nations and their impacts on Cuban development will be emphasized. The 1959 Revolution was a defining moment in Cuban history and a central element in Cuban culture. Students will learn about the experiences that shaped the revolution, altered its course in the 1970s and 1980s, and led to profound experimentation and a renewed search for authenticity in the 1990s.

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 381 Principles of Spatial Design and Aesthetics (also CRP 581 and LA 480)
Fall. 3 credits. Course enrollment is restricted to planning and landscape architecture students unless special permission is granted by instructor. Not offered 1999–2000.
A lecture course that introduces the spatial and visual design vocabularies of cities. Aesthetic principles and theories of design are investigated for different types of urban spaces drawn from a variety of international examples, historic and modern. Included in the course are design methods and applications in the contemporary urban context of Europe and North America.]

CRP 395 Special Topics
Fall, spring, summer. 4 credits. Hours to be arranged.

CRP 395.40 The History of Urban Form in America (also CRP 669.40)
Fall. 3 credits.
The history of city planning in America from colonial times to the early 20th century including brief reviews of European influences on urban form. Lecture, discussions, short papers.

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 direct discussions on outstanding texts, write book reviews, and prepare brief reports.

CRP 404 Urban Economics (also CRP 504)
Spring. 4 credits. Prerequisite: microeconomics.
Urban phenomena are analyzed from an economic point of view. Areas examined include economic aspects of urbanization processes and policies, determinants of urban growth and decline, urban land and housing markets, urban transportation, and urban public services. Some time will be spent in discussing problems of cities in developing countries.

CRP 408 Introduction to Urban Geographic Information Systems (GIS) (also CRP 508)
Spring. 4 credits. Letter grade.
Geographic Information Systems (GIS) have revolutionized the way we manage, analyze, and present spatial information. This course will focus on GIS in the social sciences. Many of the exercises and examples will be based on planning issues, but the concepts can be applied to many other disciplines such as government, economics, natural resources, and sociology. Some of the issues to be covered include: fundamentals of spatial analysis; overview of GIS technology and applications; designing a GIS project; gathering and analyzing data; and creating thematic maps.

CRP 412 Devolution and Public Sector Restructuring (also CRP 612)
Fall. 3 credits. S-U grades optional.
This course will address devolution and decentralization of government services in a

national and international context and then focus on the local public sector response in the United States. Privatization, intermunicipal cooperation, and internal restructuring will be reviewed including changing roles for the private sector, non-profit sector and unions. Implications for policy, program design, public advocacy and citizen involvement will be addressed. Special topics may include welfare reform. Graduate students will be expected to write a major research paper in addition to short papers throughout the term.

CRP 416 European City: The Public Sphere and Public Space
Fall. 2–4 credits variable. Open to all juniors and seniors, S-U option available to non-majors. Enrollment may be limited by the instructor. Rome Program only.
An examination of the social, economic, and political life of the European city, particularly Italian cities, especially Rome. Study of the socio-economic underpinnings of the city. How are cities organized, how do citizens relate to the state, the city to the nation, the nation to the global market? How and where do different groups of people live? How do they travel, inside the city and from city to city? How are new parts of the city developed and old ones preserved, transformed, or destroyed? What public services do people expect, and how are they delivered? What is the role of private business? How do Italians/Europeans confront problems of the urban environment, poor neighborhood services, and impoverished immigrants? In all these cases, how do Italian (or European) conditions and policies differ from those in the United States (or elsewhere)?

CRP 417 Industrial Restructuring: Implications for State and Local Policy (also CRP 517)
Fall. 4 credits.
A basic introduction to new issues arising from the way in which national and international economic shifts are affecting diverse United States localities. The course will focus on intra-industry restructuring, the location of economic activities, and state and local economic policy. Cases will be drawn from a variety of industries and national situations, with specific application to New York and other Northeast locations.

CRP 418 Local Government Restructuring in New York (also CRP 618)
Spring. 4 credits. Optional Grade. Prerequisite: CRP 412/612.
Students will undertake research requested by New York State clients—statewide associations of local government, state agencies and the public sector union, to analyze and identify alternative approaches to restructuring local government service delivery. The course will begin with an overview of qualitative research methods: case studies, interviews techniques, and surveys. The class will work as team with specific statewide client organizations to complete a project. Formal presentation and web page design will be part of the final product.

CRP 442 The Sociology of Science
For description, See S&TS 442.

CRP 448 Social Policy and Social Welfare (also CRP 548)
Spring. 4 credits.
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 nature and extent of social welfare provision, comparing the U.S. with 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 workfare) will illustrate how values and assumptions about state, economy, and society affect the forms of social welfare provisions and how they are administered.

CRP 451 Environmental Law (also CRP 551)
Fall. 4 credits.
An introduction to how the legal system handles environmental problems. Study of federal statutes such as the National Environmental Policy Act, the Clean Air Act, and the Clean Water Act, and of important judicial decisions that have been handed down under federal environmental statutes and regulations. Discussion of environmental law topics from a policy management perspective. This course is designed for undergraduate and graduate students interested in urban issues, planning, natural resources, government, environmental engineering, law, business, architecture, landscape architecture, etc. Course assignments for graduate students will differ in some aspects from those for undergraduates.

CRP 453 Environmental Aspects of International Planning (also CRP 683)
Fall. 3 credits.
This seminar will examine the roles of diverse environmental actors–international organizations, national bureaucracies, scientific communities, NGOs, and social movement organizations in shaping environmental debates and designing conservation and remediation programs in the Third World. Open to advanced undergraduate and graduate students in planning, environmental studies, and related social and natural sciences.

CRP 457 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.

CRP 461 Methods of Archival Research
Spring. 3 credits.
Examination of methods of using archival materials, including documents in the Cornell archives and regional history collection, for research in the history of architecture, historic preservation, and history of urban development.

CRP 474 Third World Urbanization (also CRP 674)
Spring. 4 credits. S-U grades optional.
Colonialism and economic globalization have profoundly affected urban Third World societies and landscapes—often by relegating everyday urban life to the margins and shrouding it in illegality. This course explores social, political and spatial dimensions of these processes. We look at rural-urban dynamics and their implications for the structure of urban space and for concepts of state and citizenship, we assess the position of Third World Cities in the global economy and implications for employment. Special attention to women workers, and urban environment. The second half of the course focuses on responses to these massive changes: violence and repression, social movements, and transmigration.

CRP 477 Issues in African Development (also CRP 677)
Fall and spring. 1 credit. S-U only.
This course examines a broad range of critical concerns in contemporary Africa including food production, human resource development, migration, urbanization, environmental resource management, economic growth, and policy guidance. The weekly presentations are made by invited specialists. Students are required to write a term paper.

CRP 490 Student-Faculty Research
Fall or spring. 1–4 credits. Limited to undergraduate students in the Urban and Regional Studies Program. S-U grades only.
Research, reading, and/or writing project in which a student and faculty member choose a topic related to urban and regional studies.

CRP 491 Rome Wasn't Built in a Day
Spring. 3 credits. Letter grade.
In this electronic course, students will learn about how the form and spatial structure of the city of Rome has evolved through time. Using the interactive CD-ROM "layers of Rome" as a digital text, the course will engage participants in the investigations of urban design in Rome both as a case study and as a vehicle for exploring concepts applicable to many contemporary cities worldwide. The material focuses on the intersection between historical studies of urban space, architectural geography, urban landscape formation and the design of cities. Lectures, research, readings and exercises will be developed using the Layers of Rome CD, web searches, digital networking and various interactive learning technologies geared toward urban analysis and visual design media.

CRP 492 Honors Thesis Research
Fall or spring. 4 credits. Limited to Urban and Regional Studies Program majors who have been selected as honor students by the department faculty.
Each selected student works with his or her thesis adviser.

CRP 493 Honors Thesis Writing
Fall or spring. 4 credits. Prerequisite: completion of CRP 492.
Each selected student works with his or her thesis adviser.

CRP 497 Supervised Readings
Fall or spring. Variable 4 credits. Limited to upperclass students. Prerequisite: permission of instructor.

Graduate Courses and Seminars

Courses numbered from 500 to 599 and 600 to 699 are generally considered introductory or first-year courses; those numbered from 700 to 799 and 800 to 899 are generally considered more advanced. Upperclass undergradu-

ate courses are numbered from 300 to 499. (Undergraduate students with the necessary prerequisites and permission of the instructor may enroll in courses numbered 500 and above.)

CRP 504 Urban Economics (also CRP 404)
Spring. 4 credits.
For description, see CRP 404.

CRP 508 Introduction to Urban Geographic Information Systems (GIS) (also CRP 408)
Spring. 4 credits. Letter grade.
For description, see CRP 408.

CRP 512 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. The perspective of the public and nonprofit sectors is the same as that 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.

CRP 513 Planning Practice and Urban Structure Seminar
Fall. 4 credits.
This introductory graduate seminar has several objectives. 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 517 Industrial Restructuring: Implications for State and Local Policy (also CRP 417)
Fall. 4 credits. For description, see CRP 417.

CRP 518 Politics of Community Development (also CRP 318)
Spring. 3 credits. Letter grade.
For description, see CRP 318.

CRP 519 Urban Theory and Spatial Development
Spring. 3 credits. Letter grade.
This course complements theories of urbanization and spatial development with an introduction to issues of governance within urban regions in the U.S. and Western Europe. The course will discuss economic and political institutions and actors as they shape the spatial form of cities. The work of authors such as Patsy Healey, Margit Mayer, David Harvey, Mike Davis, and Susan Fainstein will be discussed.

CRP 520 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.

CRP 521 Mathematical Foundation for Planning Analysis.
Fall. 1 credit. S-U grades 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 with prior course work as a refresher course in preparation for higher-level courses in planning analysis. Departmental permission required.

CRP 525 Introductory Methods of Planning Analysis
Fall. 4 credits. Letter grade.
A course on quantitative and qualitative analysis of neighborhoods, cities, and regions. Focus is on data from places in the USA, but tools are applicable throughout the world: descriptive and inferential statistics; mapping; and observation. Required lab exposes students to essential microcomputer applications and builds skills in writing and analysis.

CRP 529 Mathematics for Planners
Fall. 4 credits variable. S-U grades optional.
The course covers basic mathematical concepts and techniques—with an emphasis on calculus—needed by the student who wishes to take intermediate-level courses in economics, urban and regional analysis, quantitative methods for the social sciences and policy analysis. Topics include: matrix algebra, set theory, functions, differentiation, and integration.

CRP 532 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.

CRP 533 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 537 Real Estate Seminar Series
Fall and spring. 1/2 credit per term. S-U grades only. Restricted to MPS/RE students.
A one-credit course designed to bring students weekly into direct contact with real estate professionals mainly through the use of videoconferences originating from locations around the world.

CRP 541 The Politics of Technical Decisions I (also GOVT 628 and S&TS 415)
Spring. 4 credits.
For description, see S&TS 415.

CRP 545 Introduction to Public Policy Analysis and Management (also CRP 321)
For description, see CRP 321.

CRP 546 Introduction to Community and Environmental Dispute Resolution
Fall. 3 credits.
This course will explore the theories and techniques of dispute resolution as they apply to community, environmental, and related public policy disputes. Analysis will complement skill-building. Issues of power, participation, and strategy are central to our examinations of negotiation and mediation practice.

CRP 547 American Indians, Planners, and Public Policy (also CRP 363, LA 363, and LA 547)
Spring. 3 credits.
For description, see LA 363.

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 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.
Seminar covering the essentials of growth management, zoning, and subdivision: the main tools for implementing a land-use plan. Agriculture and open space preservation, infrastructure timing controls, redevelopment, planned unit development, and much more.

CRP 555 Urban Systems Studio (also LA 701)
Fall. 5 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.

Computer modeling and digital design media will be introduced as tools for urban design. 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 grades 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 ARCH 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 ARCH 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 ARCH 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 ARCH 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 ARCH 587)
Spring. 3 credits. Open to juniors, seniors, and graduate students.
A survey of the development of building materials in the United States, chiefly during the nineteenth and early twentieth centuries, and a review of the measures that might be taken to conserve them.

CRP 565 Fieldwork or Workshop in History and Preservation
Fall or spring. Variable credit.
Work on applied problems in history and preservation planning in a field or laboratory setting or both.

CRP 567 Measured Drawing (also ARCH 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 569 Archaeology on Preservation Planning and Site Design (also LA 569)
Spring. 3 credits. Offered alternate years.
For description, see LA 569.

[CRP 581 Principles of Spatial Design and Aesthetics (also CRP 381 and LA 480)
Not offered 1999–2000.
For description, see CRP 381.]

CRP 605 Urban Public Finance
Fall. 4 credits. Letter grade. Prerequisite: prior exposure to microeconomics.
An overview of neoclassical public economics theory, particularly those aspects of the theory that are central to urban public finance. In part two, the unusual three-tiered fiscal system of the United States is described along with the evolving fiscal and economic role of large municipal governments. Part three of the course presents the public finance theory of taxation. Major taxes and other revenue sources utilized by large municipalities are described and analyzed. Part four is the heart of the matter, namely the measurement and analysis of the fiscal condition of cities.

CRP 607 GIS Applications Workshop
Spring. 3 credits. Letter grade. Prerequisites: a basic GIS course and knowledge of ArcView or ArcInfo. Students with exceptional programming and web design skills can take the class with the prior permission of instructor.
This course is a more advance GIS class that focuses upon GIS applications and projects for one or more clients. Clients may be out-of-state and travel for meetings and/or site visits for data collection may be required. Contact the instructor directly to learn about project options for the current semester.

CRP 612 Devolution and Public Sector Restructuring (also CRP 412)
Fall. 3 credits S-U grades optional.
For description, see CRP 412.

CRP 614 Gender and International Development (also WOMNS 614)
Fall. 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.

CRP 616 Development and Change in the World Economy
Spring. 3 credits. Letter grade only.
This course concentrates on the current dynamics of national and 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 since the late 1960s, 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 flexibility, the erosion of nation states as economic units, and the formation of trade blocks and global institutions.

CRP 618 Local Government Restructuring in New York (also CRP 418)
Spring. 4 credits. S-U grades optional. Prerequisite: CRP 412/612.
For description, see CRP 418.

CRP 621 Quantitative Techniques for Policy Analysis and Program Management
Spring. 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 631 Local Economic Policy—Field Workshop
Fall. 4 credits.
A group policy analysis exercise in an upstate New York city. Students do a combination of data analysis; interviews with labor, 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.

CRP 632 Methods of Regional Science and Planning I
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. CRP 730 emphasizes statistical and econometric models.

CRP 633 Methods of Regional Science and Planning II
Fall. 4 credits.
See CRP 632. CRP 633 will provide an introduction to deterministic methods and models such as input/output models, social accounting models, and optimization models.

CRP 635 Workshop: State Economic Development Strategies
Spring. 4 credits. S-U grades optional.
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 exercises in 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.

CRP 639.06 Special Topic: Regional Development, Planning, and the Market, with Emphasis on the Third World-II: Current Policy Perspective
Spring. 4 credits variable.
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 experience.

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, and 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 prosmatic, political speech and action in diverse practical settings.

CRP 653 Legal Aspects of Land-Use Planning
Spring. 3 credits. Offered alternate years.
Survey of leading cases and legal concepts in land-use planning, with particular attention to zoning, subdivision control, condemnation, and growth-control issues.

CRP 655 Real Estate Project Workshop
Spring. 3 credits. Permission of instructor required.
Students will be asked to undertake the preparation of reports analyzing various aspects of real estate activity. Individual and team working relationships will be required. A range of types of problems that may be encountered in the real estate field will be addressed, including project feasibility, marketing, planning and design, legal constraints and concerns, etc. Projects will focus on real world case studies and will require professional level reports suitable for oral and written presentations.

CRP 657 Real Estate Law
Fall. 3 credits. Letter grade.
Examination of major legal concepts pertaining to acquisition, use, management, and transfer of real estate. Particular focus on important legal considerations pertaining to property rights, contracts, and public controls on the use of land. Consideration of important case law, statutory law, and rules and regulations. Discussion of current legal issues affecting real estate industry.

CRP 661 Historic Preservation Planning Workshop: Plans and Programs
Fall or spring. 1–4 credits. Prerequisite: CRP 561.
Preparation of elements of historic preservation plans, designs, legislation, and special studies. Individual or group projects are selected by students. Fieldwork is emphasized.

CRP 662 Seminar in American Urban History (also CRP 361)
Spring. 3 credits. Prerequisite: permission of instructor.
For description, see CRP 361.

CRP 663 Historic Preservation Law
Spring. 3 credits. Offered alternate years.
Law of historic district and landmark designation, tools for preservation (such as police power, taxation, eminent domain), and recent developments in state and federal historic preservation.

CRP 664 Economics and Financing of Neighborhood Conservation and Preservation
Spring. 3 credits.
The economic and financial aspects of historic preservation and neighborhood conservation. Topics include public finance, selected issues in urban economics, real estate economics, and private financing of real estate projects.

CRP 665 Preservation Planning and Urban Change
Fall. 3 credits.
An examination of fundamental planning concepts and issues as they relate to historic preservation. Neighborhood revitalization, federal housing programs, the role of public and private institutions, displacement, and other social issues are among the primary topics.

CRP 666 Pre-Industrial Cities and Towns of North American (also LA 666)
Fall. 3 credits. S-U grades optional.
For description, see LA 666.

CRP 669.40 The History of Urban Form in America (also CRP 395.40)
Fall. 3 credits.
For description, see CRP 395.40.

CRP 670 Regional Planning and Development in Developing Nations
Fall or spring. 4 credits. Prerequisite: 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 Planning
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 672 International Institutions
Fall. 3 credits. Letter grade.
Studying major international organizations of the post-WWII period like the UN, ILO, GATT-WTO, World Bank and IMF, Bretton Woods. We examine how they functioned during and after the globalizing international economy. We explore weaknesses in global governance and in the international financial system, and we assess current debates and proposals for reform.

CRP 674 Third World Urbanization (also CRP 474)
Spring. 4 credits. S-U grades optional.
For description, see CRP 474.

CRP 675 Seminar in Project Planning in Developing Countries
Fall. 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 677 Issues in African Development (also CRP 477)
Fall or spring. 1 credit. S-U grades only.
For description, see CRP 477.

CRP 683 Environmental Aspects of International Planning (also CRP 453)
Fall. 3 credits.
For description, see CRP 453.

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, organization, and urban structure. The first part of the course, which may be taken separately for one credit, provides an overview of administrative issues affecting planning. Next, attention is given to theories of organizational structure, growth, and change. Final sessions are devoted to the influence of urban and regional structures as context. Critical reading, short papers, and seminar discussion characterize the course.

CRP 732 Methods of Regional Science and Planning III
Fall or spring. 3 credits. Prerequisites: CRP 632 and CRP 633 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.
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 790 Professional Planning Colloquium I
Fall. 1 credit.
Visiting lecturers address 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 791 Master's Thesis in Regional Science
Fall or spring. 12 credits variable. S-U grades optional. Hours to be arranged. Regional Science faculty.

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 variable.
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 variable.

CRP 796 Professional Writing and Publishing (Colloqui)
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 credits variable. 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.
The theory of urban spatial organization. Economic, technological, and social factors leading to urbanization and various kinds of spatial organizations are explored. Major theoretical contributions to the understanding of intraregional and intraurban distribution of population and economic activity are reviewed.

CRP 801 Advanced Seminar in Urban and Regional Theory II
Spring. 3 credits.
A continuation of City and Regional Planning 800, concentrating on recent developments.

CRP 810 Advanced Planning Theory
Fall. 3 credits.
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 Science, Planning, and Policy Analysis
Fall or spring. 4 credits variable. 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 variable.

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 639 Regional Development Planning

CRP 649 Social-Policy Planning

CRP 659 Urban Development Planning

CRP 669 History and Preservation

CRP 679 Planning and Developing Regions

CRP 689 Environmental Planning

CRP 699 Regional Science

CRP 719 Planning Theory and Politics

LANDSCAPE ARCHITECTURE

Landscape Architecture at Cornell is jointly sponsored by the College of Agriculture and Life Sciences and the College of Architecture, Art, and Planning.

The Program

Program faculty: M. I. Adleman, S. Baugher, K. L. Gleason, H. Gottfried, chair; P. Horrigan, R. Jaenson, D. W. Krall, L. J. Mirin, R. T. Trancik, P. J. Trowbridge, K. A. Wolf.

Landscape Architecture offers a three-year Master of Landscape Architecture License Qualifying Degree, administered through the Graduate School, for those who have a four-year undergraduate degree in another field. The major is composed of several parts: core courses related to professional education in Landscape Architecture, a concentration in a subject related to the core courses, and free electives. 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 or a capstone studio.

The department 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 core courses in the discipline and the development of concentrations in subject matter areas such as landscape history and theory, landscape ecology and urban horticulture, the cultural landscape, site/landscape and art, or urban design.

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 Grounding in Landscape Architecture**
Fall. 4 credits.

***LA 142 Grounding in Landscape Architecture**
Spring. 4 credits.

***LA 201 Medium of the Landscape**
Fall. 5 credits.

***LA 202 Medium of the Landscape**
Spring. 5 credits.

[*LA 261 Urban Archaeology (also CRP 261)
Fall. 3 credits. Not offered 1999–2000.]

[*LA 262 Laboratory in Landscape Archaeology (also ARKEO 262)
Spring. 3 credits. Not offered 1999–2000.]

***LA 282 The American Landscape**
Fall. 3 credits.

***LA 292 Creating a Second Nature**
Spring. 3 credits.

***LA 301 Integrating Theory and Practice I**
Fall. 5 credits.

***LA 302 Community Design Studio: Integrating Theory and Practice**
Spring. 5 credits.

***LA 315 Site Engineering I**
Spring. 2 credits.

***LA 316 Site Engineering II**
Fall. 2 credits.

***LA 317 Site Construction I**
Fall. 2 credits. Weeks 1–7.

***LA 318 Site Construction II**
Spring. 2 credits. Weeks 8–15.

***LA 360 Pre-Industrial Cities and Towns of North America (also CRP 360, CRP 666 and LA 666)**
Fall. 3 credits. Offered alternate years 1999–00.

***LA 363 American Indians, Planners, and Public Policy (also CRP 363/547 and LA 547)**
Spring. 3 credits.

***LA 402 Urban Design in Virtual Space**
Spring. 5 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. Not offered 1999–2000.]

***LA 482 Landscape Preservation: Theory & Practice**
Spring. 3 credits.

***LA 483 Design Criticism**
Fall. 3 credits.

***LA 486 Community Design Workshop**
Spring. 3 credits.

***LA 487 Experiential Community Design**
Fall. 3 credits.

***LA 490 Rome Wasn't Built in a Day**
Spring. 3 credits.

***LA 491 Design and Plant Establishment in the Urban Environment (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
Spring. 1–5 credits; may be repeated for credit. S-U grades optional. L. J. Mirin.
Work on special topics by individuals or small groups.

***LA 498 Undergraduate Teaching**
Fall or spring. 1–2 credits.

***LA 501 Composition and Theory**
Fall. 5 credits.

***LA 502 Composition and Theory**
Spring. 5 credits.

***LA 505 Graphic Communication I**
Fall. 3 credits.

[*LA 506 Graphic Communication II
Spring. 3 credits. Not offered 1999–2000.]

LANAR 524 History of European Landscape Architecture
Fall. 3 credits. L. Mirin.
A survey from classical times to the present, emphasizing design principles and techniques that have established the landscape architecture tradition in Europe. Particular reference is made to the manner in which gardens, streets, plazas, parks, and new towns reflect in their built form, a range of responses to demands of culture, economics, technology, security, the law, and ecology.

LANAR 525 History of American Landscape Architecture
Spring. 3 credits. L. Mirin.
Landscape architecture in the United States from Jefferson to the present is examined as a unique expression of the American experience. Influences exerted by the physical landscape, the frontier and utopian spirit, and the cultural assumptions of democracy and capitalism are traced as they affect the forms of urban parks, private and corporate estates, public housing, transportation planning, national parks, and other open-space designs.

***LA 545 The Parks and Fora of Imperial Rome**
Spring. 3 credits.

[*LA 569 Archaeology in Preservation Planning and Site Design (also CRP 569)
Spring. 3 credits. Next offered 2000–2001.]

***LA 590 Theory Seminar**
Spring. 3 credits.

***LA 598 Graduate Teaching**
Fall or spring. 1–2 credits.

***LA 601 Integrating Theory and Practice I**
Fall. 5 credits. Limited to graduate students.

***LA 602 Integrating Theory and Practice II**
Spring. 5 credits. Limited to graduate students.

***LA 615 Site Engineering I**
Spring. 2 credits.

***LA 616 Site Engineering II**
Fall. 2 credits. Weeks 8–15.

***LA 617 Site Construction I**
Fall. 2 credits. Weeks 1–7.

***LA 618 Site Construction II**
Spring. 2 credits. Weeks 8–15.

***LA 618 Site Construction II**
Spring. 2 credits. Weeks 8–15.

***[LA 619 Advanced Site Grading**
Spring. 2 credits. Not offered 1999–2000.]

***LA 666 Pre-Industrial Cities and Towns of North America (also CRP 666)**
Fall. 3 credits. Offered alternate years.

***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: Designing Cities in the Electronic Age (also CRP 555)**
Fall. 5 credits.

***LA 702 Advanced Design Studio**
Spring. 5 credits.

***LA 800 Master's Thesis in Landscape Architecture**
Fall or spring. 9 credits.

*Offered through the College of Agriculture and Life Sciences.

FACULTY ROSTER

Azis, Iwan, Ph.D., Cornell U. Visiting Prof., City and Regional Planning.
Baugher, Sherene, Ph.D., SUNY at Stony Brook, Visiting Prof., City and Regional Planning
Beneria, Lourdes, Ph.D., Columbia U. Prof., City and Regional Planning
Bertoia, Roberto, M.F.A., Southern Illinois U. Assoc. Prof., Art
Blum, Zevi, B.Arch., Cornell U. Assoc. Prof., Art
Booth, Richard S., J.D., George Washington U. Assoc. Prof., City and Regional Planning
Bowman, Stanley J., M.F.A., U. of New Mexico. Prof., Art
Briggs, Laura, M. Arch, Columbia U. Asst. Prof., Architecture
Chi, Lily H., M. Phil,. Cambridge U., Asst. Prof., Architecture
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
Curry, Milton S. F., M. Arch., Harvard U., Asst. Prof., Architecture
Czamanski, Stan, Ph.D., U. of Pennsylvania. Prof. Emeritus, City and Regional Planning
Daly, Norman, M.A., Ohio State U. Prof. Emeritus, Art
Drennan, Matthew P., Ph.D., New York University. Prof., City and Regional Planning
Esnard, Ann-Margaret, Ph.D., U of Massachusetts-Amherst. 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
Goehner, Werner H., Dipl. Ing., Technical U. Karlsruhe (Germany), M.Arch., Cornell U. Prof., Architecture
Goldsmith, William W., Ph.D., Cornell U. Prof., City and Regional Planning
Greenberg, Donald P., Ph.D., Cornell U. Prof., Architecture
Hanchett, Thomas, Ph.D., U. of North Carolina. Asst. Prof., City and Regional Planning
Hascup, George E., B.Arch., U. of California at Berkeley. Prof., Architecture

Hodgden, Lee F., M.Arch, Massachusetts Inst. of Technology. Prof. Emeritus, Architecture
Hubbell, Kent L., M.F.A.S., Yale. Prof., Architecture
Isard, Walter, Ph.D., Harvard U. Prof., City and Regional Planning
Kira, Alexander, M.R.P., Cornell U. Prof. Emeritus, Architecture
Kord, Victor, M.F.A., Yale U. Prof., Art
Lewis, David B., Ph.D., Cornell U. Assoc. Prof., City and Regional Planning
Lobo, Jose, Ph.D., Cornell U. Prof., City and Regional Planning
Locey, Jean N., M.F.A., Ohio U. Prof., Art
Lynch, Barbara, Ph.D., Cornell U. Visiting Assoc. Prof., City and Regional Planning
Lyons, Marcia, M.F.A., School of Visual Arts. Visiting Asst. Prof., Art
MacDougall, Bonnie G., Ph.D, Cornell U. Assoc. Prof., Architecture
Mackenzie, Archie B., M.Arch., U. of California at Berkeley. Assoc. Prof., Architecture
McGrain, Todd V., MFA, U. of Wisconsin. Asst. Prof., Art
Meyer, Elisabeth H., M.F.A., U. of Texas. Assoc. Prof., Art
Mikus, Eleanore, M.A., U. of Denver. Prof. Emeritus, Art
Miller, John C., M.Arch., Cornell U. Prof., Architecture
Mirin, Leonard J., M.L.A., U. of Michigan. Assoc. Prof., Landscape Architecture
Mulcahy, Vincent J., M.Arch., Harvard U. Assoc. Prof., Architecture
Ochshorn, Jonathan, M. Urban Design, City College of New York, Assoc. 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
Page, Gregory, M.F.A., U. of Wisconsin. Assoc. Prof., Art
Parsons, Kermit C., M.R.P., Cornell U. Prof., City and Regional Planning
Pearman, Charles W., B.Arch., U. of Michigan. Prof., Architecture
Pendall, Rolf, Ph.D., U. of Claifornia at Berkeley. Prof., City and Regional Planning
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. Prof., Architecture
Rowe, Colin F., M.A., U. of London (England). A. D. White Prof. Emeritus
Saltzman, Sid, Ph.D., Cornell U. Prof., City and Regional Planning
Saul, Francis W., M.S., Harvard U. Assoc. Prof. Emeritus, Architecture
Schack, Mario L., M.Arch., Harvard U. Arthur L. and Isabel B. Wiesenberger Prof., Architecture
Shaw, John P., M.Arch., Massachusetts Inst. of Technology. Prof. Emeritus, Architecture
Simitch, Andrea, B.Arch., Cornell U. Assoc. Prof., Architecture
Singer, Arnold, Prof. Emeritus, Art
Squier, Jack L., M.F.A., Cornell U. Prof., Art
Stein, Stuart W., M.C.P., Massachusetts Inst. of Technology. Prof. Emeritus, City and Regional Planning
Taft, W. Stanley, M.F.A, California College of Arts and Crafts, Assoc. Prof., Art
Tomlan, Michael A., Ph.D, Cornell U. Asst. Prof., City and Regional Planning
Trancik, Roger T., M.L.A.-U.D., Harvard U. Prof., Landscape Architecture/City and Regional Planning
Ungers, O. Mathias, Diploma, Technical U. Karlsruhe (Germany). Prof. Emeritus, Architecture
Vietorisz, Thomas, Ph.D., Massachusetts Inst. of Technology. Adjunct Prof., City and Regional Planning
WalkingStick, Kay, M.F.A., Pratt Institute. Prof., Art
Warke, Val K., M.Arch., Harvard U. Assoc. Prof., Architecture
Warner, Mildred, Ph.D., Cornell U. Prof., City and Regional Planning
Wells, Jerry A., B.Arch., U. of Texas. Prof., Architecture
Woods, Mary N., Ph.D., Columbia U. Assoc. Prof., Architecture
Zissovici, John, M.Arch., Cornell U., Assoc. Prof., Architecture

DIVISION OF BIOLOGICAL SCIENCES

The biology major provides a unified curriculum for undergraduates 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

Many different departments participate in the biology major.

Student services are provided by the Office of Undergraduate Biology, which includes the Behrman Biology Center. Both are located in Stimson Hall, where academic advice, information on biological sciences course offerings, other important information, and counseling are available for undergraduates. The Office of Undergraduate Biology also follows the progress of biology majors and works closely with faculty advisers. Additional services and resources of the Biology Center include academic program planning, tutoring, lecture tapes, examination files, and information on undergraduate research opportunities. The center has comfortable areas for studying and relaxing.

The Shoals Marine Laboratory, a cooperative venture with the University of New Hampshire, is located on Appledore Island in the Gulf of Maine. Its base office in Stimson Hall provides advising and career counseling for students interested in the marine sciences and administers the SEA Semester program for Cornell students pursuing studies at Woods Hole or aboard the schooner *Westward* or brigantine *Corwith Cramer*.

FACULTY

E. Adkins-Regan, K. K. Adler, E. E. Alani, C. F. Aquadro, W. J. Arion, A. H. Bass, D. M. Bates, A. Bensadoun, K. W. Beyenbach, A. W. Blackler, S. E. Bloom, R. Booker, A. C. Borror, J. Bradfield, A. P. Bretscher, W. J. Brown, P. J. Bruns, J. M. Calvo, R. R. Capranica, B. F. Chabot, R. H. Chen, J. L. Cisne, J. P. Comstock, R. A. Corradino, W. L. Crepet, P. J. Davies, J. I. Davis, D. Deitcher, A. A. Dhondt, J. J. Doyle, T. Eisner, S. T. Emlen, P. P. Feeny, G. W. Feigenson, B. Finlay, J. W. Fitzpatrick, A. S. Flecker, R. H. Foote, J. E. Fortune, T. D. Fox, M. A. Geber, W. C. Ghiorse, J. Gibson, Q. H. Gibson, R. F. Gilmour, M. L. Goldberg, H. W. Greene, N. G. Hairston, Jr., B. P. Halpern, M. R. Hanson, R. G. Harrison, R. M. Harris-Warrick, C. D. Harvell, L. O. Hedin, J. D. Helmann, G. P. Hess, P. C. Hinkle, K. Hodge, S. Holmes, C. D. Hopkins, K. A. Houpt, T. R. Houpt, R. W. Howarth, S. H. Howell, H. C. Howland, R. R. Hoy, T. C. Huffaker, M. N. Kazarinoff, K. J. Kemphues, K. A. R. Kennedy, L. V. Kochian, A. S. Kondrashov, L. Kraus, R. L. Last, S. A. Levin, J. K. Liebherr, G. E. Likens, J. T. Lis, E. R. Loew, M. A. Luckow, D. McCobb, A. R. McCune, J. M. Fessenden MacDonald, R. J. MacIntyre, E. L. Madsen, P. L. Marks, H. S. Mason, G. D. May, J. G. Morin, R. P. Mortlock, J. B. Nasrallah, M. E. Nasrallah, P. W. Nathanielsz, L. Nicholson, K. J. Niklas, K. C. Nixon, T. G. Owens, D. J. Paolillo Jr., M. V. Parthasarathy, T. R. Podleski, A. G. Power, W. B. Provine, A. Quaroni, H. K. Reeve, M. E. Richmond, J. W. Roberts, D. Robertshaw, E. Rodriquez, R. B. Root, M. J. Rossman, J. B. Russell, M. M. Salpeter, T. D. Seeley, D. I. Shalloway, J. P. Shapleigh, P. W. Sherman, S. M. Snedeker, R. M. Spanswick, D. B. Stern, J. F. Thompson, R. Turgeon, B.-K. Tye, S. Vehrencamp, V. M. Vogt, C. Walcott, R. O. Wayne, W. W. Webb, N. F. Weeden, Q. D. Wheeler, K. E. Whitlock, D. B. Wilson, S. C. Winans, D. W. Winkler, M. F. Wolfner, J. F. Wootton, R. Wu, K. R. Zamudio, S. H. Zinder

Other Teaching Personnel

G. S. Albrecht, J. Barry, J. E. Blankenship, R. A. Calvo, P. W. Concannon, C. Eberhard, P. R. Ecklund, S. Ely, J. C. Glase, B. R. Johnson, B. Land, C. H. McFadden, S. Merkel, H. T. Nivison, C. M. Rehkugler, M. J. Shulman, T. Silva, C. M. Wahl-Loew

DISTRIBUTION REQUIREMENT

In the College of Agriculture and Life Sciences, the biological sciences distribution requirement (Group B) is for a minimum of 9 credits, including at least 6 credits of introductory biology satisfied by Biological Sciences 109–110, 105–106, or 101 and 103 plus 102 and 104, or 107–108 or any combination of the first term of one sequence and the second term of another. Advanced placement in biology with a score of 4 or 5 (6 or 8 credits, respectively) satisfies the requirement for introductory biology. The additional credits may be satisfied by any biological sciences courses *except BIOG 200* (unless permission is obtained), *BIOG 209, or BIOSM 367*.

For College of Arts and Sciences students matriculating before fall 1992, the biological sciences distribution requirement is for a two-semester introductory biology sequence selected from Biological Sciences 109–110, 105–106, or 101 and 103 plus 102 and 104, or 107–108 or any combination of the first term of one sequence and the second term of another. An Advanced Placement score of 4 or 5 fulfills one-half of 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 biology ("BIO") course (200+) *other than BIOG 200* (except by permission), *BIOG 209, or BIOSM 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 biolgy ("BIO") courses can be used toward fulfillment of the biological distribution requirement except *BIOG 200* (unless permission is obtained), *BIOG 209, or BIOSM 367*. The following courses are especially suitable for the distribution requirement because they have no prerequisites: BIO G 101–104, 105–106, 107–108, 109–110, 170, 202, 207; BIOBM 132; BIOES 154, 264, 275; BIOGD 184; BIOMI 192; BIOAP 212; BIOPL 240, 241. *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 BIO G 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: BIO G 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.

USE OF ANIMALS IN THE BIOLOGICAL SCIENCES CURRICULUM: CORNELL UNIVERSITY

Students wishing to enroll in biology ("BIO") courses should know and understand the following criteria relative to the use of animals in the teaching program, as passed by the faculty of the Division of Biological Sciences in 1988, and reaffirmed in 1997:

1. "Live animals will be used for teaching in certain courses in the biological sciences. Some animals will require humane euthanasia after they have been used for teaching.
2. Courses bearing the "BIO" description conform to the rules for the care of such animals as outlined in Guiding

Principles in the Care and Use of Animals (as approved by the Council of the American Physiological Society), the Guide for the Care and Use of Laboratory Animals. (DHEW publication 86–23, revised 1996; see p. 14, *Courses of Study*), the Animal Welfare Act, and the New York State Public Health Law. Within these regulations, and in keeping with the principle of Academic Freedom of the Faculty, the use of animals to aid in teaching any biological sciences discipline is at the discretion of the professor in charge.

3. Each course, as well as research projects, in which animals are used receives a formal review annually by the Cornell University Institutional Animal Care and Use Committee (IACUC).
4. Any concerns regarding the use of live animals in teaching should be addressed first to the faculty member responsible for that course. He or she is required to be in compliance with all applicable regulations and guidelines. Alternatively, students may choose to address their concerns to the director of the Cornell Center for Research Animal Resources, Dr. Fred Quimby, at 253–3520. The director may initiate discussion with the faculty member responsible for a particular course without involving the student if he or she would prefer to remain anonymous.
5. Enrollees in those courses in the biological sciences in which animal use is a component may, at the professor's discretion, be asked to sign copies of this statement (USE OF ANIMALS...) at the first meeting of the course."

ADVANCED PLACEMENT

For information on credit for advanced placement in Biological Sciences, please see the section on Advanced Placement in the front of this publication.

THE MAJOR

The major of biological sciences is available 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 Office of Undergraduate Biology, 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 Office of Undergraduate Biology, in 200 Stimson Hall. Students in the College of Agriculture and Life Sciences who were admitted directly to the major complete the application process to declare a program of study area and to assure satisfactory progress toward completion of the major. Acceptance into the major requires completion of the course sequences in introductory biology, chemistry, and mathematics (see requirements 1–3 below), plus one semester of organic chemistry lectures. In addition, a 2.75 Cornell cumulative grade-point average is required for final acceptance into the major except for those students admitted directly to the major as freshmen (College of Agriculture and Life Sciences students only) or as transfers. Students in the process of completing these prerequisites for admission to the major may be accepted on a *provisional* basis. Final acceptance into the major is required for graduation with a biological sciences major. It is the student's responsibility to assure that final acceptance has been granted.

Whenever possible, students should include the introductory biology, chemistry, and mathematics sequences in their freshman schedule and complete the organic chemistry lecture course in their sophomore year. Students are not encouraged to continue with the major in biological sciences unless performance in these four subjects gives evidence of capacity to perform satisfactorily at a more advanced level.

The requirements for the biological sciences major are listed below. These courses, 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): BIO G 101 and 103 plus 102 and 104, or 105–106. BIO G 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 BIO G 101–102, 101 and 103, 102 and 104, or 103–104. These students should consult information available in the course office (1140 Comstock Hall) and in the Biology Center (216 Stimson Hall) to determine which semester to complete the introductory biology requirement. For students in doubt, completion of BIO G 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 206–208, or 215–216.*
3) **College mathematics** (one year): one semester of calculus (Mathematics 106, 111, 191 or their equivalent) plus one semester selected from the following:
   a. a second semester of calculus (Mathematics 112, 192, or their equivalents.
   b. a course in finite mathematics (Biometry 101, 417, Mathematics 105, 231).
   c. a course in statistics (Biometry 261, Mathematics 171, Agriculture and Resource Management 210, Psychology 350, Industrial and Labor Relations 210 and 211).

Students interested in quantitative aspects of biology (e.g., computational, physical, population biology) are advised to satisfy the mathematics requirement with two semesters of calculus.

4) **Organic chemistry**: Chemistry 257 and 251, 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:** BIOGD 281.
7) **Biochemistry:** BIOBM 330, or 331 and 332, or 333.
8) **Evolutionary Biology:** BIOES 278 or BIOPL 448.
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 for the biology major 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.

Note: Core courses cannot count twoards the Program of Study Requirements.

Programs of Study and Requirements

As noted in the list of requirements above, students accepted into the biological sciences major must choose a program of study. The program of study requirements are designed to help students achieve depth in one area of biology while ensuring that the selected advanced courses form a coherent and meaningful unit. Because of the flexibility allowed in satisfying these requirements, students should consult their faculty advisers. The possible programs of study are listed below.

1) *Animal Physiology:* BIOAP 311, Introductory Animal Physiology, Lectures; BIOAP 313, Histology: The Biology of the Tissues; BIOAP 316, Cellular Physiology; and BIOAP 319, Animal Physiology Experimentation. The Program of Study in Animal Physiology emphasizes whole-animal, tissue, and cell physiology, and provides considerable opportunity for studies using live animals. It is intended especially for students contemplating careers in biomedical

practice or research. Advanced courses, though not required, include BIOAP 419, Advanced Animal Physiology Experimentation, which permits selected students to conduct supervised research projects of their choice, and BIOAP 458, Mammalian Physiology, which provides in-depth coverage of selected topics in mammalian and human physiology.

2) *Biochemistry:* Chemistry 300, Quantitative Chemistry; six credits of organic chemistry (Chemistry 357–358 or 359–360); a minimum of four credits of organic chemistry laboratory (Chemistry 301–302 or 251–252–302 or 301 or 251–252); four credits of biochemistry laboratory courses (BIOBM 430); and Physical Chemistry (Chemistry 389–390 or 287–288 or 287–390 or 389–288). Note that Chemistry 288 is designed for biologists. Five hours of Biochemistry are recommended (331 and 332 or 330 and 334) and students interested in graduate work in biochemistry should take Physics 207–208 and a third semester of calculus in preparation for CHEM 389–390. Be sure to complete CHEM 207–208 or 215–216 during the freshman year.

3) *Molecular and Cell Biology*. Chemistry 357–358 or 359–360; BIOBM 432, Survey of Cell Biology; 4 credits of BIOBM 430, Laboratories in Biochemistry, Molecular and Cell Biology, and at least 7 additional credits of courses that have a cell biological or molecular biological orientation. The 7 additional hours should include at least two courses from the following list (underlined courses are recommended as providing breadth in molecular and cell biology): BIOAP 619, Lipids; BIOAP 658, Molecular Mechanisms of Hormone Action; BIOBM 434, Applications of Molecular Biology; BIOBM 437, Eukaryotic Cell Proliferation; BIOBM 631, Protein Structure and Function; BIOBM 632, Membranes and Bioenergetics; BIOBM 633, Biosynthesis of Macromolecules; BIOBM 635, Mechanisms of Metabolic Regulation and Mammalian Gene Expression; BIOBM 636, Cell Biology; BIOBM 639, The Nucleus; BIO G 305, Immunology; BIOBM 407, Nature of Sensing and Response: Signal Transduction in Biological Systems; BIOGD 385, Developmental Biology; BIOGD 483, Molecular Aspects of Development; BIOGD 484, Molecular Evolution; BIOGD 486, Advanced Eukaryotic Genetics; BIOGD 682, Fertilization and the Early Embryo; BIOPL 343, Molecular Biology and Genetic Engineering of Plants; BIOPL 347, Laboratory in Molecular Biology and Genetic Engineering of Plants; BIOPL 444, Plant Cell Biology; BIOPL 641, Laboratory in Plant Molecular Biology; BIOPL 652, Plant Molecular Biology II; BIOMI 290, General Microbiology, Lectures; BIOMI 408, Viruses and Disease; BIOMI 485, Bacterial Genetics; BIOMI 692, Protein-Nucleic Acid Interactions; BIONB 222, Neurobiology and Behavior II: Introduction to Neurobiology; BIONB 325, Neurodiseases-Molecular Aspects; BIONB 425, Natural History of Ion Channels; BIONB 495, Molecular and Genetic Approaches to Neurosciences. Five hours of biochemistry are recommended (BIOBM 331 and 332 or 330 and 334). Be sure to complete CHEM 207–208 or 215–216 during the freshman year.

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) BIOPL 241, Introductory Botany; BIOES 274, The Vertebrates: Structure, Function, and Evolution; 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; ENTOM 212, Insect Biology.

   (b) BIOES 263, Field Ecology; BIOPL 448, Plant Evolution and the Fossil Record; BIOES 452, Herbivores and Plants: Chemical Ecology and Coevolution; BIOES 455, Insect Ecology; BIOES 456, Stream Ecology; BIOES 457 and 459, Limnology: Ecology of Lakes, Lectures and Laboratory; BIOES 461, Population and Evolutionary Ecology; BIOES 462, Marine Ecological Processes; BIOES 463 and 465, Plant Ecology and Population Biology, Lectures and Laboratory; BIOES 464, Macroevolution; BIOES 473, Ecology of Agricultural Systems; BIOES 478, Ecosystem Biology; BIOES 479, Paleobiology; BIOGD 481, Population Genetics.

Note: One 400-level, 4-credit course (including 4 credits from BIOSM 364) offered at Shoals Marine Laboratory may be applied toward the 10 credits. Students are encouraged to gain experience in some aspect of field biology through course work at a biological field station or work experience.

Note: The Ecology and Evolutionary Biology program of study offers an undergraduate specialization in Marine Biology and Oceanography. A description of this specialization can be found in the section entitled COURSES IN MARINE SCIENCE.

Note: The Organization for Tropical Studies (OTS) offers an Undergraduate Semester Abroad Program, featuring two courses in biology (Fundamentals of Tropical Biology and Field Research in Tropical Biology) and one course each in Environmental Policy and Latin American Culture. Cornell biology majors, with a concentration in Ecology and Evolutionary Biology, who complete the OTS Program as part of Cornell Abroad, can substitute the credit earned from the biology courses for two 3-credit courses at the 300 level from list (b). The OTS Program is administered through Duke University. Applications are available at Cornell Abroad, 474 Uris Hall.

5) *General Biology:* The Program of Study in General Biology requires a minimum of 13 credit hours from courses offered by the Division of Biological Sciences in addition to courses counted toward requirements 1–10 above. These 13 credits must include

   1) One course from each of the three different programs of study from among the nine other programs of study. Only those courses specifically listed as fulfilling a program of study requirement are acceptable without permission of instructor.

   2) a course with a laboratory, and

   3) a minimum of two upper-level (300 and above) courses of two or more credits each.

100-level courses are not acceptable for meeting any of these requirements. BIOPL 341 may not count as the lab course; BIO G 498 may not be used to fulfill the requirements of this program of study. 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, but it cannot count as a course representing a program of study.

Note: It is possible to use a single course to fulfill more than one requirement. For example, BIOES 472, Herpetology, could count in all three areas: as a course in the Ecology & Evolutionary Biology program of study, as an upper level course, and as a course with a lab.

6) *Genetics and Development:* A minimum of 13 credits, usually chosen from the following courses: BIOGD 385, Developmental Biology; BIOGD 387, Developmental Aspects of Evolution; BIOGD 389, Embryology; BIOGD 480, Seminar in Developmental Biology; BIOGD 481, Population Genetics; BIOGD 482, Human Genetics and Society; BIOGD 483, Molecular Aspects of Development; BIOGD 484, Molecular Evolution; BIOGD 486, Advanced Eukaryotic Genetics; BIOMI 485, Bacterial Genetics, BIONB 493, Developmental Neurobiology; BIOPL 343, Molecular Biology and Genetic Engineering of Plants.

   Students may also choose from the following courses to complete the 13-credit requirement: BIOGD 682, Fertilization and Early Development; BIOGD 684, Advanced Topics in Population Genetics; BIOGD 687, Developmental Genetics; BIOBM 633, Biosynthesis of Macromolecules; BIOBM 639, The Nucleus; BIOES 663, Theoretical Population Genetics; BIOMI 694, Genetics of Diverse Bacteria; BIOPL 641, Laboratory in Plant Molecular Biology; BIOPL 644, Plant Growth and Development; BIOPL 652, Plant Molecular Biology II; BIOPL 653, Plant Molecular Biology I; PL BR 606, Advanced Plant Genetics.

   Up to 3 credits for this program of study may be chosen from other biological sciences courses, including BIO G 499, Undergraduate Research in Biology, with approval of the faculty adviser.

7) *Microbiology:* BIOMI 290, General Microbiology, Lectures; BIOMI 291, General Microbiology, Laboratory; BIOMI 300, Seminar in Microbiology;

and at least three courses chosen from the following: BIOMI 391, Advanced Microbiology Laboratory; BIOMI 415, Bacterial Diversity; BIOMI 416, Bacterial Physiology; and BIOMI 485, Bacterial Genetics.

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. These additional credits must include a course from the neurobiology and behavior offerings (this course can NOT be BIONB 420, 720 or BIOG 499). However, BIONB 420, 720 and BIO G 499 MAY be used to supplement this neurobiology and behavior course to fulfill the 7 additional credits. Please consult with your advisor for courses that may be applied towards the 7 additional credits that are not listed in the Biological Sciences course offerings. BIO G 498 may not be used to fulfill the requirements of this program of study.

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 247, Ethnobiology; BIOPL 248, Taxonomy of Vascular Plants; BIOPL 342 and 344, Plant Physiology, Lectures and Laboratory; BIOPL 343 and 347, Molecular Biology and Genetic Engineering of Plants, Lectures and Laboratory; BIOPL 345, Plant Anatomy; BIOPL 444, Plant Cell Biology; BIOPL 445, Photosynthesis; BIOPL 447, Molecular Systematics; BIOPL 448, Plant Evolution and the Fossil Record; BIOES 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 444, Plant Cell Biology; BIOPL 648, Plant Biochemistry; PL BR 401, Plant Cell and Tissue Culture; or PL BR 402, Plant Tissue Culture Laboratory.

10) *Systematics and Biotic Diversity:* A minimum of 13 credits from the following two groups, including at least 7 credits from group A, and 3 from group B; and at least two laboratory courses (marked with *). BIOG 499, Undergraduate Research in Biology, with approval of the advisor, can be used in fulfillment of up to four credits in Group A, and can count as one laboratory course if it has a laboratory component of 2 or more credits.

(a) *BIOES 274, The Vertebrates: Structure, Function, and Evolution; *BIOES 371, Human Paleontology; *BIOES 373, The Invertebrates: Form, Function, and Evolution; *BIOES 471, Mammalogy; *BIOES 472, Herpetology; *BIOES 475, Ornithology; *BIOES 476, Biology of Fishes; BIOMI 290, General Microbiology, Lectures; *BIOMI 291, General Microbiology, Laboratory; BIOMI 415, Bacterial Diversity, Lectures; *BIOPL 241, Introductory Botany; *BIOPL 243, Taxonomy of Cultivated Plants; BIOPL 247, Ethnobiology; *BIOPL 248, Taxonomy of Vascular Plants; BIOPL 343, The Healing Forest; BIOPL 645, Families of Tropical Flowering Plants—Lecture; *BIOPL 646, Families of Tropical Flowering Plants—Lab; *ENTOM 212, Insect Biology; ENTOM 215, Spider Biology: Life on a Silken Thread; *ENTOM 322, Insect Morphology; *ENTOM 331, Introductory Insect Systematics; *ENTOM 471, Freshwater Invertebrate Biology; *ENTOM 631, Systematics of the Coleoptera; PL PA 309, Introductory Mycology; *PL PA 319, Field Mycology.

(b) BIOES 464, Macroevolution; BIOES 479, Paleobiology; *BIOPL 440, Phylogenetic Systematics; BIOPL 447, Molecular Systematics; *BIOPL 448, Plant Evolution and the Fossil Record; *BIOPL 453, Historical Biogeography; BIOPL 442, Current Topics in Ethnobiology.

11) *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 of Undergraduate Biology (200 Stimson Hall) for further information. In addition, students who want to undertake a course of study not covered by the nine existing programs of study or the special program may petition the Biological Sciences Curriculum Committee. Information on independent options and Curriculum Committee petition forms are available in the Office of Undergraduate Biology, 200 Stimson Hall.

Independent Research and Honors Program

Individual research projects under the direction of a faculty member are encouraged as an aspect of study within a program of study. Applicants for research projects are accepted by the individual faculty members, who take into account students' previous academic accomplishments, interests and goals, and the availability of space and equipment suitable for the proposed project. Students accepted for independent research enroll for credit in Biological Sciences 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 Biological Sciences may act as a supervisor. Faculty supervisors outside Biological Sciences are acceptable only if a faculty member of Biological Sciences agrees to take full responsibility for the quality of the work. Students may not earn credit for research conducted outside of Cornell. Information on faculty research activities and undergraduate research opportunities is available in the Behrman Biology Center, 216 Stimson Hall.

Research credits may not be used in completion of the following program of study areas: animal physiology; biochemistry; cell biology; ecology and evolutionary biology; microbiology; plant biology. Up to 3 credits of research may be used to complete the program of studies in general biology, genetics and development, systematics and biotic diversity, as well as 4 credits of research 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 of Undergraduate Biology, 200 Stimson Hall, and must be submitted early in the senior year to the Honors Program Committee by the announced deadline. Application forms for the honors program are separate from the enrollment forms for 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 all biology, chemistry, mathematics, and physics courses. (Grades earned in courses in other departments that are used to fulfill major requirements are included in this computation.) In addition, candidates must have a Cornell faculty member in Biological Sciences to supervise their research. Students who select supervisors outside of Biological Sciences must arrange for a cosigner within Biological Sciences. The cosigner must agree to meet with the student on a regular basis, report to the Honors Program Committee on the progress of the work approximately two months before the thesis is due, and to serve as a reviewer of the thesis. An honors candidate usually enrolls for credit in BIO G 499, Undergraduate Research in Biology under the direction of the faculty member acting as honors supervisor, although it is not necessary. Students choosing to earn credit for honors research must enroll in BIO G 499, Undergraduate Research in Biology, separately from the honors program. Requirements of the honors program include participation in honors research seminars during two semesters, submission of an acceptable honors thesis, completion of all major requirements, and maintenance of the 3.00 Cornell cumulative grade-point average through graduation. Recommendation to the faculty that a

candidate graduate with honors and at what level of honors is the responsibility of the Honors Program Committee. The student's final grade point average is a factor in determining the level of honors recommended.

Students interested in the honors program should consult their faculty advisers early during their junior year. Students are strongly encouraged to begin their research projects in their junior year, although they are not formally admitted to the honors program until the beginning of their senior year. Students who are considering study abroad during their junior year should consult with a member of the Honors Committee during their sophomore year to plan a reasonable schedule for honors research. The Honors Program requires that student participants attend honors seminars in which they give oral presentations during the first and second semesters of their senior year. Therefore, students who are considering studying away from campus during their senior year should consult with a member of the Honors Committee no later than the beginning of the first semester of their junior year. Details pertaining to thesis due dates, seminars, and other requirements may be obtained from the Office of Undergraduate Biology, 200 Stimson Hall. Information on faculty research activities is available in the Behrman Biology Center, 216 Stimson Hall. Deviation from any of the requirements of the Honors Program requires a petition in the form of a letter to the Honors Program Committee, c/o Registrar, Office of Undergraduate Biology, 200 Stimson Hall.

CURRICULUM COMMITTEE

Many decisions pertaining to the curriculum, to division-wide requirements, and to the programs of study are made by the Biological Sciences Curriculum Committee. The committee consists of faculty and elected student members and welcomes advice and suggestions from all interested persons.

ADVISING

Students in need of academic advice are encouraged to consult their advisers, come to the Behrman Biology Center (216 Stimson Hall) or the Office of Undergraduate Biology, 200 Stimson Hall.

Students interested in marine biology should visit the Cornell Marine Programs Office, G14 Stimson Hall.

Students interested in the multidisciplinary program of Biology and Society should see "Special Programs and Interdisciplinary Studies," in the College of Arts and Sciences section of this catalog.

INDEX OF COURSES

The 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 ("BIO") courses count as agriculture and life sciences credits for students in the College of Agriculture and Life Sciences and as arts and sciences credits for students in the College of Arts and Sciences.

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GENERAL COURSES (BIO G)

Biological Sciences teaches three introductory biology course sequences during the academic year: BIO G 101–104, BIO G 105–106, and BIO G 109–110; and one during the eight-week summer session: BIO G 107–108, BIO G 101–104, 105–106, and 107–108 are intended for biological sciences majors and other students needing 8 credits from an introductory sequence for majors (for example, students in a premedical curriculum). Any of these sequences meet the prerequisite for upper-level courses listing "one year of introductory biology for majors" as a prerequisite. BIO G 109–110 is a course sequence intended for non-majors, and meet the prerequisite for many, but not all, upper-level courses listing "one year of introductory biology" as a prerequisite. Students can earn a maximum of 8 credits in introductory biology (including advanced placement credits).

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 prelims: fall, Sept. 23 and Nov. 9; spring, Feb. 24 and Apr. 6. C. D. Hopkins.

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, physiology, neurobiology, and behavior. The spring semester covers genetics, development, evolution, and ecology. Each topic is considered in the light of modern evolutionary theory and discussions of plant and animal systems are integrated. For those students who object to animal dissection, alternative materials are available for study. However, testing will involve identification of important structures in real organisms.

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 weekly lec for discs, 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 expertise in the methods used by biologists to construct new knowledge. Students are exposed to basic concepts, research methods, including laboratory and data transformation techniques, and instrumentation in the major areas of biology. First-semester topics include biochemistry, physiology, plant biology, and behavior. In the second semester, laboratory experience is provided in the areas of genetics, biotechnology, immunology, invertebrate diversity, population plant growth and development, and ecology. During the first semester, dissection of a doubly-pithed frog is included. Pithing is done by the instructor. Dissection of several invertebrates occurs during the second semester. For those students who object to animal dissection, alternative materials are available for study. However, testing will involve identification of important structures in real organisms.

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, $11. S-U grades optional, with permission of instructor. Lec, T 9:05 (1st lec of fall term, R 8/26 9:05); additional study and lab hours to be arranged. C. H. McFadden and staff.

Designed primarily for biology majors, preprofessionals, and other students who desire a challenging, broad introduction to fundamental concepts of biology. Cell biology, physiology, anatomy (accompanied by preserved vertebrate dissection), and biochemistry are strongly emphasized in the fall semester. Subjects in the spring semester are genetics, development, ecology, evolution, behavior, and the diversity of organisms (accompanied by preserved and live invertebrate dissection). Students who plan to concentrate in anatomy and physiology should consider taking this course because of the strong emphasis on organismal biology. Because some testing involves the use of pre-dissected specimens, students who object to dissections should take BIO G 101–104. The course uses an autotutorial format and offers considerable flexibility in scheduling. Completion of the course requires mastery of a group of core units. Testing on these units is primarily by oral examination. Students who elect to take the course must be able to meet deadlines. Four formal laboratory sessions are offered each semester; additional laboratory work is included in the core units. Evaluation is based on written reports on experimental work, practical exams, and a comprehensive final exam.

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 organ system 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, developmental biology, population

biology, 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. For those students who object to animal dissection, alternative materials are available for study. However, testing will involve identification of important structures in real organisms.

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 2–4:25 or T 10:10–12:35. Students do not choose lab sections during course enrollment; lab assignments are made during first day of classes. Each student must attend lab on alternate weeks. Evening prelims: fall, Sept. 23 and Nov. 9; spring, Feb. 24 and Apr. 4. A. Blackler, R. Turgeon, H. Greene, C. Eberhard, and staff.

Students who do not plan to major in biology may take this broad introductory course in modern biology. The content is designed to appeal to anyone who seeks a comprehensive knowledge of biology as part of a general education. Laboratory sections enable small groups of students to meet with the course staff and are used for problem-solving experiments, demonstrations, and discussions. No live dissections are involved; there are dissections of vertebrate, invertebrate and plant material. For those students who object to dissection, alternative materials are available for study and there is no grade penalty for omitting or observation of animals. Testing, for students choosing to be tested, will involve identification of important structures in real organisms.

BIO G 170 Evolution of the Earth and Life (also GEOL 102)

Spring. 3 credits. S-U grades optional. Lecs, T R 9:05 or 11:15; lab, T W or R 2:00–4:25; field trips during lab. J. L. Cisne.

Earth systems and their evolution. Earth history's astronomical context. Plate tectonics, continental drift, and their implications for climate and life. Coevolution of life and the atmosphere. Precedents for ongoing global change. Dinosaurs; mass extinctions; human ancestry. Laboratories on reconstructing geological history and mapping ancient geography. Fossil-collecting on field trips.

BIO G 200 Special Studies in Biology

Fall, spring, or summer. 1–3 credits. Prerequisites: transfer- or special-student status and written permission from the Office of Undergraduate Biology. Students must register in 200 Stimson Hall. S-U grades optional, with permission of instructor. Hours to be arranged. Staff.

A registration device for students who want to take only a portion of a regular biological sciences course—for example, only the lectures or only the laboratory in a course that includes both. Only students who have already had training equivalent to the portion of the regular course that is to be omitted may register in this manner. This course may not be substituted for 100-level courses and may not be used in fulfillment of college distribution requirements except by permission from the Office of Undergraduate Biology

[BIO G 202 The Diversity of Life

Fall. 3 credits. S-U grades optional. Lecs, M W F 2:30. Not offered 1999–2000. J. I. Davis, J. J. Doyle, E. Rodriguez.

The main focus of this course is on the diversity of living and extinct species. This diversity is examined from an evolutionary perspective, with attention to the principles employed in the discovery of species and in the analysis of relationships among them. Interactions between humans and other species are examined during the latter portion of the semester.]

BIO G 207 Evolution (also HIST 287 and S&TS 287)

Fall or summer. 3 credits. Intended for students with no background in college biology. May not be taken for credit after BIOES 278. Does not meet the evolutionary biology requirement for the biological sciences major. S-U grades optional. Fall: Lecs, T R 10:10; disc, 1 hour each week to be arranged. W. B. Provine. Summer (3-week session) (also S&TS 287). Lecs/disc, M-F 9:30–10:45 and 1:00–2:15. A. S. Kondrashov.

Evolution is the central concept in biology. This course examines evolution in historical and cultural contexts. This course aims to understand the major issues in the history and current status of evolutionary biology, and explore the implications of evolution for culture. Issues range from controversies over mechanisms of evolution in natural populations to the conflict between creationists and evolutionists.

BIO G 209 Introduction to Natural Science Illustration

Summer (6-week session). 2 credits. Limited to 12 students. Prerequisite: freehand drawing or permission of instructor. S-U grades optional. Lecs and labs, T R 6:30–9:30 p.m. B. S. King.

An introduction to the art of natural science illustration for publication, and to the techniques of various media including pencil, pen and ink, watercolor, colored pencil, scratchboard, and carbon dust. Potentials and limitations of line and half-tone reproduction, copyright, and portfolio presentation are discussed.

BIO G 305 Basic Immunology Lectures (also VETMI 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. J. A. Marsh.

A survey of immunology, with emphasis on the biological functions of the immune response.

BIO G 320 Principles of Toxicology (also VETMI 320)

Spring. 3 credits. Prerequisites: 1 year each of introductory biology and chemistry, with lab; 1 semester of organic chemistry lecture or waiver by instructor. Lec T R 1:25–2:40. S. Penningroth, R. Dietert, and S. Bloom.

An introduction to the interdisciplinary science of toxicology is presented, including selected material from biology, chemistry, ecology and pharmacology. Basic principles are illustrated by examining several "toxicological contexts," for example, DDT toxicity to wildlife reproduction. Risk management is introduced as a new discipline in which regulatory agencies integrate science-based quantitative risk assessment with economic and social considerations to implement politically acceptable cleanups at hazardous chemical waste sites. Students form teams and present toxicological analyses of hypothetical "risk scenarios," recommending acceptable risk management strategies in response to environmental contamination. Occasional research talks by toxicology faculty introduce students to basic research in this interdisciplinary branch of Biological Science.

This is an introductory level course in toxicology. The format is lecture, supplemented by case examples. It is appropriate for non-majors seeking basic literacy in environmental and human toxicology. It also serves as a "gateway course" for students interested in 400- and 600-level toxicology courses.

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. Sem to be arranged. Staff.

From time to time specialized seminars on topics of interest to undergraduates are offered by visiting faculty or faculty from the Sections of Ecology and Systematics, Genetics and Development, or Plant Biology. Topics and instructors are listed in the division's catalog supplement issued at the beginning of the semester. For students interested in Biochemistry, Physiology, or Neurobiology, please see descriptions under appropriate section.

Section 02 Development and Evolution (also BIOGD 480, BIOES 760–02, and BIOGD 780)

Fall*. 2 credits. Prerequisites: BIOGD 281 and BIOES 278. S-U grades only. Lecs and Discs T 12:20–2:25 p.m. Students will also be required to attend five seminars on M 4:00–5:30 p.m. M. Wolfner, A. McCune.

Five leading international experts will describe recent advances in data and theory at the intersection of developmental biology and evolutionary biology. Topic coverage will center around pattern formation and the origin of metazoan body plans. During the Tuesday class meeting prior to each expert's visit,

students and course faculty will present and discuss recent papers by the upcoming speaker. The following week, students will be required to attend the speaker's seminar on Monday at 4:00 p.m. and then meet with the speaker during class on the following day for continued discussion of the topic.

*Fall 1999 is the only time that this special course will be offered, at least in this seminar-coupled format. Graduate students should register for BIOES 760 or BIOGD 780; undergraduates should register for BIO G 400 or BIOGD 480.

BIO G 401 Introduction to Scanning Electron Microscopy
Fall or spring, weeks 1–8. 1 credit. Limited to 8 students (fall), 12 students (spring). S-U grades optional. Lec, M 10:10; lab, T R or F 9:05–12:15 or T W or R 1:25–4:25. Fee may be charged. M. V. Parthasarathy.
An introductory course that includes the principle and use of the scanning electron microscope. Students use biological material to explore and understand some of the fine biological architecture. In addition to preparing the specimens, the students use the scanning electron microscope to study and obtain micrographs of features that interest them.

BIO 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, BIOPL 345 or 443. S-U grades optional. Lec, T 11:15; labs, M W or T R 1:25–4:25. Two sections: Sec 01, 1 credit, weeks 1–4; sec 02, 3 credits, weeks 5–12. Students may register for one or both sections. Fee may be charged. M. V. Parthasarathy.
Section 01, 1 credit, weeks 1–4, covers the principles and use of the transmission electron microscopy (TEM), with emphasis on proper operation of the instrument and interpretation of images obtained. Negatively stained materials are used for viewing with the transmission electron microscope. Section 02, 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 fixtures, cryofixations, 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 405 Biology of the Neotropics
Fall. 2 credits. Prerequisite: introductory biology (majors, non-majors, or equivalent), or permission of instructor. S-U grades optional. Sem, W 7:30–9:30 p.m. P. H. Wrege, A. S. Flecker.
This seminar is an introductory survey of the biology of the New World tropics, with primary focus on moist lowland forests. The objectives are to learn the basic characteristics and phenomena important to understanding neotropical biology, to gain firsthand knowledge of the resources in tropical biology available at Cornell, and to learn how to organize and execute a meaningful seminar presentation.

BIO G 408 Presentation Skills Biologists
Spring. 1 credit. Prerequisites: previous research experience. Preference given to students accepted into the Honors Program. L. Southard and G. Hess.
This course will cover oral and written communication skills used in presenting research to other scientists. Topics covered will include organization of scientific papers, presentation tips for research seminars, and preparation of visual aids using Power Point. All students will present a 10-minute seminar on their research and will evaluate other presentations.

BIO G 410 Teaching Contemporary Biology
Fall. 3 credits. Prerequisite: one year introductory biology; permission of instructor. L. Southard and S. Merkel.
This course provides students with the opportunity to experience teaching high school science. Students will concentrate on a topic of current public interest, then develop teaching plans appropriate for high school students. The first part of the course consists of lectures, discussion, and laboratory experiments, which will familiarize the students with the scientific content of the course. Students will then work in teams with high school teachers to develop their presentations. The final part of the course will include practice presentations and teaching at regional high schools.

BIO G 431 Frontiers in Biophysics
Fall. 1/2 credit. S-U grades only. Lec to be arranged. G. Feigenson and staff.
A day of lectures on Saturday 9/25 giving an overview of current research in biophysics at Cornell by faculty from different departments across the university. Designed for undergraduates who are considering a career in biophysics and for graduate students who are interested in biophysics research opportunities at Cornell.

BIO G 450 Light and Video Microscopy for Biologists
Spring. 3 credits. Limited to 12 students. Prerequisites: one year 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 both qualitative and quantitative techniques to probe noninvasively the structure and function of living plant cells.

BIO G 467 Seminar in the History of Biology (also HIST 415, B&SOC 447, and S&TS 447)
Summer (6-week session). 4 credits. Limited to 18 students. S-U grades optional. W. B. Provine.
Specific topic changes each year.

[BIO G 469 Food, Agriculture, and Society (also B&SOC 469 and S&TS 469)
Spring. 3 credits. Limited to 20 students. Prerequisite: an introductory ecology course or permission of instructor. S-U grades optional. Lecs, T R 1:25–2:40. Not offered 1999–2000. 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 498 Teaching Experience
Fall or spring. 1–4 credits. Enrollment limited. Prerequisites: previous enrollment in the course to be taught or equivalent. *Arts students may not count this course toward graduation. They may, however, upon petition to their class dean, carry fewer than 12 other credits and remain in good standing. This would affect Dean's List eligibility, but not eligibility for graduating with distinction.* S-U grades optional, with permission of instructor. Hours to be arranged. Staff.
Designed to give qualified undergraduate students teaching experience through actual involvement in planning and assisting in biology courses. This experience may include supervised participation in a discussion group, assisting in a biology laboratory, assisting in field biology, or tutoring. Biological sciences courses currently offering such experience include BIO G 105–106; BIOAP 311, 313, 319; BIOBM 330, 331; BIOES 274, 475; and BIOMI 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 or 8 credits per term with more than one supervisor.* Prerequisite: written permission of staff member who supervises the work and assigns the grade. *Students must register in the Office of Undergraduate Biology in 200 Stimson Hall.* Each student must submit an independent study statement describing the proposed research project during course registration. (Applications are available in the college offices and in 200 Stimson Hall.) Any faculty member in Biological Sciences may act as a supervisor. Cornell faculty supervisors outside Biological Sciences are acceptable only if a faculty member of Biological Sciences agrees to serve as cosigner, taking full responsibility for the quality of the work. Supervisors outside of Cornell are not acceptable. 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 for completion of the following programs of study: animal physiology; biochemistry; cell biology; ecology and evolutionary biology; microbiology; plant biology. Up to 3 credits of research may be used to complete the Program of Studies in general biology and genetics and development, and 4 credits of research in neurobiology and behavior.

BIO G 705 Advanced Immunology Lectures (also VETMI 705)
Spring. 4 credits. Prerequisite: BIO G 305 or permission of instructor. Offered alternate years. Next offered spring 2002. 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 VETMI 719)
Spring. 2 credits. Prerequisite: BIO G 305 or permission of instructor. S-U grades optional, with permission of instructor. Lec, R 10:10–12:05. Offered alternate years. Next offered spring 2001. Coordinator: R. G. Bell.
Coverage at an advanced level of the immunology of diseases caused by selected viruses, protozoa, and helminthis, and tumor immunology.]

Related Courses in Other Departments

The Sea: An Introduction to Oceanography (Biological Sciences [BIOES] 154)

Medicine and Civilization (Biology and Society 322)

Pathogenic Bacteriology and Mycology (Biological Sciences [BIOMI] 404 and Veterinary Microbiology 318)

Viruses and Disease (Biological Sciences [BIOMI] 408 and Veterinary Microbiology 408)

ANIMAL PHYSIOLOGY (BIOAP)

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 prelims: March 2 and Apr. 13. P. W. Concannon and staff.
Introduction to the physiology of all major organ systems and the relation of that physiology to human health and disease. Emphasis on understanding of major body functions and control mechanisms regulating each organ system. Students develop a fundamental understanding of how their bodies work that will be the basis of making informed decisions about their own health and medical needs and those of their families. Taught by staff of research physiologists and cooperating physicians.

[BIOAP 214 Biological Basis of Sex Differences (also B&SOC 214 and WOMNS 214)
Fall. 3 credits. Limited to non-biology majors and freshman, sophomore, and junior biology majors; senior biology majors may register with permission of instructor. Prerequisite: one year of introductory biology. S-U grades optional. Lecs, T R 8:30–9:55. Offered alternate years. Not offered fall 1999. 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 VETPH 346)
Fall. 3 credits. Prerequisites: one year of college biology, chemistry, and mathematics. Recommended: previous or concurrent course in physics. S-U grades optional, with permission of instructor. Lecs, M W F 11:15. Evening prelims: Sept. 28 and Oct. 28. E. R. Loew and staff.
A general course in animal physiology emphasizing principles of operation, regulation, and integration common to a broad range of living systems from the cellular to the organismal level. Structure/function relationships are stressed along with underlying physico-chemical mechanisms.

BIOAP 312 Farm Animal Behavior (also ANSC 305)
Spring. 2 credits. Prerequisites: 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 communication, learning, social interactions, reproduction, and feeding of domestic animals, and their physiological basis. Management systems for commercial livestock production 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 previous or concurrent enrollment in BIOAP 311. S-U grades optional, with permission of instructor. Lecs, T R 1:25; labs, T R 2:30–5:00. Evening prelims: Oct. 1 and Nov. 5. C. Wahl.
Provides students with a basis for understanding the microscopic, fine-structural, and functional organization of vertebrates, as well as methods of analytic morphology at the cell and tissue levels. Dynamic interrelations of structure, composition, and function in cells and tissues are emphasized. The course may include work with vertebrate animals.

BIOAP 316 Cellular Physiology
Spring. 4 credits. Limited to 72 students, with preference given to students studying in animal physiology. Each lab limited to 36 students. Prerequisite: concurrent or previous enrollment in BIOBM 330 or 331 and 332 or 333. Lecs, M W F 9:05; lab, M or T 1:25–5:00. Evening prelims: Feb. 29, Apr. 6, and May 2. 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 in physiology, and other students interested in biomedically related professions. Graduate students in the Field of Physiology and related fields without equivalent background are strongly encouraged to enroll. Each of 2 afternoon laboratory sections is limited to 40 students. Prerequisite: concurrent or previous enrollment in BIOAP 311 or permission of instructor. Lec, R 12:20; lab, M or W 12:20–5:00 (includes disc section). R. A. Corradino.
A series of student-conducted *in vitro* and *in vivo* experiments designed to illustrate basic physiological processes in animals, with emphasis on relevance to humans, and to introduce students to physiology research techniques, instrumentation, experimental design, and interpretation of results. Techniques include anesthesia, surgical procedures, vivisection under anesthesia, and real-time computer recording and analysis of data. 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, frogs, rats, and rabbits, which are euthanized after the laboratory exercises. Written reports of laboratory activities are required. Grading is based on evaluation of these reports, take-home case studies, laboratory performance, and weekly quizzes.

BIOAP 419 Advanced Animal Physiology Experimentation
Spring. 3 credits. Prerequisite: BIOAP 319 previous semester or permission of instructor. Limited to 12 students selected on the basis of project proposals. Lab to be arranged. Coordinator and adviser: R. A. Corradino.
Advanced research on selected aspects of laboratories conducted in BIOAP 319, Animal Physiology Experimentation. Close supervision is provided.

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 T8 014 Vet Research Tower before the first class. Lecs, M W F 10:10. Evening prelims: Feb. 22, Mar. 28, and Apr. 18. 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 lecturers talk about work and careers in basic research and/or clinical medicine. Recommended for biological sciences majors, pre-med and pre-vet students, and beginning graduate students in physiology, nutrition, and animal science.

BIOAP 619 Lipids (also NS 602)
Fall. 2 credits. Lecs, T R 11:15. A. Bensadoun.
Advanced course on biochemical, metabolic, and nutritional aspects of lipids. Emphasis is placed on critical analysis of current topics in lipid methodology; lipid absorption; lipoprotein secretion, molecular structure, and catabolism; molecular biology, function and regulation of lipoprotein receptors; mechanism of hormonal regulation of lipolysis and fatty acid synthesis; and cholesterol metabolism and atherosclerosis.

BIOAP 658 Molecular Mechanisms of Hormone Action
Spring. 2 credits. Prerequisite: permission of instructor. Minimum enrollment of 6 students registered for credit required. Letter grade only. Offered alternate years. Lecs, T R 10:10. R. A. Corradino.
An advanced course developed from the current literature on general endocrine mechanisms. Primarily a lecture course with student discussion.

BIOAP 710–718 Special Topics in Physiology
Fall or spring. 1 or 2 credits for each topic. May be repeated for credit. Enrollment in each topic may be limited. S-U grades optional, with permission of instructor. Lectures, laboratories, discussions, and seminars on specialized topics. Four topics offered fall 1999; topics to be offered announced for spring 2000.

BIOAP 711 Readings in Applied Animal Behavior
Fall. 1 credit. Prerequisite: BIOAP 311 or equivalent. Offered alternate years. Lec, 1 hour each week to be arranged. K. A. Houpt.

[BIOAP 712 Thermoregulation and Exercise
Fall. 1 credit. Offered alternate years. Not offered 1999–2000. 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 713 The Physiological Control Systems That Control Ingestive Behavior: Food and Water Intake
Fall. 1 credit. Not offered fall 1999. T. R. Houpt.
A variety of species will be considered with emphasis on common mammalian species: rat, dog, goat, pig, horse, and human. A mixed lecture/seminar format will be used.]

BIOAP 715 Stress Physiology: To Be Discussed as Part of Animal Welfare
Fall. 1 credit. Prerequisite: BIOAP 311 or equivalent required. Offered alternate years. K. A. Houpt.
The emphasis will be on physiological assessment of stress.

BIOAP 719 Graduate Research in Animal Physiology (also VETPH 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: undergraduate degree in biology and a strong interest in reproductive biology. S-U grades optional. Lec/disc, T R 10:10–12:05. Offered alternate years. J. E. Fortune, W. R. Butler, and staff.
A team-taught survey course in reproductive physiology/endocrinology. Lectures by a number of reproductive biologists on various aspects of male reproductive function (endocrine regulation, testis function, spermatogenesis, and sperm physiology/function); female reproductive function (endocrinology, ovarian development and functions, oocyte physiology/function); fertilization and early embryo development; pregnancy; parturition; puberty; and reproductive technology. Student participation in the form of discussions and/or presentations.

BIOAP 811 Advanced Physiological Methods I
Fall. 2 credits. Enrollment limited. Prerequisites: graduate student status or permission of course coordinator. S-U grades only. Lab to be arranged. Coordinator: J. Ray.
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. S-U grades only. Lab to be arranged. Coordinator: J. Ray.
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)

Neuroanatomy (Veterinary Anatomy 504)

Sensory Function (Biological Sciences [BIONB] 492)

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 (registered students receive an unsatisfactory grade for nonattendance). Lec, S 10:10–11:00, for first three S of semester. Section chair and staff.
Discussions by six professors about their research and promising areas for research in the future.

BIOBM 233 Introduction to Biomolecular Structure
Fall. 2 credits. Limited to 30 students. Prerequisites: CHEM 207–208 or equivalents. Lecs, T R 2:30–3:20. S. E. Ealick.
This course is intended for students with a basic understanding of chemistry who are considering a program of study in biochemistry. The interrelationship between the structure and function of biologically important molecules are explored. Emphasis is placed on understanding the way in which the three-dimensional arrangements of atoms determine the biological properties of both small molecules and macromolecules such as proteins and enzymes. The study of molecular structure is aided by interactive computer graphics for visualizing three-dimensional structures of molecules.

BIOBM 330–332 Principles of Biochemistry
Introductory biochemistry is offered in three formats: individualized instruction (330) and lectures (331 and 332) during the academic year and lecture (333) during the summer. *Individualized instruction is offered to a maximum of approximately 250 students each semester. Lectures given fall semester (331), spring semester (332), and summer (333).*

BIOBM 330 Principles of Biochemistry, Individualized Instruction
Fall or spring. 4 credits. Prerequisites: one year of introductory biology for majors and one year of general chemistry and CHEM 257 or 357–358 (CHEM 358 may be taken concurrently) or equivalent, or permission of instructor. Concurrent registration in BIOBM 334 is encouraged. May not be taken for credit after BIOBM 331, 332, or 333. S-U grade optional for graduate students only. Hours to be arranged. Evening prelims: fall, Oct. 5 and Nov. 4; spring, Feb. 29 and Apr. 6. J. E. Blankenship, P. C. Hinkle, 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.

BIOBM 331 Principles of Biochemistry: Proteins and Metabolism
Fall. 3 credits. Prerequisites: one year of introductory biology for majors and one year of general chemistry and CHEM 257 or 357–358 (CHEM 257 or 357 should not

be taken concurrently) 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. 21. 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 previous or concurrent registration in 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. B. K. Tye.

A comprehensive course in molecular biology that covers the structure and properties of DNA, DNA replication and recombination, synthesis and processing of RNA and proteins, the regulation of gene expression, and the principles and uses of recombinant DNA technologies.

BIOBM 333 Principles of Biochemistry: Proteins, Metabolism, and Molecular Biology

Summer (8-week session). 4 credits. Prerequisites: one year of introductory biology for majors and one year general chemistry and CHEM 257, or 357–358, or equivalents, or permission of the instructor. May not be taken for credit after BIOBM 330, 331, or 332. S-U grades with permission of instructor. Lecs, M W F 10:00–12:00. S. Ely or H. T. Nivison.

The content of this course is similar to that of BIOBM 330; however, it is presented in lecture format rather than as individualized instruction. The topics include the structure and function of proteins, enzyme catalysis, metabolism, and the replication and expression of genes.

BIOBM 334 Computer Graphics and Molecular Biology

Fall or spring. 1 credit. Prerequisite: concurrent registration in BIOBM 330. If space permits, students who have completed BIOBM 331 and have either taken or are concurrently taking, BIOBM 332 will be permitted to register during the first week of classes. Disc to be arranged. J. E. Blankenship, P. C. Hinkle, and staff.

Visualization of complex biomolecules using Silicon Graphics computers. Group presentations on current topics in molecular biology.

BIOBM 407 Nature of Sensing and Response: Signal Transduction in Biological Systems (Also PLPA 407)

Spring. 3 credits. Prerequisite: BIOBM 330 or 333 or 331 and previous or concurrent registration in 332. Recommended: BIOGD 281. S-U grades optional. Lec T R 10:10–11:25. T. P. Delaney.

The responses of organisms and cells to their surroundings are examined to illustrate how biological systems sense their biotic and abiotic environment and communicate sensing into appropriate responses. A wide variety of response systems will be explored to identify their unique features and to illustrate how similar processes are utilized by widely divergent organisms. Examples are drawn from prokaryote, plant and animal systems for environmental sensing, control of development and responses during disease. Discussion will also examine the role of genetics and biochemistry in understanding signal transduction pathways, as well as the way these systems are perturbed by mutation and disease.

BIOBM 430 Laboratories in Biochemistry, Molecular, and Cell Biology (also BIONB 430)

Fall, spring, summer. 2 or 4 credits (students are expected to sign up for two sections for a total of 4 credits; limited space available for students taking only one section). Enrollment limited. Prerequisites: BIOBM 330, or 331 and previous or concurrent enrollment in 332, or 332 and previous or concurrent enrollment in 331, or 333, and permission of instructor. Strongly recommended: BIOGD 281. Form to apply for admission to this course is found on the Web (http://www.bio.cornell.edu/biochem/biobm430/signup.html). ***Registration in the course is official only if the form is completed before a student preregisters***. Class assignments are affected by the date the enrollment form is returned. Preference given to undergraduate majors in the Biochemistry or Molecular and Cell Biology Programs of Study, and to graduate students with a minor in the Field of Biochemistry, Molecular and Cell Biology. Labs, M W 12:20–4:25 (disc, F 1:25–2:25) or T 9:05–4:25 (disc, R 1:25–2:25) or R 9:05–4:25 (disc, T 1:25–2:25). Each section is seven weeks during the semester; which sections are offered in each semester depends on scheduling constraints and student preferences.

Section 01 Experimental Molecular Biology

2 credits. S. Ely and H. T. Nivison.

Experiments include cloning of DNA fragments, restriction mapping, DNA sequencing, Southern blotting, and PCR. The experiments emphasize quantitative aspects as well as experimental design.

Section 02 Experimental Proteins and Enzymology

2 credits. S. Ely and H. T. Nivison.

Experiments include purification of enzymes by salt fractionation, ion exchange chromatography, and affinity chromatography, determination of kinetic parameters for an enzyme, analysis of proteins by rate zonal sedimentation, SDS-polyacrylamide gel electrophoresis, and immunoblotting.

Section 03 Experimental Cell Biology

Spring only. 2 credits. T. Huffaker.

Experiments include culture of animal cells, purification and analysis of subcellular components, immunofluorescence electron microscopy, and in vitro assays.

[Section 04 Experimental Molecular Neurobiology

Spring. Next offered spring 2001. D. Deitcher.

Experiments include PCR, cloning of DNA fragments, RNA purification, restriction digests, bacterial transformation, and DNA sequencing. Experiments will emphasize how molecular techniques can be applied to studying neurobiological problems.]

BIOBM 432 Survey of Cell Biology

Spring. 3 credits. Prerequisite: BIOBM 330, 333, or 331, and previous or concurrent registration in 332, or equivalent. S-U grades optional for graduate students only. Lecs, M W 8:40–9:55. 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 434 Applications of Molecular Biology to Medicine, Agriculture, and Industry

Fall. 3 credits. Enrollment limited to 36 students. Prerequisites: BIOBM 330 or 333 or 331 and 332. Recommended: BIOGD 281. S-U grades optional. Lecs, M W F 11:15. J. M. Calvo, S. Ely.

By considering some recent applications of biology, you my extend your knowledge of molecular biology and integrate information from biochemistry, cell biology, genetics, immunology, virology, microbiology, and plant biology. Topics include large scale sequencing of genomes, drug discovery based upon genomics, mapping and cloning human disease genes, DNA vaccines, transgenic animals, engineering plants resistant to insects, and gene therapy. Problem solving and oral presentations are important aspects of this course.

BIOBM 435–436 Undergraduate Biochemistry Seminar

435, fall; 436, spring. 1 credit each term. May be repeated for credit. Limited to upperclass students. Prerequisite: BIOBM 330 or 333 or 331 and 332 or written permission of instructor. S-U grades only. Sem time to be arranged. Organizational meeting first W of each semester at 4 p.m. Fall: G. P. Hess; spring: staff.

Selected papers from the literature on a given topic are evaluated critically during six or seven two-hour meetings.

BIOBM 437 Eukaryotic Cell Proliferation (also TOX 437)

Fall. 3 credits. Prerequisite: BIO G 101–102 or BIO G 105–106 and BIOBM 330 or BIOBM 331–332. Recommended: BIOGD 281 and BIOBM 432. S-U grades optional. Lecs, T R 12:20–1:35. R. H. Chen.

The course covers a wide spectrum of the issues related to cell proliferation in eukaryotes. Topics include regulation of cell division cycle, signal transduction pathways, growth factor receptors, oncogenes, cancer viruses, tumor suppressors, and apoptosis. Additional lectures will discuss aspects of differentiation and development that are related to the cell cycle.

BIOBM 631 Protein Structure and Function

Fall. 3 credits. Prerequisites: BIOBM 330 or 333 or 331 and 332 and organic chemistry. Recommended: physical chemistry. S-U grades optional. Lecs, M W F 9:05. L. Nicholson.

Presentations on the principles of protein structure and the nature of enzymatic catalysis. Specific topics include protein

folding, stability, dynamics and evolution, folded conformations and structure prediction, ligand binding energetics, and the structural basis of catalysis.

BIOBM 632 Membranes and Bioenergetics
Spring. 2 credits. Prerequisite: BIOBM 330 or 333 or 331 and 332 or equivalent. Lecs, T R 11:15. Offered alternate years. P. C. Hinkle.
Structure and dynamics of biological membranes, physical methods, model membranes, ionophores, ion-transport ATPases, mitochondrial and chloroplast electron transfer chains, and examples of transport from plants, animals, and bacteria. Emphasis given to structure of membrane proteins.

BIOBM 633 Biosynthesis of Macromolecules
Fall. 2 credits. Prerequisite: BIOBM 330 or 333 or 331 and 332. Recommended: BIOGD 281. Lecs, T R 9:05. J. W. Roberts, D. B. Wilson.
Synthesis of DNA, RNA, and proteins, and regulation of gene expression.

BIOBM 635 Mechanisms of Metabolic Regulation and Mammalian Gene Expression (also NS 635)
Spring. 2 credits. Prerequisites: at least 4 credits of Principles of Biochemistry and CHEM 358 or 360, or permission of instructor. Offered alternate years. Lecs, T R 9:05. M. N. Kazarinoff, N. Noy, P. Stover.
"Molecular mechanisms by which sensory, hormonal, and nutritional inputs cause changes in enzyme activity in order to regulate metabolic transformations." For course description see Nutritional Sciences 635.

BIOBM 636 Cell Biology
Spring. 2 credits. Prerequisites: BIOBM 330 or 333 or 331 and 332, and 432, or their equivalents. Lec, T 9:05–11:00. A. P. Bretscher.
Lectures cover studies aimed at elucidation of the functional organization of eucaryotic cells. Examples are drawn from research employing molecular, genetic, biochemical and cell biological approaches. Advanced discussion of topics such as the cytoskeleton, secretion, endocytosis, cell polarity and related topics are presented. Together with BIOBM 437, 632, and 639 this course provides broad coverage of the cell biology subject area.

BIOBM 637 Integration and Coordination of Energy Metabolism (also NS 636)
Fall. 3 credits. Prerequisite: BIOBM 330 or 331 or 333 or equivalent. Lecs, M W F 9:05. Evening prelims to be arranged. W. J. Arion.
"The elements and dynamics of energy metabolism in humans and higher animals are developed systematically through biochemical characterizations of the metabolic components and structure of major tissues and organs." For course description see Nutritional Sciences 636.

BIOBM 639 The Nucleus
Spring. 2 credits. Prerequisite: BIOBM 330 or 333 or 331 and 332 or equivalent. Recommended: BIOGD 281. Lec, T R 12:20. J. T. Lis.
Lectures on topics of eucaryotic gene organization, regulation of gene expression, RNA processing, chromatin structure, the structure and movement of chromosomes, and the architecture of the nucleus. This course covers the structure and function of the nucleus at the molecular and cell biological levels, and together with BIOBM 437, 632 and 636, provides broad coverage of the cell biology subject area.

[BIOBM 692 Protein-Nucleic Acid Interactions (also BIOMI 692)
Spring. 3 credits. Prerequisites: BIOBM 330 or 331 or 333 and 633. Lecs, T R 10:10–11:25. Offered alternate years. Not offered 1999–2000. J. D. Helmann.
For course description, see BIOMI 692.]

BIOBM 730 Protein NMR Spectroscopy (also VETPR 730)
Spring. 2 credits. Prerequisites: CHEM 389 and 390 or CHEM 287 and 288 or permission of instructor. S-U grades optional. Lec to be arranged. L. K. Nicholson, R. E. Oswald.
The student acquires the tools necessary for in-depth understanding of multidimensional, multinuclear NMR experiments. Schemes for magnetization transfer, selective excitation, water suppression, decoupling, and others are presented. The application of these techniques to proteins for resonance assignment, structure determination, and dynamics' characterization is studied.

BIOBM 732–737 Current Topics in Biochemistry
Fall or spring. 1/2 or 1 credit for each topic. May be repeated for credit. Prerequisite: BIOBM 330 or 333 or 331 and 332 or equivalent. S-U grades only.
Lectures and seminars on specialized topics. Topics for fall and spring to be announced in the division's course supplement published at the beginning of each semester.

[BIOBM 738 Macromolecular Crystallography (also CHEM 788)
Spring. 3 credits. S-U grades optional. Prerequisite: permission of instructor. Lecs, M W F 10:10. Offered alternate years. Not offered 1999–2000. D. J. Thiel, S. E. Ealick, J. C. Clardy.
Lectures briefly cover the fundamentals of crystallography and focus on methods for determining the 3-dimensional structures of macromolecules.]

BIOBM 750 Cancer Cell Biology (also VETPA 750)
Spring. 3 credits. Prerequisite: BIOBM 330 or 333 or 331 and 332 or equivalent. Offered alternate years. Lecs to be arranged. J. Guan, R. Levine, B. Pauli, A. Yen.
"Course covers molecular, cellular and genetic aspects of cancer." For course description see VETPA 750.

BIOBM 751 Ethical Issues and Professional Responsibilities (also TOX 751)
Spring. 2 credits. Limited to graduate students beyond first year. S-U grades only. Sem, W 2:30–4:25. Additional sections may be offered. Organizational meeting will be held on Wednesday, Jan. 26, 2:30 P.M., in 180 Biotechnology Building. Staff.
Ethical issues in research and the professional responsibilities of scientists are discussed in a case-study format. Topics to be discussed include regulations; data selection, manipulation, and representation; fraud, misconduct, and whistle-blowing; conflicts of interest and commitment; authorship, ownership, and intellectual properties; peer review and confidentiality; scientific response to external pressure; legal liabilities; and professional codes of ethics.

BIOBM 830 Biochemistry Seminar
Fall or spring. No credit. Sem, F 4:00. Staff.
Lectures on current research in biochemistry, presented by distinguished visitors and staff members. Lectures are open to everyone, but registration is limited to graduate students in Biochemistry, Molecular and Cell Biology.

BIOBM 831 Advanced Biochemical Methods I
Fall. 6 credits. Required of, and limited to, first year graduate students in the Field of Biochemistry, Molecular and Cell Biology. S-U grades only. Labs and Discs 12 hours each week TBA. Organizational meeting first R of semester, 10:10. V. M. Vogt and staff.
The first half of this course comprises an intensive laboratory covering fundamental aspects of modern molecular biology and cell biology. The second half of the course compromises research in the laboratory of a professor chosen by the student (See BIOBM 832). Students must enroll separately for each half.

BIOBM 832 Advanced Biochemical Methods II
Spring. 6 credits. Required of, and limited to, first year graduate students in the Field of Biochemistry, Molecular and Cell Biology. S-U grades only. Lab TBA. Staff.
Research in the laboratories of two different professors chosen by the student. Arrangements are made jointly between the Director of Graduate Studies and the research advisor.

BIOBM 833 Research Seminar in Biochemistry
Fall or spring. 1 credit each term. May be repeated for credit. Required of, and limited to, second-, third-, and fourth-year graduate students majoring in biochemistry. S-U grades only. Sem, M 12:20–1:30. T. C. Huffaker.
Each student presents one seminar per year on his or her thesis research and then meets with instructors and thesis committee members for evaluation.

BIOBM 835–836 Methods and Logic in Biochemistry, Molecular and Cell Biology
835, fall; 836, spring. 1 credit each term. Limited to first-year graduate students majoring in the Field of Biochemistry, Molecular and Cell Biology. S-U grades only. Sem and disc to be arranged. Fall: G. P. Hess; spring: staff.
A seminar course with critical discussion by students of original research papers. A variety of topics in biochemistry, molecular and cell biology are covered.

Related Courses in Other Departments

Lipids (Biological Sciences [BIOAP] 619 and Nutritional Sciences 602)

Molecular Aspects of Development (Biological Sciences [BIOGD] 483)

Molecular Biology Techniques for Animal Biologists (Animal Science 650)

Molecular Mechanisms of Hormone Action (Biological Sciences [BIOAP] 658 and Veterinary Medicine 758)

Teaching Experience (Biological Sciences [BIO G] 498)

Undergraduate Research in Biology (Biological Sciences [BIO G] 499)

ECOLOGY AND EVOLUTIONARY BIOLOGY (BIOES)

BIOES 154 The Sea: An Introduction to Oceanography (also GEOL 104)

Spring. 3 or 4 credits (4-credit option includes one 2 1/2 hour laboratory each week). S-U grades optional. Lecs, T R 11:40–12:55; labs, M or W 2:00–4:25, or M 7:30–9:55 p.m. C. H. Greene, 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, the oceans and climate, ocean ecology, coastal processes, marine pollution, and marine resources.

BIOES 261 Ecology and the Environment

Fall or summer. 4 credits. Prerequisite: one year of introductory biology. S-U grades optional. Lecs, M W F 11:15; disc, W or R 1:25, 2:30, or 3:35. N. G. Hairston, L. O. Hedin, P. P. Feeny.

An introduction to the science of ecology, the study of interactions between organisms and their environments. Major topics include demography, succession, biodiversity, biogeochemistry and ecosystems, and the evolution of adaptations. The influences of enemies, competitors, and mutualists on populations and communities are discussed. The effects of climate and human activities on ecological processes are also considered. Ecological principles are used to explain the issues associated with several environmental problems.

BIOES 263 Field Ecology

Fall. 2 credits. Limited to 25 students. Prerequisite: concurrent or previous enrollment in BIOES 261. Lec, R 1:25; lab, F 12:20–5:00; 1 weekend field trip to the Hudson Valley. P. L. Marks.

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, foraging behavior, census methods, and use of scientific collections.

BIOES 264 Birds in Biology

Fall. 3 credits. Limited to 25 students. May not be taken for credit after BIOES 475. Intended primarily for biology nonmajors. S-U grades optional. Lecs and disc T R 8:40–9:55; two field trips TBA. A. A. Dhondt.

This course explores exciting new insights in biology using detailed examples drawn from bird studies. Subject matter is suitable for non-majors, but of interest to majors as well. Topics will be drawn from a variety of biological disciplines. These include behavioral ecology (mating systems, territorial behavior, song), population ecology (migration, population limitation, micro-evolution, competition), evolutionary biology (trade-offs in life histories, optimal clutch size), and conservation biology (habitat fragmentation, inbreeding, acid rain). Lectures will be interspersed with discussion of selected papers.

BIOES 267 Introduction to Conservation Biology

Fall. 3 credits. May not be taken for credit after NTRES 450. Intended for both science and non-science majors. Completion of BIOES 267 is not required for NTRES 450. S-U grades optional. Lecs, M W 9:05; disc, F 9:05 or R 2:30. A. S. Flecker, J. W. Fitzpatrick.

An exploration of biological concepts related to conserving the Earth's biodiversity, introducing ecological and evolutionary principles important for understanding major conservation problems. Topics include patterns of species and ecosystem diversity, causes of extinction, genetic risks of small populations, design of nature preserves, strategies for protecting endangered species, ecosystem restoration, and the value of biodiversity.

BIOES 274 The Vertebrates: Structure, Function, and Evolution

Spring. 4 credits. Prerequisite: one year of introductory biology. Lecs, M W F 12:20; labs, M T or W 1:25–4:25. Fee, $25. K. R. Zamudio.

An introductory course in vertebrate organismal biology which explores the structure and function of vertebrates with an emphasis on trends in vertebrate evolution. Lectures will cover topics such as the origin and evolution of various vertebrate groups, sensory systems, thermoregulation, life history, locomotion, feeding, size, and scaling. Laboratories include dissections of preserved vertebrate animals and noninvasive live animal demonstrations.

[BIOES 275 Human Biology and Evolution (also ANTHR 275 and NS 275)

Fall. 3 credits. S-U grades optional, with permission of either instructor. Lecs, W F 10:10; disc, M 10:10. Offered alternate years. Not offered 1999–2000. 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 278 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; interested students complete an application form on the first day of class.) Limited to 300 students. Prerequisite: one year 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, Sept. 23 and Oct. 28; spring, Feb. 24 and Mar. 30. Fall, M. A. Geber, staff; spring, M. Shulman.

The course considers explanations for patterns of diversity and for the apparent "good fit" of organisms to the environment. Topics covered include the genetic and developmental basis of evolutionary change, processes at the population level, the theory of evolution by natural selection, levels of selection, concepts of fitness and adaptation, modes of speciation, long-term trends in evolution, rates of evolution, and extinction. 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 371 Human Paleontology (also ANTHR 371)

Fall. 4 credits. Prerequisite: one year of introductory biology or ANTHR 101 or permission of instructor. Lecs, M W F 2:30; lab, 1 hour each week to be arranged; occasional field trips. Offered alternate years. K. A. R. Kennedy.

A broad survey of the fossil evidence for human evolution with special attention to skeletal and dental anatomy, geological contexts, paleoecology, dating methods, archaeological associations, and current theories of human origins and physical diversity.

BIOES 373 Biology of the Marine Invertebrates

Fall (but taken in the previous summer at the Shoals Marine Laboratory [SML]). 4 credits. Limited to 30 students. Prerequisite: one year of introductory biology for majors. Permission of faculty required for 1999 because it will be off campus. Offered alternate years. Two week, full-time course (August 6-August 20). Daily and evening lectures, laboratories, and field work. Total cost for room, board, and overhead at SML: $800. C. D. Harvell, J. G. Morin, SML Faculty.

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 Marine Laboratory exposes students to a wealth of marine and terrestrial invertebrates in their natural habitats. Regular field excursions allow an excellent opportunity to study freshly collected and *in situ* representatives of most of the major phyla.

[BIOES 452 Herbivores and Plants: Chemical Ecology and Coevolution (also ENTOM 452)

Spring. 3 credits. Prerequisites: one year of introductory biology, BIOES 261, CHEM 253 or 357/358 and 251 or 301, or permission of instructor. S-U grades optional. Lecs, M W F 11:15. Field trips, additional lectures, or laboratory demonstrations may be held in place of F lecture. Offered alternate years. Not offered 1999–2000. 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 ENTOM 455)
Fall. 3 credits. Prerequisites: BIOES 261 or equivalent and ENTOM 212 or knowledge of another taxon. S-U grades optional. Lecs, M W F 11:15. Offered alternate years. 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 ENTOM 456 and NTRES 456)
Spring. 4 credits. Recommended: BIOES 261. S-U grades optional. Lecs, T R 9:05; labs, T W or R 1:25–4:25. Field project with lab papers. Offered alternate years. Not offered 1999–2000. B. L. Peckarsky, M. B. Bain.
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 disturbances. **Lab:** a field project includes descriptive and experimental techniques and hypotheses testing related to environmental assessment.]

[BIOES 457 Limnology: Ecology of Lakes, Lectures
Fall. 3 credits. Prerequisite: BIOES 261 or written permission of instructor. Recommended: introductory chemistry. Lecs, M W F 11:15. Offered alternate years. Not offered 1999–2000. 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. Lab, T W or R 1:25–4:25; 1 weekend field trip. Fee, $10. Offered alternate years. Not offered 1999–2000. N. G. Hairston, Jr. and staff.
Laboratories and field trips devoted to studies of the biological, chemical, and physical properties of lakes and other freshwater environments. Vertebrate dissection (fish) during one laboratory exercise and during a portion of weekend field trip.]

[BIOES 461 Population and Evolutionary Ecology
Spring. 4 credits. Prerequisites: BIOES 261 or 278 plus two semesters of calculus, or permission of instructor. S-U grades optional. Lecs, M W F 9:05; lab, M or T 1:25–4:25. Offered alternate years. Not offered 1999–2000. D. W. Winkler, A. S. Kondrashov.
Problems of ecology are viewed from an evolutionary perspective, exploring issues of adaptation and fitness 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 Ecological Processes (also GEOL 462)
Spring. 3 credits. Limited to 75 students. Prerequisite: BIOES 261. Lecs and disc, M W F 10:10. Offered alternate years. Not offered 1999–2000. C. D. Harvell, C. H. Greene.
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. Examples are drawn from all types of marine habitats, including polar seas, temperate coastal waters, and tropical coral reefs.]

[BIOES 463 Plant Ecology and Population Biology, Lectures
Fall. 3 credits. Prerequisite: BIOES 261 or 278 or equivalents, or permission of instructor. Recommended: some taxonomic familiarity with vascular plants and concurrent enrollment in BIOES 465. Lecs, M W F 11:15. Offered alternate years. Not offered 1999–2000. M. A. Geber, P. L. Marks.
This course examines the biological and historical factors affecting the structure of plant communities, and the distribution, abundance, and population dynamics of individual species. The influence of the environment, disturbance history, competition, and herbivory on the organization of plant communities are considered. Plant populations are also 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. Lecs, T R 10:10–11:25; disc, 1 hour each week to be arranged. Offered alternate years. A. R. McCune.
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 fate of variation, causes of major evolutionary transitions, and patterns of diversification and extinction in the fossil record. Discussion of these problems involve data and approaches from genetics, morphology, systematics, paleobiology, development, and ecology.

[BIOES 465 Plant Ecology and Population Biology, Laboratory
Fall. 1 credit. Prerequisite: concurrent enrollment in BIOES 463. Lab, F 12:05–5:00. Offered alternate years. Not offered 1999–2000. M. A. Geber, P. L. Marks.
Field and laboratory 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 data analysis.]

[BIOES 466 Physiological Plant Ecology, Lectures
Spring. 3 credits. Limited to 45 students. Prerequisite: BIOES 261 or introductory plant physiology. S-U grades optional, with permission of instructor. Lecs, M W 8:40–9:55; optional disc to be arranged. Offered alternate years. Not offered 1999–2000. Staff.
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. Lab, W 1:25–4:25, plus additional lab hours to be arranged. Offered alternate years. Not offered 1999–2000. Staff.
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 471 Mammalogy
Fall. 4 credits. Recommended: BIOES 274. S-U grades optional, with permission of instructor. 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. Offered alternate years. Not offered 1999–2000. Staff.
Lectures on the evolution, classification, distribution, and adaptations of mammals. Laboratory and fieldwork on systematics, ecology, and natural history of mammals of the world, with primary emphasis on the North American fauna. Systematics laboratories held in the museum at Research Park. 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
Spring. 4 credits. Limited to 35 students. Recommended: BIOES 274. S-U grades optional, with permission of instructor. Lecs, T R 12:20; labs, T R 1:25–4:25; occasional field trips and special projects. Fee, $30. Offered alternate years. Not offered 1999–2000. H. W. Greene.
Lectures cover various aspects of the biology of amphibians and reptiles, including evolution, zoogeography, ecology, behavior,

and physiology. Laboratory topics include systematics, 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 SCAS 473)

Fall. 3 credits. Limited to 45 students. Prerequisite: BIOES 261 or permission of instructor. S-U grades optional. Lecs and discs, T R 2:30–3:45. During the first 6 weeks of class, the Thursday meetings may run to 5:00 because of field trips. Offered alternate years. Not offered 1999–2000. A. G. Power, E. C. M. Fernandes.

Analysis of the ecological processes operating in agricultural systems, with an emphasis on the interactions between organisms. Topics include nutrient dynamics in agroecosystems, plant competition and facilitation, intercropping, the ecology of species invasions, mutualism in agroecosystems, plant-herbivore relations, plant-pathogen interactions, biological pest control, and evolutionary processes in agriculture. Case studies from both the tropics and the temperate zone are used to illustrate important concepts.]

[BIOES 474 Laboratory and Field Methods in Human Biology (also ANTHR 474)

Spring. 5 credits. Limited to 16 students with permission of instructor obtained by preregistering in E231 Corson. Prerequisite: one year of introductory biology or ANTHR 101 or permission of instructor. Lecs and labs, T R 10:10–12:05; additional hours to be arranged. Independent research project required. Offered alternate years. Not offered 1999–2000. K. A. R. Kennedy.

Practical exercises and demonstrations of modern approaches to the methodology of biological anthropology. Emphasis on comparative human anatomy, osteology, description of skeletal subjects, paleopathology, skeletal maturation, and relevant field techniques for the archaeologist and forensic anthropologist.]

[BIOES 475 Ornithology

Fall. 4 credits. Limited to 30 students, with permission of instructor obtained by preregistering in E241 Corson. Recommended: BIOES 274. S-U grades optional, with permission of instructor. 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 once a week. Fee, $15. Offered alternate years. Not offered 1999–2000. D. W. Winkler.

Lectures cover various aspects of the biology of birds, including anatomy, physiology, systematics, evolution, behavior, ecology, and biogeography. Laboratory includes dissection of dead material, studies of skeletons and plumages, and specimen identification of avian families of the world and species of New York. Independent projects emphasize research skills.]

[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. Lecs, M W F 10:10; lab, M 1:25–4:25; with additional lab time TBA; two field trips. A small lab fee may be required. Offered alternate years. Not offered 1999–2000. 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. Two field trips, including one full day weekend trip required. 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 478 Ecosystem Biology

Fall. 4 credits. Prerequisite: BIOES 261 or equivalent. S-U grades optional. Lecs and discs, T R 10:10–12:05. Offered alternate years. L. O. Hedin.

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 GEOL 479)

Fall. 4 credits. Prerequisites: one year of introductory biology for majors and either BIOES 274, GEOL 375, BIOES 373, or permission of instructor. S-U grades optional. Lecs, M W F 12:20; lab to be arranged. W. Allmon.

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

Fall or spring. Variable credit. Prerequisites: BIOES 261, a taxon-oriented course, and permission of instructor. S-U grades optional, with permission of instructor. Lecs and field trips to be arranged. Estimated costs: to be announced. Staff.

This course provides students with opportunities to learn field techniques and new biotas by participating in an intensive series of field exercises. Extended field trips may be scheduled during fall break, intersession, or spring break. The regions visited, trip objectives, and other details are announced by the various instructors at an organizational meeting held at the beginning of the semester. Meetings on campus are devoted to orientation and reports on completed projects.

[Section 01: Life Histories of Marine and Freshwater Invertebrates

Fall. 2 credits. Prerequisite: undergraduates must have previous experience or course work with marine or freshwater invertebrates. Two extended weekend field trips in early September and October. Fee: $100 (to help cover transportation and housing at Shoals Marine Lab). Offered alternate years. Not offered 1999–2000. C. D. Harvell, N. G. Hairston, Jr.

Field trips to the Shoals Marine Lab and Shackelton Point Field Station. Students employ experimental approaches to study the evolution of invertebrate life histories.]

Section 02: Graduate Field Course in Ecology

Spring. 3 credits. Restricted to graduate students. A fee will be required to help cover food and lodging for trip to Florida. Offered alternate years. P. L. Marks, R. B. Root.

The course is designed to give graduate students experience in defining questions and designing field investigations. The class is based at the Archbold Biological Station in central Florida over spring break and during the following week. The class visits several ecosystems including sand pine scrub, cattle ranches, cypress swamps, everglades, and coral reefs.

BIOES 661 Environmental Policy (also ALS 661 and B&SOC 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 problems. Ten to twelve students, representing several disciplines, investigate significant environmental problems. The research team spends two semesters preparing a scientific report for publication in *Science* or *BioScience*.

[BIOES 663 Theoretical Population Genetics

Fall. 3 credits. Prerequisites: knowledge of basic population genetics (e.g., BIOGD 481), and some mathematics (e.g., MATH 111). Primarily for graduate students; permission of instructor required for undergraduates. S-U grades optional. Lec, 2 hours each week to be arranged; lab (computer), 3 hours each week to be arranged. Offered alternate years. Not offered 1999–2000. A. S. Kondrashov.

Theoretical population genetics (TPG) is one of the areas of current evolutionary biology. The course explains why TPG is successful in its domain and what its limitations are. Students analyze the effects of seven elementary factors of population dynamics (mutation, selection, drift, migration, segregation, recombination, and non-random mating). Consideration of biologically 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 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. Sem to be arranged. Offered alternate years. Not offered 1999–2000. N. G. Hairston, Jr.

A seminar course on advanced topics in freshwater ecology.]

BIOES 668 Principles of Biogeochemistry
Spring. 4 credits. Limited to 20 students. Prerequisite: solid background in ecology, environmental chemistry, or related environmental science. Permission of instructor required for undergraduates. S-U grades optional. Lecs and discs, T R 10:10–12:05. Offered alternate years. R. W. Howarth, L. O. Hedin.
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 669 Plant Ecology Seminar
Spring. 1 credit. May be repeated for credit. Suggested for students majoring or minoring in plant ecology. S-U grades optional. Sem to be arranged. Not offered 1999–2000. Staff.
Includes review of current literature, student research, and selected topics of interest to participants.]

BIOES 670 Graduate Seminar in Vertebrate Biology
Fall or spring. 1 credit. May be repeated for credit. Primarily for graduate students; written permission of instructor required for undergraduates. S-U grades only. Sem to be arranged. Staff.
Seminar presentations and discussions by students on areas of current research in vertebrate biology. Topics vary from semester to semester.

[BIOES 673 Human Evolution: Concepts, History, and Theory (also ANTHR 673)
Fall. 3 credits. Prerequisite: one year of introductory biology, ANTHR 101, or permission of instructor. Lec, M 2:30; sem and disc, W 7:30–9:30 p.m. Offered alternate years. Not offered 1999–2000. K. A. R. Kennedy.
A survey of the historical background of present-day concepts of human evolutionary variations and adaptations in space and time. The formation of biological anthropology as an area of scientific inquiry within the social and biological sciences is reviewed. Students select their own topics within a broad range of readings in the history of Western concepts of human origins, diversity, and place in nature.]

BIOES 760 Special Topics in Evolution and Ecology
Fall or spring. 1–3 credits. May be repeated for credit. Enrollment limited. S-U grades optional, with permission of instructor. Hours to be arranged. Staff.
Independent or group intensive study of special topics of current interest. Content varies and is arranged between student and staff member.

Section 02 Development and Evolution (also BIO G 400, BIOGD 480, and BIOGD 780)
Fall*. 2 credits. Prerequisites: BIOGD 281 and BIOES 278. S-U grades only. Lecs and discs T 12:20–2:25 p.m. Students will also be required to attend five seminars on M 4:00–5;30 p.m. M. Wolfner, A. McCune.
Five leading international experts will describe recent advances in data and theory at the intersection of developmental biology and evolutionary biology. Topic coverage will center around pattern formation and the origin of metazoan body plans. During the Tuesday class meeting prior to each expert's visit, students and course faculty will present and discuss recent papers by the upcoming speaker. The following week, students will be required to attend the speaker's seminar on Monday at 4:00 p.m. and then meet with the speaker during class on the following day for continued discussion of the topic.

*Fall 1999 is the only time that this special course will be offered, at least in this seminar-coupled format. Graduate students should register for BIOGD 780; undergraduates should register for BIOGD 480.

BIOES 763 Workshop in Biogeochemistry
Fall or spring. 1 credit. Limited to 15 students. Prerequisite: BIOES 668. S-U grades only. Workshop and disc, TBA. Staff.
Provides a workshop-forum in which graduate students interact with invited world-leaders in biogeochemistry. Workshop topics will change each semester. A one-week workshop will be preceded by seven, one-hour preparatory discussions of readings.

BIOES 767 Current Topics in Ecology and Evolutionary Biology
Fall. 4 credits. Prerequisite: permission of instructor required for undergraduates. S-U grades only. Lecs and discs, T R 10:10–12:05; 1 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)

Animal Social Behavior (Biological Sciences [BIONB] 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)

Mathematical Ecology (Biometry and Statistics 662)

Related Courses in Entomology (Entomology 212, 331, 370, 453, 471, 631, 634, 672)

Related Courses in Natural Resources (Natural Resources 301, 302, 418, 450, 496)

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)

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 2:30. Offered alternate years. Not offered 1999–2000. 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 derived from the 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. No admittance after first week of classes. Lecs, T R 10:10–12:05; lab, T W or F 2:30–4:25; additional hours to be arranged. Students do not choose lab sections during course enrollment; lab assignments are made during first day of classes. Problem-solving sessions strongly recommended, T or W 8:30–9:45 (additional session to be arranged if necessary). P. J. Bruns, T. D. Fox, M. L. Goldberg, R. J. MacIntyre.
A general study of the fundamental principles of genetics in eukaryotes and prokaryotes. Discussions of gene transmission, gene action and interaction, gene linkage and recombination, gene structure, gene and chromosome mutations, genes in populations, and extrachromosomal inheritance. Aspects of recombinant DNA technology are discussed. In the laboratory, students perform experiments with microorganisms and conduct an independent study of inheritance in *Drosophila*.

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 281. S-U grades optional. Lecs, M W 10:10 (lecs, also F 10:10 1st 3 weeks only); disc, R 10:10 or F 10:10 or 11:15. R. A. Calvo.
A course designed for nonmajors. Lectures provide the technical background needed to understand controversial personal, social, and

legal implications of modern genetics that are discussed in section meetings.

BIOGD 385 Developmental Biology
Fall. 3 credits. Prerequisite: BIOGD 281. Lecs, M W F 11:15. K. J. Kemphues.
An introduction to the morphogenetic, cellular, and genetic aspects of the developmental biology of animals.

BIOGD 387 Developmental Aspects of Evolution
Spring. 2 credits. Prerequisite: BIOGD 281. S-U grades optional. Lecs, T R to be arranged. Offered alternate years. A. W. Blackler.
An examination of the developmental mechanisms that underlie evolutionary change and organismal diversity and of the developmental constraints that contribute to evolutionary conservatism.

BIOGD 389 Embryology
Spring. 3 credits. Preference given to seniors. Prerequisites: one year of introductory biology and a knowledge of mammalian adult anatomy. Lecs, T R 10:10; labs, T or R 2–4:25. A. W. Blackler.
A course in the embryonic development of vertebrate animals, with emphasis on the comparative aspects of morphogenesis and function at the tissue and organ levels. The laboratory has a strong morphogenetic bias, emphasizing the comparative aspects of developmental anatomy and preparation for medical studies.

BIOGD 480 Development and Evolution (also BIOES 760-02/BIOG 400/ BIOGD 780)
Fall*. 2 credits. Prerequisites: BIOGD 281 and BIOES 278. S-U grades only. Lecs and discs T 12:20–2:25 p.m. Students will also be required to attend five seminars on M 4:00–5:30 p.m. M. Wolfner, A. McCune.
Five leading international experts will describe recent advances in data and theory at the intersection of developmental biology and evolutionary biology. Topic coverage will center around pattern formation and the origin of metazoan body plans. During the Tuesday class meeting prior to each expert's visit, students and course faculty will present and discuss recent papers by the upcoming speaker. The following week, students will be required to attend the speaker's seminar on Monday at 4:00 p.m. and then meet with the speaker during class on the following day for continued discussion of the topic.

*Fall 1999 is the only time that this special course will be offered, at least in this seminar-coupled format. Graduate students should register for BIOGD 780; undergraduates should register for BIOGD 480.

BIOGD 481 Population Genetics
Fall. 4 credits. Prerequisite: BIOGD 281, BIOES 278, 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 interplay between theory and the data from experiments 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 331 and 332, and written permission of instructor. S-U grades optional. Disc, T 2:30–4:25 and R 2:30–3:30. R. A. Calvo, P. J. Bruns.
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 assisted reproductive strategies, eugenics, genetic counseling, genetic screening (pre-implantation, 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 many discussions. There is a major writing component in the course.

[BIOGD 483 Molecular Aspects of Development
Spring. 3 credits. Prerequisites: BIOGD 281; BIOBM 332 or 330 or 333; and BIOGD 385 or permission of instructor. Lecs, T R 2:30–4:00. Offered alternate years. Not offered 1999–2000. M. F. Wolfner.
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 signal transduction and 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, frogs, 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. Lecs, T R 11:15. Offered alternate years. R. J. MacIntyre.
An analysis of evolutionary changes in genes and their protein products. Theories on the evolution of the genetic code, the construction of phylogenetic trees from biochemical data and the role of gene duplications in evolution are discussed. The second half of the course concerns the evolution and the organization of genomes from viruses to higher eukaryotes, including the evolution of satellite DNA sequences and transposable elements.

BIOGD 485 Bacterial Genetics (also BIOMI 485)
Fall. 2 credits. Graduate students, see BIOMI 685. Prerequisite: BIOGD 281. Recommended: BIOMI 290 and BIOBM 330 or 331 and 332 or 333. Lecs, W 7:30–9:25 p.m. Staff.
For course description, see BIOMI 485.

BIOGD 486 Advanced Eukaryotic Genetics
Spring. 4 credits. Enrollment may be limited to 50 students. Prerequisites: BIOGD 281, BIOBM 330 or 333 or 331 and 332. S-U grades optional. Lecs, T 12:20–2:15 and R 12:20–1:10; disc R 1:25–2:15 or F 11:15–12:05. E. E. Alani.
The course develops fundamental skills in eukaryotic genetic analysis through lectures and by reading, analyzing, and presenting research articles. Concepts are presented within the context of a well-studied field, such as chromosome segregation. The basic tools that have been developed to study this field are used to analyze other topics such as vegetative and meiotic cell cycle control, embryonic development, pathogen resistance in plants, and human genetics.

BIOGD 682 Fertilization and the Early Embryo
Spring. 2 credits. Prerequisites: BIOGD 281; BIOBM 332, 330 or 333; and BIOGD 385 or permission of instructor. Lec, R 2:30–4:25. Offered alternate years. M. F. Wolfner.
This course treats 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-gastrulation embryos from several animal species. Topics include fertilization (sperm/egg binding, sperm entry into egg), pronuclear fusion, egg activation, initiation and terminating the cleavage, division period, cytoplasmic determinants, changes in nuclear and cytoplasmic architecture.

[BIOGD 684 Advanced Topics in Population Genetics
Spring. 2 credits. Limited to 20 students. Prerequisites: BIOGD 481 or equivalent and written permission of instructor. S-U grades optional. Lec, T 2:30–4:25. Offered alternate years. Next offered spring 2001. C. F. Aquadro.
An in-depth exploration of current areas of research in population genetics. Readings primarily from recent books and the current literature. Specific topics are announced the previous fall and in the division's catalog supplement. Format includes lectures, discussion, and presentations by students.]

[BIOGD 685 Advanced Bacterial Genetics (BIOMI 485)
Fall. 2 credits. Limited to graduate students in Biological Sciences; see BIOMI 485. Prerequisites: BIOGD 281 or equivalent, BIOBM 330 or 331 and 332 or equivalent, and permission of instructor. Recommended: BIOMI 290 or equivalent. Lec, W 7:30–9:25; disc, R 10:10–11:00. Not offered 1999–2000, 2000–2001. Staff.
For course description, see BIOMI 685.]

[BIOGD 687 Developmental Genetics
Fall. 2 credits. Limited to 20 students. Prerequisites: BIOGD 281 and 385 or their equivalents. S-U grades optional. Lec to be arranged. Offered alternate years. Next offered fall 2000. K. J. Kemphues.

Selected topics focus on the use of genetic analysis in understanding mechanisms of development. Topics are drawn primarily from studies in fruitflies, nematodes, mice and fish. Possible topics include pattern formation, cell lineage, neural development, maternal information in development, germ cell development, sex determination, and intercellular communication. Students read current literature and are encouraged to discuss each topic in class.]

BIOGD 780 Development and Evolution (also BIOES 760–02/BIOG 400/ BIOGD 480)

Fall*. 2 credits. Prerequisites: BIOGD 281 and BIOES 278. S/U grades only. Lecs and Discs T 12:20–2:25 p.m. Students will also be required to attend five seminars on M 4:00–5:30 p.m. M. Wolfner, A. McCune.

Five leading international experts will describe recent advances in data and theory at the intersection of developmental biology and evolutionary biology. Topic coverage will center around pattern formation and the origin of metazoan body plans. During the Tuesday class meeting prior to each expert's visit, students and course faculty will present and discuss recent papers by the upcoming speaker. The following week, students will be required to attend the speaker's seminar on Monday at 4:00 p.m. and then meet with the speaker during class on the following day for continued discussion of the topic.

*Fall 1999 is the only time that this special course will be offered, at least in this seminar-coupled format. Graduate students should register for BIOGD 780; undergraduates should register for BIOGD 480.

BIOGD 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.

[BIOGD 782–783 Current Genetics/ Development Topics

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. Not offered 1999–2000. Staff.]

BIOGD 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 12:20–1:30. Staff.

Each graduate student presents one seminar per year based on his or her thesis research. The student then meets with the thesis committee members for an evaluation of the presentation.

BIOGD 787 Seminar in Genetics and Development

Fall and 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)

Biosynthesis of Macromolecules (Biological Sciences [BIOBM] 633)

Current Topics in Biochemistry (Biological Sciences [BIOBM] 731–736)

Evolutionary Biology (Biological Sciences [BIOES] 278)

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)

Plant Cytogenetics (Plant Breeding 446)

Plant Genome Organization (PLBR 653–03)

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)

MICROBIOLOGY (BIOMI)

[BIOMI 192 Microorganisms on the Planet Earth

Spring. 3 credits. May not be taken for credit after BIOMI 290. S-U grades optional. Lecs, M W F 11:15. Not offered 1999–2000, 2000–01. R. P. Mortlock.

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 archaebacteria, 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. Staff.

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 medical microbiology.

BIOMI 291 General Microbiology Laboratory

Fall or spring, 2 credits. Summer (6-week session), 2 credits. Prerequisite: concurrent or previous enrollment in BIOMI 290. Lec, F 12:20; labs, M W 12:20–2:15 or 2:30–4:25, or T R 10:10–12:05, 12:20–2:15, or 2:30–4:25. 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.

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 391 Advanced Microbiology Laboratory

Fall. 3 credits. Prerequisites: BIOMI 290, 291, and BIOBM 330 or 331 or 333. Preference given to biological sciences students in the microbiology program of study. Lab, M W 1:25–4:25; disc, F 1:25. J. B. Russell, W. C. Ghiorse, J. P. Shapleigh, S. H. Zinder.

A laboratory course that illustrates basic principles of experimental microbiology. The course is organized into four modules which last three weeks each: 1) ecology, 2) physiology, 3) genetics, and 4) structure and function. Students are encouraged to take this course during their third year of study.

BIOMI 398 Environmental Microbiology

Spring. 3 credits. Prerequisite: BIOES 261 or BIOMI 290 or SCAS 260 or permission of instructor. Lecs, M W F 10:10. W. C. Ghiorse.

The biology, behavior, diversity, 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 404 Pathogenic Bacteriology and Mycology (also VETMI 404)

Spring. 2 or 3 credits (3 credits with lecture and seminar with permission of instructor for undergraduates). Prerequisites: BIOMI 290 and 291. Strongly recommended: BIO G 305. Lecs, M W 10:10; sem, F 10:10. Offered alternate years. Not offered 1999–2000. M. Wiedmann.

This is a course in medical microbiology, presenting the major groups of bacterial and mycotic pathogens important to human and veterinary medicine. The emphasis of this course is infection and disease pathogenesis. Topics include disease causality; interactions of host, pathogen and environment, including immunity to bacteria and fungi; and principles of antimicrobial therapy and drug resistance. A companion seminar addresses the current and classic literature related to microbial pathophysiology on the cellular and molecular level.]

[BIOMI 406 Clinical Microbiology
Fall and spring. 15 credits each semester. Prerequisite: permission of instructor. Hours to be arranged. Not offered 1999–2000, 2000–2001. R. P. Mortlock.
Training and practical experience in clinical microbiology in the hospital laboratory of the Cornell Medical College and New York Hospital in New York City. Emphasis is on developing students' capability in the isolation and rapid identification of organisms from various types of clinical specimens. This course is intended to prepare the student for state and federal licensing in various areas of clinical microbiology. This is a full-time program, taking place from September to August of the student's senior year.]

BIOMI 408 Viruses and Disease I (also VETMI 408)
Spring. 3 credits. Prerequisites: BIOMI 290, 291; BIO G 305; and permission of instructor. Recommended: BIOGD 281. Lecs, M W 7:30 p.m. Offered alternate years. 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 neoplasis are highlighted in the context of approaches to prevent or reduce the severity of diseases.

[BIOMI 409 Viruses and Disease II (also VETMI 409)
Fall. 2 credits. Prerequisites: BIOMI 290 & 291. Recommended, BIOMI 408, BIOBM 330–332, BIOBM 432. Lecs, W 7–9:00 p.m. Offered alternate years. Not offered 1999–2000. G. Whittaker.
This course will be complementary to BIOMI 408, Viruses and Disease I, and will emphasize RNA viruses. The course will be complete in its own right. As such, completion of BIOMI 408 is not a requirement, but is encouraged. The structure and classification of viruses, virus entry, genome replication and assembly will be studied with particular emphasis on virus-host cell interactions. Vaccination, chemotherapy and evolution of viruses will also be discussed.]

BIOMI 415 Bacterial Diversity
Fall. 3 credits. Prerequisites: BIOMI 290, 291, and BIOBM 330 or 331 or 333. Lecs, M W F 11:15. S. H. Zinder.
A consideration of the physiology, ecology, genetics, and practical potential of important groups of bacteria. Topics include molecular methods for determining bacterial phylogeny and taxonomy, the evolution of diverse mechanisms of energy conservation, fixation of carbon and nitrogen, and adaptation to extreme environments.

BIOMI 416 Bacterial Physiology
Spring. 3 credits. Prerequisites: BIOMI 290, 291, and BIOBM 330 or 331 or 333, or their equivalents. Lecs, M W F 11:15. J. P. Shapleigh.
The concern is with the physiological and metabolic functions of bacteria. Consideration is given to chemical structure, regulation, growth, and energy metabolism. Special attention is given to those aspects of bacterial metabolism not normally studied in biochemistry courses.

BIOMI 417 Medical Parasitology (also VETMI 431)
Fall. 2 credits. Prerequisites: courses pertaining to zoology and biology. Offered alternate years. Lecs, T R 3:35–4:25. D. Bowman.
A systematic study of anthropod, protozoan, and helminth parasites of public health importance with emphasis on epidemiologic, clinical, and zoonotic aspects of these parasitisms.

BIOMI 485 Bacterial Genetics
Fall. 2 credits. Graduate students, see BIOMI 685. Prerequisite: BIOGD 281. Recommended: BIOMI 290 and BIOBM 330 or 331 and 332 or 333. Lecs, W 7:30–9:25 p.m. Staff.
Concepts and principles of formal genetic analysis as applied to prokaryotes, with emphasis on enterobacteria and their viruses. Topics include mutagenesis and isolation of mutants; genetic exchange, recombination and mapping; complementation, epistasis and suppression; transposons; gene expression and regulation; and genetics of bacterial pathogenesis.

BIOMI 652 (Section 03) Molecular Plant-Microbe Interactions (BIOPL 652, Sec 03)
Spring. 1 credit. Prerequisites: BIOGD 281, BIOBM 330 or 331 or 333, and BIOPL 653 (section 01) or their equivalents. S-U grades optional. Lecs, M W F 10:10 (12 lecs) first third of semester. S. C. Winans.
For course description, see BIOPL 652, Sec 03.

[BIOMI 685 Advanced Bacterial Genetics
Fall. 2 credits. Limited to graduate students; see BIOMI 485. Prerequisites: BIOGD 281 or equivalent, BIOBM 330 or 331 and 332 or equivalent, and permission of instructor. Recommended: BIOMI 290 or equivalent. Lec, W 7:30–9:25 p.m.; disc to be arranged. Not offered 1999–2000, 2000–2001. Staff.
Concepts and principles of formal genetic analysis as applied to prokaryotes, with emphasis on enterobacteria and their viruses. Lectures and some written assignments are shared with BIOMI 485; advanced topics from the primary literature are critically evaluated in the discussion.]

[BIOMI 692 Protein-Nucleic Acid Interactions
Spring. 3 credits. Prerequisites: BIOBM 330 or 331 or 333 and 633. Lecs, T R 10:10–11:25. Offered alternate years. Not offered 1999–2000. 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.]

[BIOMI 694 Genetics of Diverse Bacteria
Spring. 3 credits. Prerequisite: BIOMI 485 or equivalent. Lecs, M W 2:30–3:45. Not offered 1999–2000. Staff.
Selected topics in bacterial diversity, with strong emphasis placed on underlying molecular mechanisms. Topics include interactions between bacteria and plants and animals, prokaryotic developmental biology, biodegradation of xenobiotics, and synthesis of antibiotics.]

BIOMI 791 Advanced Topics in Bacterial Genetics
Fall or spring. 1 credit. May be repeated for credit. Prerequisite: graduate standing in microbiology. S-U grades only. Disc, T 4–5:00. S. C. Winans.
Discussion and critical evaluation of selections from the contemporary literature in bacterial genetics and molecular biology.

BIOMI 795–796 Current Topics in Microbiology
Fall, 795; spring, 796. 1/2 or 1 credit for each topic. May be repeated for credit. Designed primarily for graduate students in microbiology. Prerequisite: upper-level courses in microbiology. S-U grades only. Lecs to be arranged. Staff.
Lectures and seminars on special topics in microbiology.

BIOMI 797 Graduate Seminar in Microbiology
Fall and spring. 1 credit each semester. All students in the Graduate Field of Microbiology must enroll for at least their first three semesters in residence. Students are expected to lead discussions on recent primary literature in microbiology. S-U grades only. Sem to be arranged. Staff.

BIOMI 798 Graduate Research Seminar in Microbiology
Fall and spring. 1 credit each semester. Required of all graduate students in the Graduate Field of Microbiology. S-U grades only. Sem to be arranged. Staff.
A seminar relating to the research activities of those enrolled. Students who have completed the BIOMI 797 series requirement are required to present a seminar concerning their research interests and activities at least once each year.

BIOMI 799 Microbiology Seminar
Fall and spring. Required of all graduate students in the Graduate Field of Microbiology and open to all who are interested. Sem to be arranged. Staff.

Related Courses in Other Departments

Advanced Food Microbiology (Food Science 607)

Advanced Immunology Lectures (Biological Sciences [BIO G] 705 and Veterinary Microbiology 705)

Advanced Soil Microbiology (Soil, Crop, and Atmospheric Sciences 666)

Advanced Work in Bacteriology, Virology, or Immunology (Veterinary Microbiology 707)

Bacterial Plant Diseases (Plant Pathology 647)

Basic Immunology, Lectures (Biological Sciences [BIO G] 305 and Veterinary Microbiology 315)

Ciliophorology (Biological Sciences [BIOSM] 409)

Ecology of Soil-Borne Pathogens (Plant Pathology 644)

Food Microbiology, Laboratory (Food Science 395)

Food Microbiology, Lectures (Food Science 394)

Immunology of Infectious Diseases and Tumors (Biological Sciences [BIO G] 706 and Veterinary Microbiology 719)

Introduction to Scanning Electron Microscopy (Biological Sciences [BIO G] 401)

Introductory Mycology (Plant Pathology 309)

Light and Video Microscopy for Biologists (Biological Sciences [BIO G] 450)

Limnology: Ecology of Lakes, Lectures (Biological Sciences [BIOES] 457)

Magical Mushrooms, Mischievous Molds (Plant Pathology 201)

Microbiology for Environmental Engineering (Civil and Environmental Engineering 451)

Plant Virology (Plant Pathology 645)

Principles of Biogeochemistry (Biological Sciences [BIOES] 668)

NEUROBIOLOGY AND BEHAVIOR (BIONB)

BIONB 221 Neurobiology and Behavior I: Introduction to Behavior

Fall. 3, 4, or 5 credits (4 credits with one discussion per week; 5 credits with two discussions per week and participation in the Writing in the Majors program). 4- or 5-credit option required of students in the neurobiology and behavior program of study. Each 4-credit discussion section is limited to 20 students, with preference given to students studying neurobiology and behavior. Enrollment in the 5-credit option is limited to 15 students. Students may not preregister for the 5-credit option; interested students complete an application form on the first day of class. Not open to freshmen. Prerequisite: one year of introductory biology for majors. May be taken independently of BIONB 222. S-U grades optional. Lecs, M W F 12:20; disc to be arranged. S. T. Emlen and staff.

A general introduction to the field of behavior. Topics include evolution and behavior, behavioral ecology, sociobiology, chemical ecology, communication, rhythmicity, orientation and navigation, and hormonal mechanisms of behavior.

BIONB 222 Neurobiology and Behavior II: Introduction to Neurobiology

Spring. 3 or 4 credits (4 credits with discussion and written projects). 4-credit option required of students studying neurobiology and behavior. Each discussion limited to 20 students, with preference given to students studying neurobiology and behavior. Not open to freshmen. Prerequisites: one year of introductory biology for majors and one year of chemistry. May be taken independently of BIONB 221. S-U grades optional. Lecs, M W F 12:20; disc to be arranged. R. Booker and staff.

A general introduction to the field of cellular and integrative neurobiology. Topics include neural systems, neuroanatomy, developmental neurobiology, electrical properties of nerve cells, synaptic mechanisms, neurochemistry, motor systems, sensory systems, learning, and memory. Some discussion sections include dissections of preserved brains.

BIONB 322 Hormones and Behavior (also PSYCH 322)

Spring. 3 credits; two lectures plus a section in which students will read and discuss original papers in the field, give an oral presentation, and write a term paper. Limited to juniors and seniors. Prerequisites: PSYCH 223 or BIONB 221 or BIONB 222 or one year of introductory biology plus a course in psychology. S-U grades optional, but not recommended. Lec M W F 11:15. E. Adkins-Regan.

A major focus of the course will be comparative and evolutionary approaches to the study of the relationship between reproductive hormones and sexual behavior in vertebrates, including humans. Also included will be hormonal contributions to parental behavior, aggression, stress, learning and memory, and biological rhythms.

BIONB 324 Biopsychology Laboratory (also PSYCH 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 1:25–4:25. T. DeVoogd.

Experiments designed to provide research experience in animal behavior (including learning) and its neural and hormonal mechanisms. A variety of techniques, species, and behavior patterns are included. Live animals are used in the laboratory.

BIONB 325 Neurodiseases—Molecular Aspects

Fall. 3 credits. Prerequisites: two courses from BIONB 222, BIOGD 281, BIOBM 330, or 331; co-registration in one of the two is acceptable. S-U grades optional. Lecs, T R 9:05; disc, T 1:30 or 2:30. T. R. Podleski.

The intent of this course is to teach students how to use recombinant DNA techniques for the study of neurodiseases. 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, Prion diseases, schizophrenia, depression, disorders affecting ion channels, and muscular dystrophies. Emphasis is placed on how these studies provide a useful approach to studying the mammalian 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. Lecs, M W F 10:10; disc, 1 hour each week to be arranged. Offered alternate years. 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 PSYCH 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. 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 include invertebrate, "simple system" approaches, imprinting, avian song learning, hippocampal and cerebellar function, and human pathology. Many of the readings are from primary literature.

BIONB 392 Drugs and the Brain

Spring. 3 credits. Prerequisites: BIONB 222 or equivalent and permission of instructor. S-U grades optional. Lecs, T R 10:10–11:25; disc to be arranged. Offered alternate years. R. Harris-Warrick.

An introduction to neuropharmacology. After a brief introduction to pharmacology, there is discussion of the major neurotransmitter families. Topics include the biological actions of the major psychoactive drugs on the brain, including cocaine, amphetamines, alcohol, psychedelics, marijuana, antidepressants and antipsychotics.

BIONB 396 Introduction to Sensory Systems (also PSYCH 396 and 696)

Spring. 3 or 4 credits (4 credits with term paper or web site). 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 are expected to have elementary knowledge of perception, neurophysiology, behavior, and chemistry. No auditors. Lecs, M W F 10:10. Offered alternate years. B. P. Halpern.

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 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. The principles and limitations of major methods used to examine sensory systems are considered. General principles of sensory systems and auditory, visual, and somesthetic systems are covered. One aspect of each system (e.g., localization of objects in space by sound, color vision, and thermoreception) is selected for special attention. 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 PSYCH 431 and 631)

Fall. 3 or 4 credits (4 credits with term paper or web site). 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. Lecs, T R 10:10–11:25. 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. Brief written statements (by electronic mail) of questions and problems related to each set of assigned readings are required at least one day in advance of each class meeting. This course is taught using the Socratic Method, in which the instructor asks questions of the students. Students are expected to come to each class having already done, and thought about, the assigned readings. Use of e-mail and the internet are integral parts of the course.

[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: 254-4352). 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. Offered alternate years. Not offered 1999–2000. H. K. Reeve.

This is an intensive lecture and computer lab course on modeling strategies and techniques in the study of behavioral evolution. Population-genetic (including quantitative-genetic), 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 of cooperation and conflict within animal social groups. Students learn to assess critically recent 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 novel directions. The *Mathematica* software program is used as a modeling tool in the accompanying computer lab (no prior experience with computers required).]

[BIONB 424 Neuroethology (also PSYCH 424)

Spring. 3 credits. Prerequisites: BIONB 221 and 222. S-U grades optional. Lecs, T 9:05–11:05; R 9:05–9:55. Offered alternate years. Not offered 1999–2000. 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 knowledge and techniques in the neurosciences, many of the ethologist's mechanisms are being explained in terms of neural systems. This course reviews the status of research in neuroethology, including mechanisms of acoustic communication in insects and in verebrates, echolocation in bats and sound localization in owls, electroreception and electrolocation, 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 425 Molecular Neurophysiology

Spring. 3 credits. Prerequisite: BIONB 222 or permission of instructor. S-U grades optional. Lecs, T R 2:55–4:10. Offered alternate years. Not offered 1999–2000. D. McCobb.

Course focuses on the roles of the primary proteins generating cellular electrical signals and ion channels in nerve cells and other excitable cells (e.g., muscle, heart, glands). Cutting-edge electrophysiological and molecular genetic experiments will be reviewed. Diversity of excitable properties deriving from channel structure will be considered in the contexts of behavior and behavioral plasticity (learning), neural development, and channel evolution. Course format includes written and oral presentations reviewing scientific literature in selected areas and proposing new experiments.]

[BIONB 426 Animal Communication

Spring. 4 credits. Limited to 50 students. Prerequisite: BIONB 221. Letter grade only. Lecs, T R 2:30–4:25; disc, one hour each week to be arranged. Offered alternate years. Not offered 1999–2000. Staff.

A detailed examination of the study of communication by non-human animals. The course begins with an exploration of different conceptual frameworks used in the study of communication, then turns to specific studies of the mechanisms, ontogeny, functional design, and evolutionary history of the signaling systems used by animals. The class considers how communication provides humans with a window on the minds of other animals. Readings are drawn from the primary literature.]

BIONB 427 Animal Social Behavior

Fall. 4 credits. Limited to 30 students. Prerequisites: BIONB 221 and BIOES 261 or 278, and advance permission of instructor. S-U grades optional, with permission of instructor. Lecs and discs, T R 2:30–4:25. Offered alternate years. P. W. Sherman.

An intensive course for upper-division students interested in behavorial ecology and sociobiology. Lectures, discussions, and student presentations examine topics including adaptation, communication, mating systems, sexual selection, sex ratios, inbreeding and outbreeding, conflict and cooperation in animal societies, eusociality, kin recognition, and Darwinian medicine.

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 associate director's office.) 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, biorhythms, and communication. Topics, instructors, and time of organizational meeting are listed in the division's catalog supplement issued at the beginning of each semester.

[BIONB 429 Olfaction and Taste: Structure and Function (also PSYCH 429)

Spring. 3 or 4 credits (4 credits with term paper or research project, which can, but need not, study nonhuman vertebrates). Preference given to junior and senior psychology and biology majors and graduate students. Graduate students, see PSYCH 629. Prerequisite: a 300-level course in biopsychology or equivalent. Lecs, T R 9:05. Offered alternate years. Not offered 1999–2000. 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. Doty, L. M. Bartoshuk, and J. B. Snow; *The Neurobiology of Taste and Smell*, edited by T. E. Finger and W. L. Silver.]

[BIONB 430 Experimental Molecular Neurobiology

Spring. 2 credits. Limited to 12 students. Prerequisites: co-meeting with BIOBM 430 lab. Mandatory registration via web page: www.bio.cornell.edu/biochem/biobm/signup.html. Disc, one hour each week on day other than lab day; Lab T or R all day, or M and W afternoons, to be coordinated with other BIOBM 430 sections. Letter grade only. Offered alternate years. Not offered 1999–2000. D. L. Deitcher.

Experiments include PCR, cloning of DNA fragments, RNA purification, restriction digests, bacterial transformation, and DNA sequencing. Experiments will emphasize how molecular techniques can be applied to studying neurobiological problems.]

BIONB 470 Biophysical Methods

Spring. 3 credits. Limited to 20 students. Prerequisites: solid knowledge of basic physics and mathematics through the sophomore level; some knowledge of cellular biology helpful but not required. Letter grades only. Lecs T R 8:40–9:55. M. Lindau.

An overview of the diversity of modern biophysical experimental techniques used in the study of biological systems at the cellular and molecular level. Topics covered will include methods that examine both structure and function of biological systems, with emphsis on the applications of these methods to biological membranes. The course format will include assigned literature reviews by the students on specific biophysics topics and individual student presentations on these

topics. The course in intended for students of the engineering, physics, chemistry, and biological disciplines who seek an introduction to modern biophysical experimental methods.

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 T 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 introduce laboratory exercises and discuss results, to supplement laboratory topics, and for discussion of primary research papers. Extracellular and intracellular recording and voltage clamp techniques are used to analyze motor neuron and sensory receptor firing properties, and examine the cellular basis for resting and action potentials and synaptic transmission. A variety of preparations are used as model systems. Computer acquisition and analysis of laboratory results are emphasized.

[BIONB 492 Sensory Function (also PSYCH 492)
Spring. 4 credits. Limited to 25 students. Prerequisite: a 300-level course in biopsychology or BIONB 222 or BIOAP 311, or permission of instructors. Students are expected to have a knowledge of elementary physics, chemistry, and behavior. S-U grades optional. Lecs, M W F 10:10; disc, hours to be arranged. Offered alternate years. Not offered 1999–2000. B. P. Halpern, H. C. Howland.
This course covers classical topics in sensory function such as vision, hearing, touch, and balance, as well as some more modern topics like sensory coding, location of stimulus sources in space, the development of sensory system, and nonclassical 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.

This course will be taught using the Socratic method, in which the instructors ask questions of the students, and their answers will be discussed. Students will be expected to come to each class having read, thought about, and prepared to discuss the assigned readings and other assigned information resources. Students will submit brief analyses of, and comments and questions on, all assignments by e-mail to the course's electronic mailing list a day before each class meeting. The mailing list will distribute submissions to all members of the class and to the instructors. In addition to these brief triweekly written exercise, a term paper or web site in the form of a review article will be required.]

[BIONB 493 Developmental Neurobiology
Fall. 3 credits. Prerequisite: BIONB 222 or permission of instructor. S-U grades optional, with permission of instructor. Lecs, T R 11:40–12:55. Offered alternate years. Not offered 1999–2000. R. Booker.
Lectures covering the development of the nervous system, taking examples from both vertebrates and invertebrates. Emphasis is on cellular and molecular issues, that is, how do nerve cells differentiate both morphologically and biochemically? The role of cues such as hormones and developmental genes in neural development is discussed. Readings are taken from original journal articles.]

[BIONB 494 Comparative Vertebrate Neuroanatomy
Spring. 3 credits. Intended for juniors, seniors, and graduate students. Prerequisite: BIONB 222 or equivalent. S-U grades optional. Lecs, T R 10:10–11:30. Offered alternate years. Not offered 1999–2000. A. H. Bass.
Organization and evolution of neuroanatomical pathways as substrates for species-typical vertebrate behaviors. The course is divided into three major sections: development, general principles of brain organization, and co-evolution of vertebrate brain and behavior.]

BIONB 495 Molecular and Genetic Approaches to Neuroscience
Fall. 3 credits. Limited to juniors, seniors, and graduate students. Prerequisites: BIONB 222 and BIOBM 330 or 332. Letter grade only. Lecs, T R 2:55–4:10. Offered alternate years. D. Deitcher.
Focus of the course is on how different molecular and genetic approaches have led to major advances in neuroscience. Lectures, student presentations, and discussions examine original research articles. Topics include ligand-gated channels, potassium channels, seven membrane spanning receptors, development of the neuromuscular junction, neurotransmitter release, second messengers, and learning and memory.

[BIONB 496 Bioacoustic Signals in Animals and Man
Spring. 3 credits. Limited to 12 junior, senior, and graduate students. Prerequisites: one year of introductory biology, PHYS 101–102 or 207–208, and permission of instructor. S-U grades optional. Lecs, M W 9:05; lab to be arranged. Offered alternate years. Not offered 1999–2000. C. W. Clark, R. R. Hoy.
Humans and most terrestrial animals live in a world of sound. Acoustic signals mediate social interactions and predator-prey behavior. This course teaches students about animal acoustical communication by introducing them to the different communication systems that are based on sound. The course presents the physical properties of sound, the physiological mechanisms of sound production and hearing, and an analysis of the behavioral context of signaling. In the laboratory students learn how to record, synthesize, and analyze acoustic signals with the aid of tape recorders and the Macintosh computer. Laboratories are designed around the lecture material and provide "real-world" exercises designed to stimulate discovery of the fundamental principles described in class. Class research projects on a selected topic in bioacoustics are required. The laboratory is based on software instrumentation running on a Macintosh II platform equipped with A/D-D/A data acquisition boards.]

[BIONB 623 Chemical Communication (also CHEM 622)
Fall. 3 credits. Primarily for research-oriented students. Limited to 30 students. Prerequisites: one year of introductory biology for majors or equivalent, course work in biochemistry, and CHEM 358 or equivalent. Lecs, M W 10:10; disc, F 10:10. Offered alternate years. Not offered 1999–2000. T. Eisner, J. Meinwald, W. L. Roelofs, and guest lecturers.
The production, transmission, and reception of chemical signals in communicative interactions of animals, plants, and microorganisms. Studies of insects are emphasized. Specific topics are treated with varying emphasis on chemical, biochemical, ecological, behavioral, and evolutionary principles.]

BIONB 626 Sex Differences in Brain and Behavior (also PSYCH 524)
Spring. 2 credits. Limited to 12 students. Prerequisite: BIONB 322 or permission of instructor. Discs and sems 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.

BIONB 720 Seminar in Advanced Topics in Neurobiology and Behavior
Fall or spring. Variable credit. May be repeated for credit. Primarily for graduate students; written permission of instructor required for undergraduates. S-U grades optional. Sem to be arranged. Staff and students.
Designed to provide several study groups each semester on specialized topics. A group may meet for whatever period is judged adequate to enable coverage of the selected topics. Ordinarily, topics are selected and circulated during the preceding semester. Discussion of current literature is encouraged. Suggestions for topics should be submitted by faculty or students to the chair of the Section of Neurobiology and Behavior.

BIONB 721 Introductory Graduate Survey in Neurobiology and Behavior
Fall. 2 credits. Required of graduate students majoring in neurobiology and behavior. Concurrent registration in BIONB 221 and 222 not required. S-U grades only. Lecs and discs, T 10:10–12:05. H. C. Howland.
Lectures, readings, and discussion to introduce first-year graduate students to the research activities of the faculty in the Graduate Field of Neurobiology and Behavior. Class meets weekly for two hours. Students will also prepare a research proposal on a potential topic for their thesis research (in the format of an NSF or NIH grant). This proposal will be prepared in consultation with one or more relevant faculty members.

[BIONB 723 Advanced Topics in Animal Behavior
Fall or spring. Variable credit. May be repeated for credit. Primarily for graduate students in behavior. Prerequisite: permission of instructor. S-U grades optional. Sem to be arranged. Not offered 1999–2000. Staff.
A seminar on a specific topic in animal behavior. The instructor presents lectures during the first few course meetings; the remainder of the course is devoted to student presentations. Topic and instructor are listed in the division's catalog supplement issued at the beginning of the semester.]

[BIONB 724 Field Methods in Animal Behavior
Fall or spring. Variable credit. May be repeated for credit. Primarily for graduate students in behavior. Prerequisite: permission of instructor. S-U grades optional. Sem and fieldwork to be arranged. Not offered 1999–2000. Staff.
A seminar-field experience course designed for first-year graduate students in animal behavior. Weekly seminars discussing field methodology, data collection, and hypothesis testing are followed by an intensive period (ten days to two weeks) in the field. Specific topics and field sites vary from semester to semester. Topic and instructor are listed in the division's catalog supplement issued at the beginning of the semester.]

[BIONB 790 Advanced Topics in Cellular and Molecular Neurobiology
Fall or spring. Variable credit. May be repeated for credit. Limited to graduate students and advanced undergraduates studying neurobiology and behavior. Prerequisite: BIONB 222. S-U grades optional. Lecs and sem to be arranged. Not offered 1999–2000. Staff.
A lecture-seminar course on selected topics in cellular and molecular neurobiology. Students read original papers in the scientific literature and lead discussions of these articles. Suggestions for topics may be submitted by faculty or students to the chair of the Section of Neurobiology and Behavior. Topic and instructor are listed in the division's catalog supplement issued at the beginning of the semester.]

[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. Not offered 1999–2000. 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. Lecs and discs to be arranged. Not offered 1999–2000. 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. Not offered 1999–2000. 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 and Development (BIOGD 480/780; BIOES 760; BIO G 400)

Evolution of Human Behavior (Psychology 326)

Human Behavior: A Sociobiological Perspective (Anthropology 476)

Insect Behavior Seminar (Entomology 662)

Neurobiology of Animal Behavior (Biological Sciences [BIOSM] 327)

Primates and Evolution (Anthropology 490)

Primate Behavior and Ecology (Anthropology 390)

Teaching Experience (Biological Sciences [BIO G] 498)

The Brain and Sleep (Psychology 440/640)

Undergraduate Research in Biology (Biological Sciences [BIO G] 499)

OTS Undergraduate Semester Abroad Programs

Shoals Marine Laboratory Program

PLANT BIOLOGY (BIOPL)

BIOPL 240 Green World/Blue Planet
Spring. 3 credits. S-U grades optional. Lecs, T R 1:25–2:40. K. J. Niklas and staff.
The course focuses on helping individuals understand how scientific information relates to the issues they face as citizens, in management decision making, and in public policy. To what extent should genetic engineering of crop plants be permitted? Should we place limits on fossil fuel consumption as a means of limiting global warming and global climate change? Must human endeavors be restricted in certain areas to maintain diversity? The format of this course is interactive, with lectures and discussions about how we as a society deal with controversial issues.

BIOPL 241 Introductory Botany
Fall. 3 credits. Lecs, T R 9:05; lab, M T W or R 1:25–4:25, or M 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 still required to attend the afternoon field trips.*

BIOPL 242 Plant Physiology, Lectures
Spring. 3 credits. Lecs, M W F 10:10. S-U grades optional. Primarily for undergraduates in agricultural sciences, but also for any Biological Sciences students wanting to know about plant function. Suitable as a second-level course for nonmajors to satisfy the biology distribution requirement. Prerequisites: one year of introductory biology and/or BIOPL 241. Recommended: one year of introductory chemistry. Concurrent enrollment in BIOPL 244 required of plant science undergraduates and highly recommended for other science majors. May not be taken for credit after BIOPL 342 except by written permission of instructor. Evening prelims Feb. 24 and March 30. P. J. Davies.
How plants function and grow. Examples deal with crop plants or higher plants where possible, though not exclusively. Topics include cell structure and function; plant metabolism, including photosynthesis; light relations in crops; plant-water relations; water uptake, transport, and transpiration; irrigation of crops; sugar transport; mineral nutrition; growth and development—hormones, responses to light, flowering, fruiting, dormancy, and abscission; stress; tissue culture; and genetic engineering of plants.

[BIOPL 243 Taxonomy of Cultivated Plants (also HORT 243)
Fall. 3 credits. Prerequisite: one year of introductory biology or written permission of instructor. May not be taken for credit after BIOPL 248. Lecs, M W 10:10; labs, W 2–4:25. Offered alternate years. Not offered 1999–2000. M. A. Luckow.
A study of ferns and seed plants, their relationships, and their classification into families and genera, emphasizing cultivated plants. Particular emphasis is placed on gaining proficiency in identifying and distinguishing families and in preparing and using analytic keys. Attention is also given to the economic importance of taxa, to the basic taxonomic literature, and to the elements of nomenclature.]

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. T. Silva.
Experiments exemplify concepts covered in BIOPL 242 and offer experience in a variety of biological and biochemical techniques, including use of small amounts of radioisotopes.

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. T. Silva.
Introductory botany, including plant identification. Emphasizes structure, reproduction, and classification of flowering plants. Much of the laboratory work is conducted outdoors taking advantage of several outstanding natural areas which are available for study. Those who lack college-level biology are expected to work closely with the instructor on supplemental instructional materials.

BIOPL 247 Ethnobiology
Fall. 3 credits. S-U grades optional. Lecs, T R 11:15; disc, R 12:20 or 1:25. D. M. Bates.
A consideration of the principles, methods, and issues of ethnobiology. Emphasis is on the past and present ecological, evolutionary, economic, and cultural interrelationships of humans in traditional and lay societies with their plants and animals, as a means of understanding the place and future of humans in the biosphere. Traditional medicines, underutilized organisms, resource management, and ownership of nature, and methodology are among the topics covered.

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. Lecs, M W F 9:05; lab, W or R 1:25–4:25. J. I. Davis.
An introduction to the classification of vascular plants, with attention to the goals of taxonomy, the processes of plant evolution, and the means of analyzing evolutionary relationships among plants. The laboratory concentrates on methods of plant identification and presents an overview of vascular plant diversity, with particular attention to the flowering plants.

BIOPL 340 Methods in Chemical Prospecting
Spring. 2 credits. Prerequisites: Intro Biology (BIOG 101–104, 105–106, 107–108) required. Completion or concurrent enrollment in organic chemistry, recommended. Lab to be arranged. Offered alternate years. J. Berry and E. Rodriguez.
Student participants will learn theory and methodologies, including biological assays and other techniques, related to investigation of natural products from the biological world, and apply these methodologies to individual research projects. Each student will present results of their research in a poster session, in addition to preparing a scientific report.

BIOPL 342 Plant Physiology, Lectures
Spring. 3 credits. Prerequisites: one year of introductory biology 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. Lecs, T R 10:10–11:25. T. G. Owens.
An integrated and interdisciplinary study of the processes that contribute to the growth, competition, and reproduction of plants. Topics include, but are not limited to, plant water relations, membrane properties and processes, photosynthesis, plant respiration, mineral and organic nutrition, stress physiology, control of growth and development, and responses to the environment. Emphasis is on the relationship between structure and function from the molecular to the whole-plant level.

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. M. E. Nasrallah.
An introduction to current studies involving recombinant DNA technology and its application to the improvement of plants. The course emphasizes genetic transformation methodology, gene expression systems, and strategies for increasing productivity. The course is directed at undergraduates who wish to become familiar with the theory and practice of plant biotechnology.

BIOPL 344 Plant Physiology, Laboratory
Spring. 2 credits. Prerequisite: concurrent enrollment in BIOPL 342. May not be taken for credit after BIOPL 244. Similar to BIOPL 244 but at a more advanced level. Lab, W 1:25–4:25; disc, W 12:20. T. Silva.
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, with emphasis on experimental design.

BIOPL 345 Plant Anatomy
Fall. 4 credits. Limited to 15 students. Prerequisite: one year of introductory biology or a semester of botany. Lecs, M W 9:05; labs, M W 2–4:25. Offered alternate years. 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 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 12:25–4:25. M. E. Nasrallah.
A companion to BIOPL 343 with laboratory activities that focus on the practice of plant biotechnology. Students will transfer genes to plants by a variety of methods, and will analyze their expression in the host genome by use of reporter gene assays, and by the preparation and analysis of nucleic acids.

BIOPL 348 The Healing Forest
Spring. 2 credits. Prerequisites: BIOPL 247 or BIOPL 241, 243, or 248 or permission of instructor. Lec/disc, R 2:30–4:25. Offered alternate years. D. M. Bates, E. Rodriguez.
An ethnobotanical consideration of the role of plants in traditional and western medicine. Studies of indigenous and lay societies illustrate the ecological, systematic, biochemical, and cultural aspects of herbal medicines and are placed in the broader context of such interdependent themes as the conservation of biological and cultural diversity, human health, bioprospecting, compensation for indigenous knowledge, and sustainable development.

[BIOPL 440 Phylogenetic Systematics
Fall. 4 credits. Limited to 24 students. Prerequisite: graduate standing or permission of instructor. Lecs, T R 10:10; labs, T R 2:00–4:25. Offered alternate years. Not offered 1999–2000. K. C. Nixon.
Basic and advanced theory and methods of phylogenetic analysis. Students are introduced to cladistic analysis using parsimony and gain experience with computer-aided analysis of taxonomic data, including both morphological and molecular data sources. Topics discussed include applications of phylogenetic methods to biogeography and evolutionary studies.]

BIOPL 441 Systematics and Evolution of Crops
Fall. 2 credits. Prerequisite: an advanced-level course in the plant sciences with taxonomic content or permission of instructor. Lecs, R 12:20–2:15. Offered alternate years. D. M. Bates.
An integrated study of the systematics and evolution of agronomic and horticultural species. Processes of domestication, the evolutionary history of selected cultigens, the nature of weeds and land races, classification and nomenclature as applied to cultivated plants, and underexploited plant resources are among the topics considered.

BIOPL 442 Current Topics in Ethnobiology
Fall. 2 or 4 credits (4 credits with an independent research component and term paper). Prerequisites: BIOPL 247, 348, or permission of instructor. Offered alternate years. Lec/disc, T 2:30–4:25. E. Rodriguez, D. M. Bates.
Explorations of the interrelationships of plants and animals with humans from a wide range of perspectives. Topics considered are contemporary issues, theory, and methodology of ethnobotany and ethnobiology, and the role of plants and animals in human lives, in subsistence and exchange, and in thought.

BIOPL 443 Topics and Research Methods in Systematics
Fall or spring. 1–2 credits (1 credit per section). Prerequisite: written permission of instructor. S-U grades optional.
A series of 1-credit modules on specialized topics in systematics. Topics and instructors vary each semester. May not be taught every semester. Topics and instructors are listed in the division's catalog supplement issued at the beginning of the semester.

BIOPL 444 Plant Cell Biology
Fall. 4 credits. Limited to 24 students. Prerequisites: 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 mystery of the living cell. The dynamics of protoplasm, membranes, and the various organelles are studied. The mechanisms of cell growth and division, the relationship of the cytoskeleton to cell shape and motility, the interaction of the cell with its environment, and the processes that give rise to multicellular differentiated plants are investigated.

[BIOPL 445 Photosynthesis
Fall. 3 credits. Prerequisites: one year of college chemistry and mathematics. Recommended: one year of college physics and plant physiology. Lecs, M W F 10:10. Offered alternate years. Not offered 1999–2000. T. G. Owens.
An introduction to the processes of photosynthesis in plants, algae and bacteria. An interdisciplinary approach is emphasized incorporating biochemical, biophysical, physiological and molecular perspectives. The course will cover the range of processes involved in photosynthesis beginning with light harvesting and primary photochemistry through electron transport and inorganic carbon fixation. Emphasis will be placed on the regulation of photosynthesis from the cellular to the whole-plant level.]

BIOPL 447 Molecular Systematics
Fall. 3 credits. Prerequisites: BIOES 278 or BIOGD 281 or BIOBM 332, or written permission of instructor. Lecs, T R 8:30–9:55. Offered alternate years. J. J. Doyle.
The theory and practice of using molecular evidence, particularly DNA sequence data, for addressing diverse systematic and evolutionary questions. Emphasis is on phylogeny reconstruction, particularly in eukaryotic systems. The organization and evolution of nuclear and organellar genomes is described from the standpoint of their suitability for systematic and evolutionary studies.

[BIOPL 448 Plant Evolution and the Fossil Record
Spring. 3 credits. Prerequisite: BIOPL 241 or equivalent, or permission of instructor. Lecs, T R 9:05; lab, R 12:20–2:15. Offered alternate years. Not offered 1999–2000. K. J. Niklas, W. L. Crepet.
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.]

BIOPL 453 Principles and Practice of Historical Biogeography (also ENTOM 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. Offered alternate years. 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 discussed. The laboratories focus on hands-on computer applications of modern techniques and discussion of controversial issues in biogeography.

BIOPL 466 Physiological Plant Ecology, Lectures (also BIOES 466)
Spring. 3 credits. Limited to 45 students. Prerequisite: BIOES 261 or introductory plant physiology. S-U grades optional, with permission of instructor. Lecs, M W 8:40–9:55; optional disc to be arranged. Offered alternated years. Staff.
For course description, see BIOES 466.

[BIOPL 468 Physiological Plant Ecology, Laboratory (also BIOES 468)
Spring. 2 credits. Limited to 15 students. Prerequisite: previous or concurrent enrollment in BIOES 466. Lab, W 1:25–4:25, plus additional lab hours to be arranged. Offered alternate years. Not offered 1999–2000. Staff.
For course description, see BIOES 468.]

BIOPL 641 Laboratory in Plant Molecular Biology
Spring. 4 credits. Prerequisites: BIOGD 281 or equivalent, BIOBM 330 or 331 or equivalent, and permission of instructor. Students (including graduate students) strongly advised to preregister by Nov. 29, in the Section of Plant Biology main office (Room 228, Plant Science Building). S-U grades optional. Lab, T 9:05–4:30. J. B. Nasrallah, M. R. Hanson.
Selected experiments on gene expression, gene transfer, and assay of reporter genes in plants. The course emphasizes the application of molecular biology methodology to plant systems. Additional lab time is required to complete assignments.

[BIOPL 642 Plant Mineral Nutrition (also SCAS 642)
Spring. 3 credits. Prerequisite: BIOPL 342 or equivalent. Lecs, M W F 10:10. Offered alternate years. Not offered 1999–2000. L. V. Kochian, R. M. Welch.
A detailed study of the processes by which plants acquire and use mineral nutrients from the soil. Topics include the uptake, translocation, and compartmentation of mineral elements; root-soil interactions; the metabolism of mineral elements; the involvement of mineral nutrients in various physiological processes; and the nutrition of plants adapted to extreme environmental stresses (e.g., acid soils). Specific mineral elements are emphasized to illustrate these topics.]

BIOPL 643 Plant Physiology, Advanced Laboratory Techniques
Spring. 4 credits. Prerequisites: organic chemistry, biochemistry, and a course in plant physiology. S-U grades only. Lab, T or W 8–5:00; disc, M 4:30–5:30. Requires minimum enrollment of 6 students. Offered alternate years. Staff.
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, sensitive growth measurements, HPLC and GC-MS, and computer interfacing with laboratory equipment.

BIOPL 644 Regulatory Factors in Plant Growth and Development
Spring. 1–2 credits (1 credit per section). Prerequisites: BIOPL 242 or 342 or equivalent, or permission of instructor. Two modules, which can be taken together or in isolation. These mesh with BIOPL 652–03 and BIOPL 653–04 (Molecular Aspects of Plant Development II and I respectively). S-U grades optional. Offered alternate years.

Section 01 Plant Hormones
1 credit. Lecs M W F 9:05 (14 lecs) January 24-February 23. P. J. Davies.
Plant Hormones: their role in plant growth and development, analysis, biosynthesis and mode of action, including signal transduction, examined from a physiological, biochemical and molecular point of view. The course covers auxin, gibberellin, cytokinin, ethylene, abscisic acid, brassinosteroids and other compounds as appropriate.

Sec 02 Phytochrome and Photomorphogenesis
1 credit. Lecs M W F 9:05 (12 lecs) April 3-April 28. P. J. Davies.
A study of the regulation of plant growth and development by light as perceived through the pigments phytochrome and cryptochrome. This will include the biochemistry and molecular biology of phytochrome and the way in which phytochrome modulates plant growth, including molecular and genetic analysis of its effects and the mechanisms by which it acts. The role of phytochrome in detecting and modulating growth in natural and agricultural environments will also be covered.

[BIOPL 645 Families of Tropical Flowering Plants
Fall. 1 credit. Prerequisite: written permission of instructor. S-U grades only. Lec and disc, F 11:15. Offered every three years. Not offered 1999–2000. K. C. Nixon.
The families of flowering plants encountered solely or chiefly in tropical regions are considered in lectures, discussions, and demonstrations, with the aim of providing basic points of recognition for, and an understanding of, diversity and relationships in these families for the student venturing into the tropics.]

[BIOPL 646 Families of Tropical Flowering Plants: Field Laboratory
Intersession. 3 credits. Limited to 20 students, with preference given to graduate students from member institutions of the Organization for Tropical Studies. Prerequisite: BIOPL 243 or 248 or equivalent. Recommended: BIOPL 645. S-U grades only. For more details and application, contact the L. H. Bailey Hortorium, 467 Mann Library. Offered every three years. Not offered 1999–2000. K. C. Nixon.
An intensive orientation to families of tropical flowering plants represented in forests of the American tropics. Emphasis on field identification combined with laboratory analysis of available materials in a "whole-biology" context.]

BIOPL 647 Seminar in Systematic Botany
Fall or spring. 1 credit. May be repeated for credit. Prerequisite: written permission of course coordinator required for undergraduates. S-U grades optional. Sem, T 11:15–1:10. Bailey Hortorium staff.
Lectures and discussions led by staff, visitors, and students on topics of current importance to systematic botany.

[BIOPL 648 Plant Biochemistry
Spring. 3 credits. Prerequisites: organic chemistry, biochemistry, and a course in plant physiology. Lecs, M W F 9:05. Offered alternate years. Not offered 1999–2000. T. G. Owens and staff.
Selected areas of plant biochemistry are reviewed in the context of the plant life cycle and responses to the environment. Topics include metabolism of lipids, carbohydrates, organic acids, phenolic compounds, and proteins; nitrogen and sulfur assimilation; respiration; photosynthesis; development and replication of chloroplasts; and cell-wall composition and properties. Attention is paid to operation of control mechanisms.]

BIOPL 649 Physiology of Ion and Water Transport in Plants
Fall. 1–3 credits (1 credit per section). Prerequisite: BIOPL 342 or equivalent, or permission of the instructor. Offered alternate years. Three modules that may be taken independently, although section 01 is recommended before taking section 02. R. M. Spanswick.

Section 01 Basic Principles of Ion Transport and Electrophysiology
1 credit. Lecs T R 10:10–11:30 (9 lecs) August 26-Sepetember 23.
The biophysical basis of ion transport across cell membranes, including membrane structure, ion fluxes and their measurement, the thermodynamic criterion for active transport, and the relationship between ion transport and the electrical properties of cell membranes.

Section 02 Ion Transport in Plants
1 credit. Lecs TR 10:10–11:30 (9 lecs) September 28-October 28.
Transport of the major ions in plant cells and whole plants. Properties of proton ATPases and their relationship to the transport of ions, sugars and amino acids at the plasma membrane and tonoplast. Ion channels in plant cell membranes. Intercellular ion transport via plasmodesmata. Long distance ion transport in higher plants.

Section 03 Water Transport in Plants
1 credit. Lecs TR 10:10–11:30 (9 lecs) November 2-December 2.
Water relations of plant cells and tissues using water potential terminology. Permeability of plant cells to water and the role of aquaporins. Transport of water through whole plants, including transpiration, stomatal physiology and the effects of water stress.

[BIOPL 651 Quantitative Whole-Plant Physiology
Fall. 3 credits. Prerequisites: introductory physics, calculus, and plant physiology. S-U grades only. Lecs, T R 10:10–11:30. Offered alternate years. Not offered 1999–2000. R. M. Spanswick.
An exploration of the extent to which physiological processes and their interactions can be formulated in a quantitative manner and integrated to describe various aspects of plant behavior, including growth and yield. Consideration is given to characterization of the plant environment, energy balance, gas exchange, water relations, photosynthesis, respiration, translocation, nutrient supply, and the timing of developmental events.]

BIOPL 652 Plant Molecular Biology II
Spring. 1–4 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.

Section 01 Molecular Plant-Pathogen Interactions (also PLPA 662)
1 credit. Lecs, M W F 10:10 (12 lecs) Jan. 26-Feb. 21. T. P. Delaney, A. R. Collmer, O. C. Yoder.
An examination of the molecular properties that control the development of host-parasite interactions in both microorganisms (bacteria and fungi) and higher plants. Contemporary theories describing the genetic and molecular mechanisms of microbial pathogenesis and plant resistance are discussed.

Section 02 Molecular Plant-Microbe Interactions (BIOMI 652)
1 credit. S-U grades optional. Lecs, M W F 12:20 (12 lecs) Jan. 26-Feb. 21. S. C. Winans.
Course focuses on the interactions of *Agrobacteria* and *Rhizobia* with plants. Topics on *Agrobacterium*-plant interactions include plant-microbe recognition mechanisms, T-DNA transfer process, oncogenesis and use of *Agrobacterium* to produce transgenic plants. Topics on *Rhizobium*-plant interactions include regulation of nitrogenase activity and expression, organization and function of the *sym* plasmid, nodule development, and plant genetics involved in plant-microbe interaction.

Section 03 Molecular Aspects of Plant Development II
1 credit. S-U grades optional. Lecs, M W F 10:10 (12 lecs) Feb. 23-Mar. 27. S. H. Howell.
The molecular genetics of plant development. This module focuses on vegetative development and includes topics such as the development of the shoot, root, and vasculature and the operation of the vegetative shoot apical meristem. The module is a companion to BIOPL 653, Sec 04 (Plant Development I), which covers molecular aspects of reproductive development.

Section 04 Plant Gene Evolution and Phylogeny
1 credit. Lecs, M W F 1:25 (12 lecs) Mar. 29-Apr. 24. J. J. Doyle.
Practical applications of molecular systematics/evolution for plant molecular biologists and other non-systematists. The course focuses on two basic issues: methods and principles for inferring relationships among genes and the use of data to hypothesize relationships among plants. Evolutionary patterns and processes of genes and gene families are discussed, as well as rates of sequence evolution, paralogy and othology, the effects of recombination and concerted evolution of gene phylogenies, and the implications of using gene or allele phylogenies to infer organismal-evolutionary patterns. The principles of distance and parsimony methods are described, and computer methods for reconstructing gene phylogenies are discussed.

BIOPL 653 Plant Molecular Biology I
Fall. 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. Coordinator: S. H. Howell.
A series of four-week modules on specialized topics.

Section 01 Concepts and Techniques in Plant Molecular Biology (also PLPA 663–01)
1 credit. Lecs, M W F 10:10 (12 lecs) Sept. 1-Sept. 27. T. Delaney, G. B. Martin.
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, plant transformation, mutant production, and use of sequence databases.

Section 02 Plant Biotechnology (also PLBR 653.2 and PLPA 663)
1 credit. Lecs, M W F 1:25 (12 lecs) Sept. 29-Oct. 27. M. Zaitlin, E. D. Earle.
This course deals with production and uses of transgenic plants for agricultural and industrial purposes. Topics include procedures for gene introduction and control of gene expression, as well as strategies for obtaining transgenic plants that are resistant to insects, diseases, and herbicides, produce useful products, or have improved nutritional and food processing characteristics. Regulatory and social issues relating to plant biotechnology are discussed.

[Section 03 Plant Genome Organization (also PLBR 653.3)
1 credit. S-U grades optional. Lecs, M W F 10:10 (12 lecs). Offered alternate years. Not offered 1999–2000. S. D. Tanksley.
The structure and variation of plant nuclear genomes, including changes in genome size, centromere/telomere structure, DNA packaging, transposable elements, genetic and physical mapping, positional gene cloning, genomic sequencing and comparitive genomics.]

Section 04 Molecular Aspects of Plant Development I
1 credit. Lecs, M W F 10:10 (12 lecs) Oct. 29-Nov. 24. J. B. Nasrallah.
This module focuses on the molecular genetics of plant reproduction. Current approaches to the elucidation of the molecular signals and pathways that lead to the establishment of the differentiated state of floral cells and organs are discussed. Topics include the establishment of pattern during floral morphogenesis, cell death and sex determination, gamete development, cell-cell signaling during pollination, and fertilization. The module is a companion to BIOPL 652, Sec 02 (Molecular Aspects of Plant Development II), which covers molecular aspects of vegetative development.

Section 05 Molecular Biology of Plant Organelles
1 credit. S-U grades optional. Lecs, M W F 1:25 (12 lecs) Oct. 29-Nov. 29. M. R. Hanson (odd years), D. B. Stern (even years).
An in-depth examination of the molecular biology of plant mitochondria (odd years) and plastids (even years). Topics include the organization and expression of organelle genomes, RNA editing, organelle transformation, expression of nuclear genes for organelle proteins. Special topics include cytoplasmic male sterility and gene regulation during plastid development.

Section 06 Molecular Breeding and Genetic Diversity
1 credit. Lecs M W F 10:10 (12 lecs) September 29-October 27. Offered alternate years. S. D. Tanksley, S. Kresovitch.
Application of DNA markers to the evaluation of genetic diversity in natural populations and germplasm collection as well as the identification, manipulation and isolation of genes important to plant and animal productivity using molecular genetic techniques. Students will learn how to design and execute experiments for identification of quantitative trait loci (QTLs) as well as how to apply molecular markers to plant and animal breeding programs. Strategies will also be taught for the use of DNA polymorphisms in the management of genetic resources.

[BIOPL 654 Botanical Nomenclature
Fall. 1 credit. Prerequisite: written permission of instructor. S-U grades only. Lec and disc to be arranged. Offered alternate years. Not offered 1999–2000. Staff.
An analysis of the International Code of Botanical Nomenclature and its application to various plant groups.]

BIOPL 656 Topics in Plant Evolution
Spring. 1 credit. Prerequisite: BIOPL 448 or equivalent background in evolution, or written permission of instructor. Lab and disc to be arranged. Offered alternate years. 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.

BIOPL 740 Plant Biology Seminar
Fall and spring. No credit (no official registration). Required of graduate students doing work in plant biology. Sem, F 11:15. Staff.
Lectures on current research in plant biology, presented by visitors and staff.

BIOPL 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.

BIOPL 742 Current Topics in Plant Molecular Biology
Fall or spring. 1 credit. Enrollment is limited. 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. P. J. Davies.
Fall topic: molecular aspects of plant hormone biosynthesis, signal transduction and action. 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.

BIOPL 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.

BIOPL 745 Current Topics in Systematics
Fall. 1 credit. Limited to graduate students, except by permission of instructor. S-U grades optional. Disc, T 12:20. Bailey Hortorium staff.
A seminar with presentations and discussion by students of original research papers in systematic biology.

BIOPL 746 Research Seminar in Systematic Botany
Spring. 1 credit. Limited to graduate students, except by permission of instructor. Disc, T 12:20. Bailey Hortorium staff.
A student-led seminar presentation based on his or her thesis research or a related topic.

BIOPL 749 Graduate Research in Botany
Fall or spring. Variable credit. May be repeated for credit. S-U grades optional. Hours to be arranged. Staff.
Similar to BIO G 499 but intended for graduate students who are working with faculty members on an individual basis.

BIOPL 840 Current Topics in Plant Physiology
Fall or spring. 2 credits. May be repeated for credit. S-U grades only. Sem to be arranged. P. J. Davies.
Fall topic: molecular aspects of plant hormone biosynthesis, signal transduction and action. Seminar reports by graduate students on current literature in experimental plant physiology or related areas.

Related Courses in Other Departments

Introductory Mycology (Plant Pathology 309)

Marine Botany: Ecology of Marine Plants (Biological Sciences [BIOSM] 449)

Mycology Conferences (Plant Pathology 649)

Phytomycology (Plant Pathology 709)

Plant Ecology and Population Biology, Lectures and Laboratory (Biological Sciences [BIOES] 463 and 465)

Plant Ecology Seminar (Biological Sciences [BIOES] 669)

Plant Cytogenetics Laboratory (Plant Breeding 446)

Teaching Experience (Biological Sciences [BIO G] 498)

Undergraduate Research in Biology (Biological Sciences [BIO G] 499)

COURSES IN MARINE SCIENCE

Cornell offers an extensive listing of undergraduate courses in marine science.

Undergraduates interested in pursuing studies in marine science are encouraged to explore the undergraduate specialization in Marine Biology offered through the Division of Biological Sciences, the undergraduate specialization in Ocean Sciences offered through the Science of Earth Systems Program, and the summer program of courses offered by the Shoals Marine Laboratory. Further information on these programs can be found at the Cornell Marine Programs Office, G14 Stimson Hall.

Undergraduate Specialization in Marine Biology and Oceanography

Biological Sciences majors in the ecology and evolutionary biology program of study have the option of specializing their program of study in the area of marine biology. This specialization is intended for students with interests in understanding the unique aspects of organismal biology in the marine environment. In addition to fulfilling the major and the ecology and evolutionary biology program of study requirements, students in marine biology are encouraged to enroll in the following courses:

1) BIOES 154, The Sea: An Introduction to Oceanography,
2) BIOSM 364, Field Marine Science or a 400-level BIOSM field course at the Shoals Marine Laboratory,
3) BIOES 462, Marine Ecology.

Undergraduate Specialization in Ocean Sciences

Science of Earth Systems majors have the option of specializing their program of study in the area of ocean sciences. This interdisciplinary specialization is intended for students with interests in understanding the interaction of biological, chemical, geological, and physical processes in ocean systems. In addition to fulfilling the Science of Earth Systems general requirements (see the SES program description in Interdisciplinary Centers, Programs, and Studies section of catalog), students in ocean sciences are required to take four advanced courses from the following list to fulfill their major requirements:

1) BIOES 373 Marine Invertebrate Zoology
2) BIOES 457 Limnology
3) BIOES 462 Marine Ecology
4) BIOES 478 Ecosystem Biology
5) BIOSM 309 Climates and Ecosystems
6) BIOSM 364 Field Marine Science
   BIOSM 375 Field Marine Ecology
7) BIOSM 365 Underwater Research
8) BIOSM 366 SEA: Introduction to Oceanography
9) BIOSM 369 SEA: Oceanography I
10) BIOSM 370 SEA: Oceanography II
11) BIOSM 371 SEA: Oceanography III
12) [BIOSM 402 Marine Pollution]
13) [BIOSM 413 Adaptations of Marine Organisms]
14) BIOSM 418 Tropical Marine Science
15) BIOSM 449 Seaweeds, Plankton and Seagrass
16) BIOSM 477 Marine Vertebrates
17) GEOL 375 Sedimentology and Stratigraphy
18) GEOL 455 Geochemistry
19) GEOL 475 Special Topics in Oceanography
20) GEOL 479 Paleobiology
21) NTRES 306 Coastal and Oceanic Law and Policy
22) NTRES 417 Wetland Resources

Students in both marine science specializations are exposed to an integrated program of study, emphasizing a natural progression of formal course work combined with ample opportunities for practical field experience.

SHOALS MARINE LABORATORY (BIOSM)

G14 Stimson Hall, 255–3717

The objective of the Shoals Marine Laboratory (SML) is to provide undergraduates, beginning graduate students, and other interested adults a unique opportunity to explore marine sciences in an island setting noted for its biota, geology, and history. SML has established a national reputation for excellence and has become North America's largest marine field station focusing on undergraduate education.

The summer population of Appledore Island is limited to about one hundred people at any one time. Participants and faculty members can literally and figuratively immerse themselves in their explorations, free from distractions common to most academic institutions. Because SML is a residential facility, a sense of community develops that makes courses and seminars at SML outstanding educational and intellectual experiences. Participants learn from and exchange ideas with a wide range of specialists whose primary interests are marine but whose perspectives often differ, providing fertile ground for lively discussions.

Credit courses at Shoals Marine Laboratory are full-time, intensive learning experiences. Courses may be taken sequentially, but not concurrently. A typical day combines lecture sessions, laboratory and field work, field trips to nearby islands and the mainland, and collecting and research excursions aboard the Laboratory's 47-foot research vessel, *John M. Kingsbury*. Field experience is an integral component of all courses, using Appledore's extensive intertidal zone, wading bird rookeries, and seabird colonies. Faculty, drawn from Cornell University, the University of New Hampshire, and other leading academic institutions, are selected not only based on their academic excellence, but also on their teaching ability in the field. In addition, numerous guest lecturers include engineers, coastal planners, and specialists from private industry, government, and the academic community.

The Ithaca campus functions of the Shoals Marine Laboratory are centered in the Cornell Marine Programs Office, G14 Stimson Hall. The office serves as an advising center for students interested in the marine sciences, maintains a browsing library with updated information on graduate study and career opportunities as well as on marine programs at other institutions, and administers the SEA Semester, a 17-credit program offered in cooperation with the Sea Education Association (SEA). SML and SEA offer a joint SEA/Island semester for 18 credits, which combines both programs (BIOSM 364, 366, 367, 368, 372).

The following marine sciences courses are currently administered by the Cornell Marine Programs Office.

BIOSM 160 The Oceanography of the Gulf of Maine
Summer. 4 credits. S-U grades optional. Limited to 24 students. A special 2-week course offered aboard the *SSV Corwith Cramer* and at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and an application, contact the SML office, G14 Stimson Hall or the Sea Education Association office at P.O. Box 6, Woods Hole, MA, 02543. 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 via Georges Bank and the Gulf of Maine. Besides operating the ship, students study the many characteristics of this unique ocean environment. Following the sea component, students spend seven days at the Shoals Marine Laboratory to collect data characteristic of the Isles of Shoals coastal environment.

BIOSM 161 Introduction to Field Marine Science
Summer. 4 credits. S-U grades optional. A special 2-week course offered in cooperation with Ryder University at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. Apply directly to Rider University, College of Continuing Studies. Contact Dr. Richard Alexander for application and information at: Alexander@enigma.rider.edu, (609) 895–5422. Offered alternate years.
This course allows students who are not biology majors to experience the breadth of the marine sciences under field conditions at an island laboratory. Aspects of biology, geology, earth science, chemistry, and physics are included. Specific topics include beach, salt marsh, tidal mud flat, tide pool, and benthic offshore environments; identification of marine plants and animals; chemical and physical oceanography; marine geology; and ecology of kelp beds and urchin barrens.

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. 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 303 Ecology of Marine Fishes
Summer. 4 credits. Prerequisite: one year of college-level biology. SCUBA certification recommended, not required. S-U grades optional. A special two-week course offered at Shoals Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Daily lecs and fieldwork for 2 weeks. SML staff.
This course presents principles, models, and methods for analysis of dynamics of fish populations and communities, and analysis of current research emphasizing theory and its potential uses in fisheries' management. Lab and field activities emphasize collection and analysis of data from the Gulf of Maine and adjacent estuarine habitats.

[BIOSM 308 Marine Microbial Ecology
Summer. 4 credits. Prerequisite: one year of college-level biology. S-U grades optional. A special two-week course offered at Shoals Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Daily lecs and fieldwork for 2 weeks. Offered alternate years. Not offered 1999–2000. SML staff.
This course examines the fundamental role of marine microbial communities in the function of the biosphere. Lectures survey bacterial, protozoan, and micrometazoan assemblages from Arctic to deep sea vent communities. Laboratory exercises cover several principal techniques of field microbial ecology and explore the rich marine microbial environment surrounding the Isles of Shoals.]

BIOSM 309 Climates and Ecosystems
Summer. 4 credits. Prerequisite: one year of college-level biology; background preferred in physics/physical geography. S-U grades optional. A special 2-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and an application consult the SML office, G14 Stimson Hall. Daily lecs, labs, and fieldwork for 2 weeks. SML faculty.
A study of the fundamentals of organism-environment interaction developed through defining and measuring abiotic factors including solar radiation, temperature, atmospheric moisture, precipital wind, and currents. On-site exploration of the dynamics of meteorology and the role of abiotic and biotic factors in the life of coastal and marine plants and animals including humans.

[BIOSM 329 Ecology of Animal Behavior
Summer. 4 credits. Prerequisite: one year of introductory college biology. Recommended: course work in ecology, psychology, or behavior. S-U grades optional. A special 2-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Daily lecs, labs, and fieldwork for 2 weeks. Offered alternate years. Not offered 1999–2000. 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 (4-credit option: additional 4 days for individual 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. Daily lecs, labs, and fieldwork for 10 days. Offered alternate years. Not offered 1999–2000. SML faculty.
Designed to give an overview of living marine organisms (algae, invertebrates, fishes, marine mammals, and shorebirds) and of the environment they inhabit. Fieldwork is emphasized. Occasional lectures and films deal with additional topics such as coastal-zone problems, marine fisheries, economics of marine organisms, and educational resources of the marine environment.]

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 Shoals Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and an application, consult the SML Office, G14 Stimson Hall. Daily lecs, labs, and fieldwork for 4 weeks. 3 core faculty members assisted by up to 15 visiting lecturers, including representatives of governmental agencies. SML faculty.
Designed for the student who desires an initial overview of the marine sciences, this course emphasizes living material in natural habitats. Most of the course work is concerned with the biology of intertidal plants and animals, biological oceanography, ichthyology, and fisheries. Attention is also given to introductory physical and chemical oceanography and marine geology. Marine ecology and the effects of human activity on the marine environment are included. Students apply this knowledge by conducting a transect study toward the end of the course. FMS places additional emphasis on ichthyology, fisheries biology, general oceanography (biological, physical, and chemical) and marine geology. FME places an additional emphasis on ecology, especially in the intertidal zone; ecological, evolutionary and physiological adaptations of marine organisms; and field experiments.

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 Shoals Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Daily lecs and fieldwork for 2 weeks. Team-taught by three faculty members with occasional guest lecturers. Not for recreational divers.
Course covers the philosophy of research, hypothesis testing and experimental design, sampling methods, various underwater techniques, diving physics and physiology, and use of dive tables. Emphasis is on subtidal ecological research. Requirements include critical evaluation of several journal articles and production of a research proposal.

BIOSM 366–370 SEA Semester
In cooperation with the Sea Education Association (SEA), the Shoals Marine Laboratory offers a semester-length sequence of courses designed to provide college undergraduates with a thorough academic, scientific, and practical understanding of the sea. *This sequence is repeated approximately once every two months throughout the year.* Students spend the first half of SEA Semester (a six-week shore component) in Woods Hole, MA, receiving instruction in oceanography, nautical science, and maritime studies. The second half of SEA Semester (a six-week sea component) is spent at sea aboard the R/V *Westward* or the R/V *Corwith Cramer*. Enrollment is open to both men and women judged capable of benefiting from SEA semester; a student must have successfully completed **at least one college-level laboratory science course** (or its equivalent) in order to be admitted to SEA Semester or SEA Summer Session. **No prior sailing experience is necessary**. Cornell students enrolled in the SEA Semester must take the entire sequence.

For more information, contact the Shoals Marine Laboratory office, G14 Stimson Hall, or call SEA directly at 1–800–552–3633. Program costs are to be paid in place of regular Cornell tuition and fees: tuition for the entire 17-credit SEA Semester, approximately 14,000 which includes room and board at SEA.

Instructors for the SEA Semester include faculty of the Sea Education Association and the Woods Hole Oceanographic Institution and others.

BIOSM 375 Field Marine Ecology
Summer. 6 credits. Prerequisites: one full year of college level biology. S-U grades optional. A 4-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, G-14 Stimson Hall. Daily lecs, labs, and fieldwork for 4 weeks. SML faculty.
Designed for students seeking an introduction to the marine sciences and marine ecology; FME emphasizes field work in natural habitats. Examines aspects of the biology and ecology of marine organisms, including intertidal plants and invertebrates, fishes, marine mammals and birds, biological oceanography, and human impacts on the marine environment. FME places a special emphasis on the ecology of the intertidal zone; ecological, evolutionary and physiological adaptations of marine organisms. Students may not take FME after taking FMS.

Shore Component (six weeks)

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 biology, physics, chemistry, and geology. Provides a broad background in oceanography with special attention to areas pertinent to the subsequent cruise. Guest lecturers from the Woods Hole research community interpret current trends and activities in this rapidly evolving field. Students develop individual projects to be carried out at sea.

BIOSM 367 SEA Introduction to Maritime Studies
3 credits. Prerequisite: concurrent enrollment in BIOSM 366 and 368.
An interdisciplinary consideration of our relationship with the marine environment. Covers the elements of maritime history, law, literature, and art necessary to appreciate our marine heritage and to understand the political and economic problems of contemporary maritime affairs.

BIOSM 368 SEA Introduction to Nautical Science
3 credits. Prerequisites: concurrent enrollment in BIOSM 366 and 367.
An introduction to the technologies of operation at sea. The concepts of navigation (piloting, celestial, and electronic), naval architecture, ship construction, marine engineering systems, and the physics of sail are taught from their bases in astronomy, mathematics, and physics. Provides the theoretical foundation for the navigation, seamanship, and engineering that students employ at sea.

Sea Component (six weeks)

Courses 369 and 370 take place aboard the R/V *Westward*, a 125-foot steel auxiliary-powered staysail schooner built in 1961, or the R/V *Corwith Cramer*, a 134-foot steel auxiliary-powered brigantine built in 1987 for SEA. Both ships normally put to sea with a ship's company of thirty-four. The professional staff of nine includes the captain, the chief scientist, three science watch officers, three deck watch officers, an engineer, and a steward. In addition, one or more visiting investigators are frequently aboard. Up to twenty-four students round out the complement.

BIOSM 369 SEA Practical Oceanography I
4 credits. Prerequisite: BIOSM 366.
Theories and problems raised in the shore component are tested in the practice of oceanography at sea. Students are introduced to the tools and techniques of the practicing oceanographer. During lectures and watch standing, students are instructed in the operation of basic oceanographic equipment; in the methodologies involved in the collection, reduction, and analysis of oceanographic data; and in the attendant operations of a sailing oceanographic research vessel.

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 sailing an oceanographic research vessel. Group research projects are completed.

BIOSM 374 Field Ornithology (An Introduction)
Summer. 4 credits. Prerequisite: one year of college-level biology. S-U grades optional. A special two-week course offered at Shoals Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Daily lecs and fieldwork for 2 weeks. SML staff.
An introduction to field ornithology focusing on the biology, ecology, and behavior of the avifauna on the Isles of Shoals. The course focuses on field work designed to observe and study many concepts frequently taught in

the classroom setting including territoriality, breeding biology, and survivorship. Students learn and apply numerous ornithological field methods including various census techniques, territory mapping, banding, behavioral observations, and creating a field notebook.

[BIOSM 402 Marine Pollution
Summer. 4 credits. Prerequisites: one year of college-level biology and chemistry or permission of instructor. S-U grades optional. A special 2-week course offered at Cornell's Shoals Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Daily lecs, labs, and fieldwork for 2 weeks. Offered alternate years. Not offered 1999–2000. SML faculty.
An introduction to marine pollutants; their sources and control/treatment; the effects of marine pollution upon coastal ecosystems; and federal and state water pollution regulatory programs. Laboratory includes training in field collection of water samples, measurement and modeling of effluent plume dispersion, and measurement of microbial indicators of water quality, dissolved nutrients, BOD, dissolved oxygen, and toxicity.]

[BIOSM 409 Ciliophorology
Summer. 2 credits. Prerequisite: permission of instructor. A special 1-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Daily lecs and lab for 1 week. Offered alternate years. Not offered 1999–2000. SML faculty.
A special course that examines ciliophoran biology in depth through lectures and laboratory exercises. Topics include a detailed look at the ciliate faunules found in such diverse habitats as salt marshes, sandy sediment interstitial spaces, the Gulf Stream and the Sargasso Sea, marine caves, and benthic hydrothermal vents. Laboratory focuses on examining silver stained specimens, and covers staining techniques, as well as back scattered and secondary SEM and TEM methodologies.]

BIOSM 413 Experimental Marine Ecology
Summer. 6 credits. Prerequisite: one year of college level biology; experience in ecology or physiology recommended. 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. Daily lecs, labs, and fieldwork for 3 weeks. SML faculty.
An introduction to the physiological ecology and functional morphology of marine plants and animals, with emphasis on selected algal and invertebrate examples from the Gulf of Maine. Topics covered include photosynthesis in the marine environment; respiration in intertidal organisms; carbohydrates, proteins, and lipids as nutrients in the sea; acclimation and tolerance of tide-pool biota; and biological responses to competition and grazing. Field and laboratory exercises explore principles and procedures used to characterize the physical, chemical, and biotic environment of intertidal and shallow subtidal organisms, including determination of temperature, light, salinity, oxygen and nutrient levels, and *in vivo* functional analyses of metabolic phenomena. The process of scientific investigation is the predominant theme of the course.

BIOSM 418 Tropical Marine Science
Summer. 12 credits. Limited to 12 students. Prerequisites: one year college-level biology; recognized SCUBA certification; medical exam; and permission of instructor. Lec/lab, 2 weeks; 6 weeks monitoring study and individual research projects, including data analysis on computers. A special 8-week course offered in Akumal, Mexico. For more details, contact Shoals Marine Laboratory, G-14 Stimson Hall, 255–3717. For competent divers only. D. F. Shapiro.
In addition to lectures and laboratories covering the basic principles of coral reef ecology, students participate in a coral reef monitoring survey. Following two weeks of course work, students engage in independent research projects. This course applies skills learned in the Underwater Research course at Shoals Marine Laboratory.

BIOSM 449 Seaweeds, Plankton and Seagrass: the Ecology and Systematics of Marine Plants
Summer. 4 credits. Prerequisite: BIOSM 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. Daily lecs, labs, and fieldwork for 2 weeks. SML faculty.
An overview of the major marine algal groups, including aspects of anatomy, morphology, development, life histories, physiology, and use. Laboratories and fieldwork emphasize relationships between distribution and major environmental parameters and involve student projects.

GEOL 475 Special Topics in Oceanography
Summer. 2–5 credits. Prerequisites: GEOL 104 or BIO ES 154 and permission of instructor. C. H. Greene and B. M. Monger.
Undergraduate instruction and participation in advanced areas of oceanographic research. Topics will change from term to term. Contact instructor for further information.

BIOSM 477 Marine Vertebrates
Summer. 6 credits. Prerequisites: 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. Daily lecs, labs, and fieldwork for 3 weeks. SML faculty.
Topics in marine vertebrate biology emphasizing laboratory studies, field collections or observations, and readings from the current literature. Topics covered include systematics of fishes of the Gulf of Maine, elasmobranch physiology, interpretation of life history and parameters from otolith microstructure, teleost skeletomuscular structure and function, population biology and the contemporary Gulf of Maine fishery, Mesozoic marine reptiles, the biology of sea turtles in cold water, coloniality in sea birds, avian adaptations to life at sea, evolution and systematics of marine mammals, diving physiology, and ecology and conservation of existing marine mammal populations. Dissection of vertebrate animals is a part of one or more laboratory sessions.

[BIOSM 495 Research Methods in Marine Biology
Summer. 1 credit. Prerequisite: concurrent enrollment in BIOSM 499, or permission of instructor. Primarily for undergraduates. A special 8 week course offered at the Shoals Marine Laboratory (SML). For more details and an application, consult the SML office, G14 Stimson Hall. Weekly seminars for 8 weeks. Offered alternate years. Not offered 1999–2000. J. G. Morin and M. J. Shulman.
Seminar course on research methodology, experimental design, statistical analyses, and scientific writing. The course is designed to assist students in the research they are conducting while enrolled in BIOSM 499.]

BIOSM 499 Research in Biology
Summer. Credits variable (2 credits/7 days on site). For more details and an application, consult the SML Office, G14 Stimson Hall.
Section A: Independent Biological Research: Independent study with a member of the Shoals Marine Laboratory core faculty, based on student faculty interest and available facilities. A short proposal of research must be set with application materials.

[ARKEO 319 Archaeology Underwater
Summer. 2 credits. Prerequisites: recognized scuba certification and a medical examination required for students engaging in underwater research; also open to non-divers. A special 1-week course offered at Cornell's Shoals Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Daily lecs, labs, and fieldwork for 1 week. Offered alternate years. Not offered 1999–2000. SML faculty.
An introduction to the subject and a review of this contemporary subdiscipline of archaeology. The approach of the course is practical, with a strong potential for actual on-site experience in search, site recognition, survey, and recording. The course also covers the history and development of the subject, the legal aspects of underwater research, and the worldwide potential of the field. Since any archaeological research project involves a great deal more than digging, the course provides ample opportunities for those who are interested in the subject but are not divers or sufficiently experienced in scuba.]

GEOL 213 Marine and Coastal Geology
Summer. 2 credits. Prerequisite: an introductory course in geology or permission of instructor. A special 1-week course offered at Cornell's Shoals Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board), $1,100. Daily lecs, labs, and fieldwork for 1 week. SML faculty.
This course examines the complete history of the Isles of Shoals from Paleozoic intrusion, deformation and metamorphism to recent glaciation, sea-level change and wave erosion. Students will learn basic surveying and mapping techniques using the Brunton compass, poplevel/stadia rod, autolevel and

GPS. Sea kayaks will be used for inter-island travel and explorations of the islands. No previous kayak experience is required. Field efforts will focus on creating a series of thematic maps depicting island characteristics such as topography, bedrock geology and structure, vegetation and land use patterns.

NTRES 306 Coastal and Oceanic Law and Policy

Summer. 2 credits. A special 1-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Daily lecs and disc for 1 week. SML faculty.

Intended for persons interested in careers in management of marine or coastal resources or in the natural sciences. Subjects include law and policy related to ocean dumping, marine sanctuaries, environmental impact statements, water and air pollution, fisheries management, offshore gas and oil production, and territorial jurisdiction. Lectures on the status and history of law are accompanied by discussion of relevant policy and analysis of the efficacy of various legal techniques. A case study that requires extensive use of the laboratory's library and personnel is assigned. The week concludes with a mock hearing.

NTRES 417 Wetland Resources

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. Daily lecs, labs, and fieldwork. SML faculty.

An examination of coastal and adjacent freshwater wetlands from historic, destruction, and preservation perspectives, including fresh- and salt-marsh ecology and management. Field trips to selected examples of the wetlands under discussion and follow-up laboratories emphasize successional features, plant identification and classification, and examination of the dominant insect and vertebrate associations.

BIOES 373 Biology of the Marine Invertebrates

Fall (but taken in the previous summer at the Shoals Marine Laboratory [SML]). 4 credits. Limited to 30 students. Prerequisite: one year of introductory biology for majors. Permission of faculty required for 1999 because it will be off campus. Two week, full-time course. Daily and evening lectures, laboratories, and field work. Offered alternate years. C. D. Harvell, J. G. Morin, SML faculty.

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. By being taught at the Shoals Marine Laboratory, students are exposed to a wealth of marine and terrestrial invertebrates in their natural habitats. Regular field excursions allow an excellent opportunity to study freshly collected and *in situ* representatives of most of the major phyla.

FACULTY ROSTER

New York State College of Agriculture and Life Sciences

Adler, Kraig K., Ph.D., U. of Michigan. Prof., Neurobiology and Behavior

Alani, Eric E., Ph.D., Harvard U. Asst. Prof., Genetics and Development

Anderson, John M., Ph.D., New York U. Prof. Emeritus, Genetics and Development

Bates, David M., Ph.D., U. of California at Los Angeles. Prof., Bailey Hortorium

Beyenbach, Klaus W., Ph.D., Washington State U. Prof., Physiology/Veterinary Physiology†

Bruns, Peter J., Ph.D., U. of Illinois. Prof., Genetics and Development

Cade, Thomas J., Ph.D., U. of California at Los Angeles. Prof. Emeritus, Ecology and Systematics

Calvo, Joseph M., Ph.D., Washington State U. William T. Keeton Professor in Biological Sciences, Biochemistry, Molecular and Cell Biology

Chabot, Brian F., Ph.D., Duke U. Prof., Ecology and Systematics

Clayton, Roderick K., Ph.D., California Inst. of Technology. Prof. Emeritus, Plant Biology

Corradino, Robert A., Ph.D., Cornell U. Prof., Physiology/Veterinary Physiology†

Crepet, William L., Ph.D., Yale U. Prof., Bailey Hortorium*

Daniel, Louise J., Ph.D., Cornell U. Prof. Emeritus, Biochemistry, Molecular and Cell Biology

Davies, Peter J., Ph.D., U. of Reading (England). Prof., Plant Biology

Davis, Jerrold I., Ph.D., U. of Washington. Assoc. Prof., Bailey Hortorium

Dhondt, André A., Ph.D., Ghent State U. (Belgium). Edwin H. Morgens Professor of Ornithology, Ecology and Systematics/Laboratory of Ornithology

Dondero, Norman C., Ph.D., Cornell U. Prof. Emeritus, Microbiology

Doyle, Jeffrey J., Ph.D., Indiana U. Prof., Bailey Hortorium

Dress, William J., Ph.D., Cornell U. Prof. Emeritus, Bailey Hortorium

Eisner, Thomas, Ph.D., Harvard U. Jacob Gould Schurman Professor, Neurobiology and Behavior*

Emlen, Stephen T., Ph.D., U. of Michigan. Jacob Gould Schurman Professor, Neurobiology and Behavior

Feeny, Paul P., Ph.D., Oxford U. (England). Prof., Ecology and Systematics/Entomology

Fitzpatrick, John W., Ph.D., Princeton U. Prof., Ecology and Systematics/Laboratory of Ornithology

Flecker, Alexander, S., Ph.D., U. of Maryland. Asst. Prof., Ecology and Systematics

Fox, Thomas D., Ph.D., Harvard U. Prof., Genetics and Development

Ghiorse, William C., Ph.D. Rensselaer Polytechnic Inst. Prof., Microbiology

Gibson, Jane, Ph.D., U. of London (England). Prof. Emeritus, Biochemistry, Molecular and Cell Biology

Goldberg, Michael L., Ph.D., Stanford U. Prof., Genetics and Development

Hanson, Maureen R., Ph.D., Harvard U. Prof., Genetics and Development

Harrison, Richard G., Ph.D., Cornell U. Prof., Ecology and Systematics*

Harris-Warrick, Ronald M., Ph.D., Stanford U. Prof., Neurobiology and Behavior

Harvell, C. Drew, Ph.D., U. of Washington. Assoc. Prof., Ecology and Systematics

Helmann, John D., Ph.D., U. of California at Berkeley. Assoc. Prof., Microbiology

Hopkins, Carl D., Ph.D., Rockefeller U. Prof., Neurobiology and Behavior

Howarth, Robert W., Ph.D., Massachusetts Inst. of Technology/Woods Hole Oceanographic Institution. David R. Atkinson Professor in Ecology and Environmental Biology, Ecology and Systematics/Soil, Crop, and Atmospheric Sciences

Ingram, John W., Ph.D., U. of California at Berkeley. Prof. Emeritus, Bailey Hortorium

Jagendorf, André T., Ph.D., Yale U. Liberty Hyde Bailey Professor of Plant Physiology Emeritus, Plant Biology

Kemphues, Kenneth J., Ph.D., Indiana U. Prof., Genetics and Development

Kingsbury, John M., Ph.D., Harvard U. Prof. Emeritus, Plant Biology

Kraus, Lee, Ph.D., U. of Illinois. Asst. Prof., Biochemistry, Molecular and Cell Biology

Lis, John T., Ph.D., Brandeis U. Prof., Biochemistry, Molecular and Cell Biology

Loew, Ellis R., Ph.D., U. of California at Los Angeles. Assoc. Prof., Physiology/Veterinary Physiology†

Luckow, Melissa A., Ph.D., U. of Texas at Austin. Assoc. Prof., Bailey Hortorium

MacDonald, Russell E., Ph.D., U. of Michigan. Prof. Emeritus, Biochemistry, Molecular and Cell Biology

MacIntyre, Ross J., Ph.D., Johns Hopkins U. Prof., Genetics and Development

Madsen, Eugene L., Ph.D., Cornell U. Asst. Prof., Microbiology

Marks, Peter L., Ph.D., Yale U. Prof., Ecology and Systematics

McCune, Amy R., Ph.D., Yale U. Assoc. Prof., Ecology and Systematics

Morin, James G., Ph.D., Harvard U. Prof., Ecology and Systematics

Mortlock, Robert P., Ph.D., U. of Illinois. Prof., Microbiology

Nasrallah, June B., Ph.D., Cornell U. Prof., Plant Biology

Nasrallah, Mikhail E., Ph.D., Cornell U. Prof., Plant Biology

Naylor, Harry B., Ph.D., Cornell U. Prof. Emeritus, Microbiology

Niklas, Karl J., Ph.D., U. of Illinois. Prof., Plant Biology

Nixon, Kevin C., Ph.D., U. of Texas at Austin. Assoc. Prof., Bailey Hortorium

Owens, Thomas G., Ph.D., Cornell U. Assoc. Prof., Plant Biology

Paolillo, Dominick J., Jr., Ph.D., U. of California at Davis. Prof., Plant Biology

Parthasarathy, Mandayam V., Ph.D., Cornell U. Prof., Plant Biology†

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Rodriguez, Eloy, Ph.D., U. of Texas. Prof., Bailey Hortorium/Plant Biology

Root, Richard B., Ph.D., U. of California at Berkeley. Prof., Ecology and Systematics/Entomology

Russell, James B., Ph.D., U. of California at Davis. Prof., Microbiology

Seeley, Jr., Harry W., Ph.D., Cornell U. Prof. Emeritus, Microbiology

Shalloway, David I., Ph.D., Massachusetts Inst. of Technology. Greater Philadelphia Prof., Biochemistry, Molecular and Cell Biology

Shapleigh, James P., Ph.D., U. of Georgia. Asst. Prof., Microbiology
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Uhl, Natalie W., Ph.D., Cornell U. Prof. Emeritus, Bailey Hortorium
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Walcott, Charles, Ph.D., Cornell U. Prof., Neurobiology and Behavior
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

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Ecklund, P. Richard, Ph.D., Oregon State U. Sr. Lecturer, Neurobiology and Behavior
Ely, Susan, Ph.D., Tufts U. Lecturer, Biochemistry, Molecular and Cell Biology
Glase, Jon C., Ph.D., Cornell U. Sr. Lecturer, Neurobiology and Behavior
Land, Bruce, Ph.D., Cornell U. Sr. Lecturer, Neurobiology and Behavior
McFadden, Carol H., Ph.D., Cornell U. Sr. Lecturer, Physiology
Merkel, Susan, M.S., Cornell U. Lecturer, Microbiology
Nivison, Helen T., Ph.D., U. of California at Davis. Lecturer, Biochemistry, Molecular and Cell Biology
Rehkugler, Carole M., M.S., Cornell U. Sr. Lecturer, Microbiology
Shulman, Myra J., Ph.D., U. of Washington. Sr. Res. Assoc., Ecology and Systematics
Silva, Thomas, M.S., U. of Rhode Island. Lecturer, Plant Biology

Joint Appointees

Bloom, Stephen E., Assoc. Prof., Poultry and Avian Sciences/Biological Sciences
Borror, Arthur C., Adjunct Prof., U. of New Hampshire/Biological Sciences
Bradfield, Jack, Prof. Neurobiology and Behavior/Library of Natural Sounds
Comstock, Jonathan P., Adjunct Asst. Prof., Boyce Thompson Institute/Ecology and Systematics
Foote, Robert H., Jacob Gould Schurman Prof. Emeritus, Animal Science/Physiology
Hodge, Kathie, Asst. Prof. Plant Pathology/Bailey Hortorium
Holmes, Susan, Assoc. Prof., Biometrics/Biological Sciences
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Kochian, Leon V., Adjunct Prof., USDA Science and Education Administration/Plant Biology
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Last, Robert L., Adjunct Prof., Boyce Thompson Institute/Genetics and Development
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May, Gregory D., Adjunct Asst. Prof., Boyce Thompson Institute/Plant Biology
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Vehrencamp, Sandra, Prof. Neurobiology and Behavior/Library of Natural Sounds
Weeden, Norman F., Assoc. Prof., Horticultural Sciences/Bailey Hortorium
Wheeler, Quentin D., Prof., Entomology/Bailey Hortorium

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Adkins-Regan, Elizabeth, Ph.D., U. of Pennsylvania. Prof., Neurobiology and Behavior/Psychology
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Bass, Andrew H., Ph.D., U. of Michigan. Prof., Neurobiology and Behavior
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Booker, Ronald, Ph.D., Princeton U. Assoc. Prof., Neurobiology and Behavior
Bretscher, Anthony P., Ph.D., Leeds U. (England). Prof., Biochemistry, Molecular and Cell Biology
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Provine, William B., Ph.D., U. of Chicago. Charles A. Alexander Professor of Biological Sciences, Ecology and Systematics/History
Salpeter, Miriam M., Ph.D., Cornell U. Prof., Neurobiology and Behavior/Applied and Engineering Physics§
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). Prof., Plant Biology
Wallace, Bruce, Ph.D., Columbia U. Prof. Emeritus, Genetics and Development
Whitlock, Kathleen E., Ph.D., U. Washington Seattle. Asst. Prof., Genetics and Development
Wilson, David B., Ph.D., Stanford U. Prof., Biochemistry, Molecular and Cell Biology
Wolfner, Mariana F., Ph.D., Stanford U. Prof., Genetics and Development
Zamudio, Kelly R., Ph.D., U. of Washington. Asst. Prof., Ecology and Systematics

Other Teaching Personnel

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Berry, John, Ph.D., Cornell U. Post Doc, Bailey Hortorium
Eberhard, Carolyn, Ph.D., Boston U. Sr. Lecturer, Plant Biology
Johnson, Bruce R., Ph.D., Boston U. Sr. Lecturer, Neurobiology and Behavior
Land, Bruce, Ph.D., Cornell U. Sr. Lecturer, Neurobiology and Behavior
Wahl-Loew, Christina M., Ph.D., Cornell U. Lecturer, Physiology

Joint Appointees

Levin, Simon A., Adjunct Prof., Princeton U./Ecology and Systematics‡

Likens, Gene E., Adjunct Prof., Institute of Ecosystem Studies/Ecology and Systematics

New York State College of Veterinary Medicine

Gasteiger, Edgar L., Ph.D., U. of Minnesota. Prof. Emeritus, Physiology/Veterinary Physiology
Tapper, Daniel N., Ph.D., Cornell U. Prof. Emeritus, Physiology/Veterinary Physiology
Wasserman, Robert H., Ph.D., Cornell U. James Law Prof. Emeritus, Physiology/Veterinary Physiology/Nutritional Sciences*‡

Other Teaching Personnel

Concannon, Patrick W., Ph.D., Cornell U. Sr. Res. Assoc., Veterinary Physiology/Physiology

Joint Appointees

Fortune, Joanne E., Ph.D., Cornell U. Prof., Veterinary Physiology/Physiology
Gilmour, Robert F., Ph.D., SUNY Upstate Medical Center. Assoc. Prof., Veterinary Physiology/Physiology
Houpt, Katherine A., Prof., Veterinary Physiology/Physiology
Houpt, T. Richard, Prof., Veterinary Physiology/Physiology
Nathanielsz, Peter W., James Law Prof., Veterinary Physiology/Physiology
Robertshaw, David, Ph.D., Glasgow U. (Scotland). Prof., Veterinary Physiology/Physiology
Wootton, John F., Prof., Veterinary Physiology/Physiology

College of Engineering

Joint Appointees

Cisne, John L., Assoc. Prof., Geological Sciences/Biological Sciences
Webb, Watt W., Prof., Applied and Engineering Physics/Biological Sciences

Biological Sciences

Joint Appointees

Snedeker, Suzanne M., Asst. Prof., Center for the Environment/Biological Sciences

Division of Nutritional Sciences

Joint Appointees

Arion, William J., Prof., Nutritional Sciences/Biochemistry, Molecular and Cell Biology
Bensadoun, Andre, Prof., Nutritional Sciences/Physiology
Kazarinoff, Michael N., 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.

COLLEGE OF ENGINEERING

ADMINISTRATION

John E. Hopcroft, dean

Michael S. Isaacson, associate dean for research and graduate studies

Michael Kelley, associate dean for professional development

Mark K. Spiro, associate dean for strategic initiatie

Deborah Cox, assistant dean for student services

Cathy Long, assistant dean for administration

Marsha Pickens, assistant dean for alumni affairs and development

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.

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 Manufacturing Enterprise. A joint venture of Cornell, industrial organizations, and the federal government to encourage the development and implementation of modern manufacturing systems.

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 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.

Cornell Nanofabrication Facility (part of the National Science Foundation funded National Nanofabrication Users Network). A center that provides equipment and services for research in the science, engineering, and technology of nanometer scale structures for electronic, chemical, physical, and biological applications.

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.

Cornell Center for Materials Research. An interdisciplinary facility with substantial support from the National Science Foundation, providing sophisticated scientific measurement and characterization equipment.

National Astronomy and Ionosphere Center. The world's largest radio-radar telescope facility, operated by Cornell in Areciebo, Puerto Rico.

National Earthquake Engineering Research Center. A facility recently established by the National Science Foundation and 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.

Power Systems Engineering Research Center. A research and instructional program centered in a laboratory that has a complete real-time model of an electric power system.

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 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.

Ward Laboratory of Nuclear Engineering. Irradiation, isotope production, and activation analysis facilities for interdisciplinary research.

The programs listed on this page are sponsored by College of Engineering units and several are industry affiliated. 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 through the bioengineering option within one of the field programs or through the College Program. Students interested in supplementing their field program with formal study in another traditional area of engineering may wish to consider one of the engineering minors offered by the college. Information about both the bioengineering option and engineering minors is available in the Engineering Advising office, 167 Olin Hall. Students interested in environmental engineering and science may pursue the environmental option offered by the School of Civil and Environmental Engineering, the major offered by the Department of Agricultural and Biological Engineering, or the science of earth systems (SES) option offered by the Department of Geological Sciences. Double majors combining environmental science and engineering are feasible.

*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 must meet the Common Curriculum as explained below. (Further explanation of the revised Common Curriculum and field flow charts are provided in the 1999–2000 edition of *The Engineering Undergraduate Handbook.*)

Course Category	*Credits*
1) Mathematics	16
2) Physics (depending on field)	8–12
3) Chemistry (depending on field)	4–8
4) First-Year writing seminar*	6
5) Computer programming†	4
6) Engineering distribution (3 courses)	
a. One Introduction to Engineering (ENGRI)	3
b. Two other engineering distribution courses (ENGRD)	6
7) Liberal studies distribution (6 courses)	18 (min.)
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 133 credits are required for graduation; the specific number of required credits 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 demonstrate proficiency in swimming to satisfy a university requirement.

Mathematics

The normal program in mathematics includes MATH 191 (or 193), 192, 293, and 294. Every student must attain a grade of at least C- in MATH 191 (or 193), 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. Failure to achieve at least a C- the second time around will generally result in dismissal from the engineering program. 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 PHYS 112, 213, and 214 or the corresponding honors courses (PHYS 116, 217, and 218). Engineering students are required to have attained a minimum grade of C- in MATH 191 or equivalent before taking PHYS 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 MATH 192 before taking PHYS 213, or C- in MATH 293 before taking PHYS 214). Students in the field programs of ABEN, CHEME, CEE, COM S, GEOL or OR&E may substitute CHEM 208 for PHYS 214.

Chemistry

CHEM 211 or 207 is required for all students.

CHEM 211 is a course designed for students who do not intend any further study in chemistry. Typically, CHEM 211 is taken during the freshman year, but students who wish to complete the physics program (PHYS 112, 213 and 214) first may postpone CHEM 211 until the sophomore year.

In general, students intending to affiliate with the following departments and schools should take CHEM 211: Applied and Engineering Physics, Civil Engineering (not students in the environmental engineering option), Computer Science, Electrical Engineering, Materials Science and Engineering, Mechanical and Aerospace Engineering, and Operations Research and Industrial Engineering. Students considering Chemical Engineering must take CHEM 207 in the fall of their freshman year, to be followed by CHEM 208 in the spring term. All students considering the environmental option in Civil Engineering, the science of earth systems option in Geological Sciences, or a health-related career such as medicine, should take the CHEM 207–208 sequence.

First-Year Writing Seminars

Each semester of their freshman year, students choose a First-Year Writing Seminar from among more than one hundred courses offered by over thirty 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

The ability to communicate is essential to successful professional practice. In addition to taking two First-Year Writing Seminars, engineering students must have a course that includes a significant amount of technical or scientific writing. They can fulfill this technical-writing requirement by enrolling in an Engineering Communications course (ENGRC 334, 335 [formerly 435], or 350), selected courses in the Communications department (COMM 260, 263, or 352), or an approved writing-intensive engineering course (ENGRD/A&EP 264, CHEME 432, M&AE 427, MS&E 435, or MS&E 443–444). Courses that fulfill the technical writing requirement may be used to satisfy another graduation requirement.

Some students might fulfill the technical-writing requirement through the writing they do in their co-op jobs; this arrangement must be approved in advance. For details, contact the Engineering Communications Program, 465 Hollister Hall.

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 453, ABEN 475, ENGRD/COM S 211 or 212, ENGRD/COM S 222, ENGRD/CEE 241, ENGRD/A&EP 264, ELE E 423, M&AE 479, M&AE 575, M&AE 578, and M&AE 670. The recommended choice for students intending to enter the field program in Engineering Physics is ENGRD 264; in Chemical Engineering, ENGRD 211, 222 or 241; in Civil Engineering, ENGRD 241; in Computer Science, ENGRD 211 or 212; in Electrical Engineering, ENGRD 211; in Mechanical Engineering, M&AE 479, M&AE 575, M&AE 578, or M&AE 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 ENGRI) to be taken by the student during their freshman year. 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 current

course offerings.

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, Structure and Interpretation of Computer Programs
   ENGRD 222, Introduction to Scientific Computing
   ENGRD 241, Engineering Computation

2) *Materials science*
   ENGRD 261, Introduction to Mechanical Properties of Materials

3) *Mechanics*
   ENGRD 202, Mechanics of Solids
   ENGRD 203, Dynamics

Students in the field program in Engineering Physics may substitute A&EP 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 MATH 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 Circuits for Electrical and Computer Engineers
   ENGRD 231, Introduction to Digital Systems
   ENGRD 264, Computer-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
   ENGRD 250, Engineering Applications in Biological Systems

8) *Biology and chemistry*
   BIO G 101 and 103, Biological Sciences, Lecture and Laboratory
   BIO G 105, Introductory Biology
   BIO G 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:

Agricultural and Biological Engineering: ENGRD 202

Chemical Engineering: ENGRD 219

Civil Engineering: ENGRD 202

Computer Science: ENGRD 211 or ENGRD 212

Electrical Engineering: ENGRD 231 (co-enrollment in ELE E 232 strongly recommended)

Geological Sciences: ENGRD 201

Materials Science and Engineering: ENGRD 261

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. (No First-Year Writing Seminar may be used to meet the liberal studies requirement.)

- 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 either category (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.

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

American Studies 101, 201, 202

Architecture 131, 132, 181, 182

Art 317, 318

Africana Studies 202, 204, 205, 211, 280, 285, 304, 310, 361, 370, 381, 404, 422, 425, 431, 432, 435, 455, 475, 483

Anthropology 290, 451, 452, 453, 455

Archeology (courses in Old World Archeology and 493)

Asian Studies (courses in Asian art, literature, religion or cultural history)

Biology and Society 206

Classics (all courses except 285, 356, 360, 361 and language courses)

Collective Bargaining, Labor Law and Labor History 100, 101, 384, 385, 386, 482, 488

Communication 426

Comparative Literature (all courses)

Economics 315, 323, 324, 325, 326

Engineering; ENGRG 250, 298, 360

English (all courses except ENGL 285 and writing courses, whose numbers end in the 80s; e.g., 288, 289, 382, etc.)

French Literature (all courses)

German Literature (all courses)

History (all courses)

History of Art (all courses)

Industrial and Labor Relations Interdepartmental Course 451

International and Comparative Labor Relations 430

Italian Literature (all courses)

Jewish Studies 274, 351, 352

Labor Economics 448

Music (only introductory, music theory, music history and digital music courses)

Natural Resources 407

Near Eastern Studies (courses listed under history, civilization, or literature)

Philosophy (all courses except courses in logic and PHIL 383)

Religious Studies 101

Russian Literature (all courses)

Science and Technology Studies 201, 205, 206, 233, 292, 355, 433, 444, 525

Spanish Literature (all courses)

Theater Arts (only courses in Theater Studies, film analysis and history)

Women's Studies 227, 238, 251, 264, 273, 307, 341, 348, 363, 365, 366, 374, 390, 404, 406, 408, 426, 433, 444, 445, 451, 455, 474, 493

b) Social Sciences

Africana Studies 171, 172, 191, 220, 231, 271, 280, 290, 300, 301, 311, 380, 410, 420, 451, 459, 478, 479

Agricultural Economics (ARME) 100, 250, 430, 431, 432, 450, 464

Anthropology (all courses except 101 and courses in Biological and Ecological Anthropology)

Archeology (all courses except those in Methodology and Technology)

Architecture 342

Asian American Studies 110

Asian Studies (courses in Asian anthropology, economics, government, linguistics, or sociology)

Biology and Society 201, 301, 406, 407

City and Regional Planning 100, 101, 314, 361, 382, 404, 442

Communication 116, 120, 240, 410, 420

Design and Environmental Analysis 150, 250

Economics (all courses except 315, 317, 318, 319, 320, 321, 326. Engineering students should generally take ECON 301–302 and *not* 101–102, unless they have had no calculus.)

Education 210, 212, 271, 311, 317, 322, 360, 413, 477

Government (all courses)

Human Development and Family Studies (all courses)

International and Comparative Labor Relations (all courses)

Labor Economics (all courses except 345 and 448)

Linquistics (all courses)

Natural Resources 201, 215

Organizational Behavior (all courses)

Policy, Analysis and Management (all courses except 305, 323, 326, 371, 424, 425, 606 and 607)

Psychology (all courses *except* 223, 307, 322, 324, 326, 332, 350, 361, 396, 422, 425, 426, 429, 465, 470, 471, 472, 473, 475, 476, 478, 479, 492)

Rural Sociology (all courses)

Sociology (all courses)

Textiles and Apparel 245

Women's Studies 210, 218, 220, 238, 244, 277, 281, 297, 305, 321, 353, 362, 365, 366, 372, 406, 408, 425, 428, 438, 450, 454, 463, 468, 479, 480, 493

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, 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 equal to two courses according to these rules.

d) Expressive Arts

Africana Studies 303, 425, 430

Art (studio courses)

Biological Sciences 208, 209

Communications (all courses except 116, 120, 314, 410, 416, 420, 426, 465)

Design and Environmental Analysis 101, 102

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, musical organizations and ensembles; three 1-credit courses equals one course)

Theater Arts (all courses except those listed in category (a) above)

Electives

- Approved electives—six (6) credits required (approved by the academic adviser)

Because these courses should help develop and broaden the skills of the engineer, advisers will generally accept the following as approved electives:

1. One Introduction to Engineering course (ENGRI).
2. Engineering distribution courses.
3. Courses stressing written or oral communication.
4. Upper-level engineering courses.
5. Advanced courses in mathematics.
6. Rigorous courses in the biological and physical sciences.
7. Courses in business, economics, or language (when they serve the student's educational and academic objectives).
8. Courses that expand the field program or another part of the curriculum (Note: No ROTC courses may be used as approved electives unless they are co-listed by an academic department.)

- Field approved electives—nine (9) credits (approved by engineering field program faculty and field faculty advisers). Students should refer to the field program curricula for descriptions of courses that meet this category.
- To ensure breadth of engineering studies, field programs will also include nine (9) credits of courses outside the field.

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, and approved electives, students are urged to consider courses listed within the "Science and Technology Studies" undergraduate area of concentration (see Interdisciplinary Centers and Programs section). These courses may provide students with an important perspective on their studies and their future careers.

Engineering Advising Office

From the time that students enter the college as freshmen until they are affiliated with a major field or the College Program before the second 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 offers general advising and counseling services 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 Requirements

By the end of the freshman year, engineering students are expected to have completed (or received credit for) the following core requirements:

- MATH 191 (or 193) and MATH 192
- Two of the following: CHEM 211, 207, 208, PHYS 112, 213, 214*
- COM S 100
- Two (2) First-Year Writing Seminars
- One (1) Introduction to Engineering course (ENGRI designation)
- Two (2) Physical Education courses

(*Students with an interest in pre-med (or other health-related careers), Chemical Engineering, the environmental option in Civil Engineering, or the science of earth systems option in Geological Sciences should enroll in the CHEM 207–208 sequence during their freshman year.)

Affiliation with a Field Program

Students must apply for affiliation with a field program during the first term of their sophomore year, although earlier affiliation may be granted at the discretion of the field. This is done by visiting 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:

(Please note that fields may impose alternative affiliation requirements for students applying for affiliation later than the first semester of the sophomore year.)

Field Program	*Courses and Minimum Grade Requirements*
Agricultural & Biological Engineering	No more than one grade below C- in mathematics and science courses and ABEN 151 or equivalent
Chemical Engineering	No more than one grade below C- in chemistry, mathematics, physics, or chemical engineering courses and a 2.2 GPA in mathematics, science, and chemical engineering courses
Civil Engineering	A 2.0 GPA in all engineering and science courses and a grade of C- or better in ENGRD 202 (for students in the environmental option who do not take ENGRD 202 prior to affiliation, a grade of C- or better in CHEM 208 is required)
Computer Science	A grade of B- or better in COM S 280, ENGRD 211 or 212 and all mathematics courses
Electrical Engineering	Good academic standing in the College of Engineering; a grade of C or better in MATH 293 and PHYS 213. Repeated technical courses used to satisfy this require ment require field approval.
Engineering Physics	A grade of B- or better in all required mathematics and physics courses
Geological Sciences	Good academic standing in the College of Engineering
Materials Science & Engineering	Good academic standing in the College of Engineering and a grade of C in ENGRD 261
Mechanical Engineering	A grade of C- or better in mathematics and science courses and ENGRD 202
Operations Research & Engineering	A grade of C- in MATH 191 (OR 193) and 192, and a 2.0 GPA in all mathematics, science, and engineering courses (both overall and in the term immediately prior to affiliation)

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

Dual Degree Option

A special academic option, intended for superior students, is the dual degree program, in which both a Bachelor of Science and either a Bachelor of Arts or Bachelor of Fine Arts degree can be earned in about five years. Students registered in the College of Engineering, the College of Arts and Sciences, or the College of Architecture, Art and Planning may apply and, after acceptance of their application, begin the dual degree program in their second or third year. Those interested should contact the appropriate coordinators of dual degree programs at the following locations: 172 Goldwin Smith Hall (for Arts and Sciences); or 135 East Sibley (for Architecture, Art and Planning); and the Associate Dean for Engineering Undergraduate Programs in 222 Carpenter 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 following normal procedures 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 the Engineering Advising office, 167 Olin Hall, and the individual field consultant offices.

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 nonengineering area. The combinations must clearly form an engineering education in scope and in substance and should include engineering design and synthesis as well as engineering sciences. In addition to 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, 222 Carpenter Hall.

Important note: because no single standardized curriculum exists, the College Program is not accredited. College Program students who intend to seek legal licensing as a Professional Engineer should be aware that this non-accredited degree program will require additional education, work, and/or experience to qualify for eligibility to take the Fundamentals of Engineering examination.

Engineering Minors

The Engineering Minor is a supplement to the regular bachelor's degree programs in the college, including the College Program, and recognizes formal study of a particular technical subject area in engineering normally outside the student's major. Therefore, it may be necessary for some students choosing to complete the requirements for an engineering minor to spend more than the traditional eight semesters to complete their studies at Cornell. In many cases, however, courses fulfilling minor requirements may also satisfy other degree requirements (e.g., distribution courses, approved electives, or field-approved electives). Students undertaking a minor are expected to complete the requirements during the time of their continuous undergraduate enrollment at Cornell.

To complete an engineering minor, an undergraduate engineering student must

- Be enrolled in a major field program that approves the participation of its affiliates in the desired minor.
- Successfully complete all the requirements for a bachelor of science degree in engineering.
- Satisfactorily complete six courses (18 credit minimum) as stipulated in a college-approved minor offered by an engineering school or department other than that which offers the student's major.

Students may apply for certification of an engineering minor at any time after the necessary coursework has been completed in accordance with published standards. Students who receive certification in an approved engineering minor will be recognized by means of an official notation on their Cornell transcript following graduation.

The College of Engineering currently offers minors in the following areas (offering departments are indicated in parentheses):

Civil Infrastructure (CEE)

Electrical Engineering (ELE E)

Engineering Management (CEE)

Engineering Statistics (OR&IE)

Environmental Engineering (ABEN/CEE)

Geological Sciences (GEOL)

Industrial Systems and Information Technology (OR&IE)

Materials Science and Engineering (MS&E)

Operations Research and Management Science (OR&IE)

Additional information on specific minors can be found in the departmental sections of this publication, The *Engineering Undergraduate Handbook*, the undergraduate field office of the department offering the minor, and the Engineering Advising office.

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 four courses (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 (totalling at least 6 credits) from the bioengineering course list. Each student interested in the bioengineering option can request (through the Engineering Undergraduate Programs office) a faculty consultant who will assist the student in course selection for this option. The bioengineering faculty consultant 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 or in the Engineering Undergraduate Programs office, 222 Carpenter Hall.

International Programs

All students who plan to study abroad apply through Cornell Abroad; please see the Cornell Abroad program description in the introductory section of Courses of Study.

An international perspective, sensitivity to other cultures, and the ability to read and speak a second language are increasingly important to today's 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. For further information on these and other opportunities to add an international dimension to your undergraduate education, see the staff in the Engineering Advising office, 167 Olin Hall. Information on co-op programs abroad is available from the Engineering Professional Programs office in 148 Olin Hall.

Engineering Communications Program

The Engineering Communications Program (ECP) provides instruction in the written, oral, and visual presentation of information. Engineering Communications ENGRC 350 and Communications for Engineering Managers ENGRC 335 (formerly 435) are three-credit seminars that give students a thorough introduction to these areas. These courses use material from engineering and business workplaces, and many assignments are based on actual events and situations. Students learn to direct their writing and presentations to different audiences that have varying roles and levels of expertise. They also deal with organizational and ethical issues in the communications they encounter and produce. Classes have lively discussion, and the limited size of sections ensures close attention to individual students' work. Occasionally, the program's instructors offer courses or independent studies in topics of special interest. ECP courses fulfill the college's technical writing requirement (see Requirements for Graduation).

In addition to offering communications seminars, the program works with the engineering fields to integrate communications instruction and practice into technical courses. The goal of these writing-intensive efforts is to strengthen students' understanding of course material and increase their ability to communicate it. The ECP also gives presentations to student groups on communications topics and teamwork, and has been involved in innovative educational projects such as Undergraduate Engineering Teaching (ENGRG 470), a collaborative learning initiative in physics and mathematics. The program awards several annual prizes for writing, oral presentation, and teamwork. For further information, contact the director, 465 Hollister Hall.

Engineering Cooperative Program

A special program for undergraduates in most fields of engineering is the Engineering Cooperative Education 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.

To be eligible, a student must have been enrolled at Cornell for four semesters prior to working, with a cumulative GPA of 2.7 or higher. (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, 146 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. (Engineering Mechanics): Theoretical and Applied Mechanics

M.Eng. (Nuclear): Nuclear Science and Engineering

M.Eng. (OR&IE): Operations Research and Industrial Engineering

Candidates for a professional master's degree who wish to specialize in areas related to manufacturing may avail themselves of two special programs. The manufacturing systems engineering option may be centered in any one of the fields listed above. This option is attested to by a Dean's Certificate in addition to a diploma at the time of graduation. An industrial internship program provides opportunities to combine on-campus education with off-campus industrial experience.

An M.Eng. option of potential interest to engineers from all fields is the program in Engineering Management, offered by the School of Civil and Environmental Engineering. This option is described in the section related to the M.Eng. (Civil & Environmental) degree.

Cornell engineering graduates in the upper half of their class will generally be admitted to M.Eng. programs; however, requirements for admission vary by field. Superior Cornell applicants who will be, at the time of matriculation, eight or fewer credits short of a baccalaureate degree may petition for early admission. Other applicants must have a baccalaureate degree or its equivalent from a college or university of recognized standing, in an area of engineering or science that is judged appropriate for the proposed field of study. They must also present evidence of undergraduate preparation equivalent to that provided by a Cornell undergraduate engineering education, a transcript, two letters of recommendation, and a statement of academic purpose. A candidate who is admitted with an undergraduate background that is judged inadequate must make up any deficiencies in addition to fulfilling the regular course requirements for the degree. Applicants from foreign universities must submit the results of the Graduate Record Examination aptitude tests and must have an adequate command of the English language. Financial aid providing partial support is available for very highly qualified candidates, primarily those who are residents of the U.S.

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 six-year program should seek advice and information from the department with whose field they intend to affiliate during their upperclass years. Information about admission to either program and about scholarship aid may be obtained from the Engineering Professional Programs office, 148 Olin Hall.

ACADEMIC PROCEDURES AND POLICIES

Advanced Placement Credit

The College of Engineering awards a significant amount of advanced placement (AP) credit to entering freshmen who demonstrate proficiency in the subject areas of introductory courses. Students can earn AP credit by receiving qualifying scores on any of the following:

(1) advanced placement examinations given and scored by the College Entrance Examination Board (CEEB); or

(2) General Certificate of Education (GCE) Advanced ("A") Level Examinations; or

(3) International Baccalaureate (IB) Higher Level Examinations; or

(4) Cornell's departmental placement examinations, given during orientation week prior to the beginning of fall-term 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 for CEEB or Cornell Departmental AP Exams

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. AP credit is awarded only for courses that meet engineering curriculum requirements.

Mathematics: MATH 191 (or 193), 192, 293, and 294 are required.

First-term math (MATH 191 or 193). 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-term 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: PHYS 112 and 213 are required.

PHYS 112. AP credit may be earned by:

- a score of 4 or 5 on the mechanics portion of the CEEB C 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 PHYS 112.

Note: Students who have received credit for PHYS 112 **may not** enroll in PHYS 213 unless concurrently enrolled in MATH 293.

PHYS 213. Students receiving a 5 on the Electricity and Magnetism portion of the C exam may choose to accept AP credit for PHYS 213 or placement in PHYS 217 with no AP credit for PHYS 213. For advice or more information contact Professor Joseph Rogers (607-255–8158), the departmental representative.

Chemistry: CHEM 207 or CHEM 211 is required.

CHEM 207 or CHEM 211. AP credits 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: COM S 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 COM S 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;
- six credits will be offered to students who receive a 4 on the CEEB AP.

Those who want to study more biology should contact the Office for Academic Affairs, Division of Biological Sciences, 200 Stimson Hall, to discuss proper placement.

First-Year Writing Seminar: Two First-Year Writing Seminars (for a total of six credits) are required.

- AP credit for one First-Year 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 First-Year Writing Seminar requirement, but can be applied toward the expressive arts category in the Liberal Studies Distribution requirement.

Liberal Studies Distribution: Six courses beyond two First-Year Writing Seminars are required. Students may earn AP credit toward the liberal studies distribution by taking College Entrance Examination Board (CEEB) AP tests. AP credit earned in the humanities or social sciences cannot be used to fulfill the "upper level" liberal studies requirements.

Modern Languages: Students may earn AP credit for competence in a foreign language 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 650 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 three credits, and a score of 3 entitles the students to six credits which are equivalent to two courses. 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 adviser.

Advanced Placement and Credit for International Credentials

Students who have successfully completed either a General Certificate of Education (GCE) Advanced ("A") Level Examination or an International Baccalaureate (IB) Higher Level Examination may be eligible for advanced placement credit in the College of Engineering as follows:

General Certificate of Education Advanced Level Examination (GCE "A")

Hong Kong Advanced Level examinations and the joint examination for the Higher School Certificate and Advanced Level Certificate of Education in Malaysia and Singapore—principal passes only—are considered equivalent in standard to GCE "A" Levels.

Subject	Marks	Credit
Biology	A or B	8 credits
Chemistry	A	8 credits (CHEM 207 and 208)
	B	4 credits (CHEM 207)
Mathematics	A or B	8 credits (MATH 191/193 and 192)
	C	4 credits (MATH 191/193)
Physics	A or B	4 credits for PHYS 112; 4 additional credits for PHYS 213 are granted to a combination of grades of A or B and a minimum of 8 Advanced Placement (or advanced standing) credits in mathematics.

International Baccalaureate (IB) Higher Level Examination

Subject	Marks	Credit
Biology	7	8 credits
	6	6 credits
Chemistry	6 or 7	4 credits (CHEM 207 or CHEM 211)
Mathematics	6 or 7	8 credits (engineering students must consult with the math department to determine prerequisite for placement in third-semester math course.)
Physics	6 or 7	4 credits (PHYS 112)

Note: Advanced Placement credit based on GCE or IB results may also be awarded for courses that satisfy the liberal studies requirement in the College of Engineering. In such cases, the College of Engineering follows the AP guidelines found earlier in this publication under "General Information."

General Policies for Advanced Placement

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.
2. All AP examinations 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. Students who have completed either GCE "A" Level or IB Higher Level Examinations must present the original or a certified copy of their examination certificate to the Engineering Advising office, 167 Olin Hall. Those who wish to take departmental examinations should 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).

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 the Engineering Advising office, 167 Olin Hall.

Transfer Credit

Undergraduate 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 and must be documented as such, in writing, by the secondary institution. Courses deemed acceptable for transfer credit must be equivalent in scope and rigor to courses at Cornell.

- To apply for transfer credit, students must complete and submit a Transfer

Credit Form (one form for each request), accompanied by a course description. (Transfer Credit Forms are available from the Engineering Advising or Registrar's offices and should be submitted prior to enrollment.) An official transcript from the offering institution (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, engineering courses, or First-Year Writing Seminars, 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.
- Departmental approval is not required to apply for transfer credit which satisfies liberal studies distribution requirements. 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 has earned a grade of 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 AP or Cornell departmental placement examination, as described in the Advanced Credit section.
- Following matriculation, students may apply up to 18 credits of transfer and/or Cornell extramural credit toward bachelor's degree requirements.
- Transfer students may transfer up to 36 credits for each year spent in full-time study at another institution, provided that the courses are acceptable for meeting graduation requirements.
- No more than 72 total transfer credits (combination of those taken both before and after matriculation) may be used to meet graduation requirements.
- Summer session courses taken at Cornell are not considered transfer credit.
- A more detailed description of the college's regulations governing transfer credit may be found in the pamphlet, *Advanced Placement and Transfer Credit for First-Year Engineering Students,* as well as *The Engineering Undergraduate Handbook*, both available from the Engineering Advising office, 167 Olin Hall.

Academic Standing

Full-time students are expected to remain in good academic standing. The criteria for good standing changes 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, stern 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;
4. no F, U, or INC grades.

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, stern 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;
4. no F, U, or INC grades.

Academic Progress

The total number of credits required for graduation range from 123 to 133, depending upon the field program. Therefore, an average semester credit load ranges from approximately 15 to 17 credits.

Because mathematics is pivotal to the study and practice of engineering, students must earn a grade of C- or better in MATH 191 (or 193), 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 withdrawal from the College of Engineering. Physics and advanced mathematics courses often have mathematics prerequisites, and having to repeat the prerequisite course may delay 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 are determined by the dean of the college. For 1999–2000, the requirement is a semester average of 3.40 or higher (without rounding); no failing, unsatisfactory, missing, or *incomplete* grades (even in physical education); and at least 12 letter-grade credits (not S-U). Students may earn Dean's List status retroactively if they meet these criteria after making up incomplete grades. Students who earn Dean's List status receive certificates from the Engineering Registrar's office, and the honor is noted on the transcript.

Graduating with Distinction and Honors Program

Graduating with Distinction

Meritorious students graduating with a Bachelor of Science degree from the College of Engineering may also be designated *cum laude*, *magna cum laude*, or *summa cum laude*.

- Cum laude will be awarded to all engineering students with an overall GPA ≥ 3.50. Cum laude will also be awarded to all engineering students who received a semester GPA ≥ 3.50 in each of the last four semesters of attendance at Cornell; in each of these semesters, at least 12 letter graded credits must be taken with no failing, unsatisfactory, missing or incomplete grades. If the student is an engineering co-op student, then the engineering co-op summer term will count as one of the last four. Students who were approved for pro-rated tuition in their final semester will be awarded cum laude if they received a semester GPA ≥ 3.50 in their last semester and meet the conditions above in the prior four semesters. (The change in the cum laude policy will become effective for the class graduating in May 2001.)
- Magna cum laude will be awarded to all engineering students with an overall GPA ≥ 3.75 (based on all credits taken at Cornell).
- Summa cum laude will be awarded to all engineering students with an overall GPA ≥ 4.0 (based on all credits taken at Cornell).

Note: all GPA calculations are minimums and are not rounded.

Field Honors Program

To be eligible for field honors, a student must enter a program with and maintain a cumulative GPA of ≥ 3.50. If the student's major field has an approved honors program and both the GPA and program requirements are fulfilled, the faculty of the field may recommend that a student graduate with the additional diploma and transcript notation of "With Honors." For more specific information, see the field program outline in this catalog.

S-U Grades

Many courses offered by the university may be taken either for a letter grade or for an S-U (satisfactory or unsatisfactory) grade designation. Under the S-U option, students earning the letter grade equivalent of C- or better in a course will receive a grade of S; those earning less than C- receive a grade of U. (Any course in which a U grade is received does not count toward graduation requirements.)

Engineering students may choose to receive an S-U grade option under the following conditions:

- The course in question must be offered with an S-U option.
- The student must have previously completed at least one full semester of study at Cornell.
- The proposed S-U course must count as either a liberal studies distribution or an approved elective in the engineering curriculum.
- Students may only elect to enroll S-U in one (1) course each semester in which the choice between letter grade and S-U is an option. (Additional courses offered "S-U only" may be taken in the same semester as the "elected S-U" course.)

The choice of grading option for any course is initially made during the pre-enrollment

period. Grading options may be changed, however, by submitting a properly completed Add/Drop Form to the Engineering Registrar by the end of the third week of classes. After this deadline, the grading option may not be changed, nor will a student be permitted to add a course in which they were previously enrolled (in the current semester) under a different grade option.

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 on a voluntary leave of absence 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) after matriculation 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 the staff of the Engineering Advising office, 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 apply at the Engineering Advising office—application forms are available in 167 Olin Hall. Students who would enter the college as second-semester sophomores or later must be accepted by a field program as part of the admission process. Students who would enter as a second-semester freshman or first-semester sophomore may be accepted into the college without the requirement of field affiliation but must be sponsored by a field program.

Students who hope to transfer into engineering should take courses in mathematics, chemistry, computer science, physics, and engineering that conform to the requirements of the Common Curriculum. Interested students should discuss their eligibility with an adviser in the Engineering Advising office, 167 Olin Hall.

Leave of Absence

A leave of absence may be voluntary, medical, or required. A description of each follows:

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 the Engineering Advising office; 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 granted during a semester goes into effect on the day it is requested and lasts for a *minimum of six months*. If a leave is requested after the twelfth week of a semester, the courses in which the student was registered at the time of the request are treated as having been dropped (i.e., a "W" will appear on the transcript for each course). 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. (See previous section of Transer Credit for details.)

Students who intend to take a leave of absence should check with the Office of Financial Aid and Student Employment to discuss 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 in writing, at least six weeks prior to the date the student plans to return to campus.

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. 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 both at the time the leave is granted and upon the student's return.

Required Leave: A required leave of absence is imposed in cases where the academic progress of a student is so poor that 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).

Rejoining the College

Students wishing to rejoin the college who have not yet affiliated with a field should request permission to rejoin in a letter to the Engineering Advising office; 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, detail any academic work completed during this time, and specify the courses the student intends to take upon return.

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 the Engineering Advising office. 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 absentia, will be deemed to have withdrawn.

Students who withdraw from the College of Engineering are eligible to apply for 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 required to withdraw 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. More than 300 national employers visit the campus annually to recruit technical graduates. Additional job opportunities are posted electronically, and a state-of-the-art résumé referral service is available. 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 (255–5006); http://www.career.cornell.edu/ccs.

AGRICULTURAL AND BIOLOGICAL ENGINEERING

M. F. Walter, chair; B. A. Ahner, L. D. Albright, D. J. Aneshansley, J. A. Bartsch, P. Baveye, J. R. Cooke, A. K. Datta, K. G. Gebremedhin, D. A. Haith, J. B. Hunter, L. H. Irwin, L. Jelinski, W. J. Jewell, D. B. Lund, C. D. Montemagno, J.-Y. Parlange, R. E. Pitt, N. R. Scott, T. S. Steenhuis, M. B. Timmons, L. P. Walker

Bachelor of Science Curriculum

Agricultural and Biological Engineering is at the focus of three great challenges facing humanity today: ensuring an adequate and safe food supply in an era of expanding world population; protecting and remediating the world's natural resources, including water, soil, air, energy and biodiversity; and developing engineering systems that monitor, replace, or intervene in the biology of living organisms. The undergraduate engineering program in the Department of Agricultural and Biological Engineering has a unique focus on biological systems, including the environment, that is realized through a combination of fundamental engineering sciences, biology, applications courses, and liberal studies. The program leads to a Bachelor of Science degree and is accredited by the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET).

Three concentrations in Agricultural and Biological Engineering are offered: environmental engineering, biological engineering, and food and fiber engineering. All of these students take courses in mathematics, computing, physics, chemistry, basic and advanced biology, fundamental engineering sciences (mechanics, thermodynamics, fluid mechanics, and transport processes), engineering applications, and design. Students select application courses in the department in areas that include bioprocessing, soil and water management, bioenvironmental and facilities engineering, bioinstrumentation, engineering aspects of animal physiology, environmental systems analysis, and waste treatment and disposal. Students select other courses in the College of Engineering that reflect their concentration, such as environmental sciences or biomedical engineering. Students planning for medical school also take organic chemistry. Throughout the curriculum, emphasis is placed on communications and teamwork skills.

Many undergraduate students participate in teaching assistantships, research assistantships, design teams, Engineering Coop, and study abroad. Students should have a strong aptitude for the sciences and mathematics and an interest in the complex social issues that surround technology.

Career opportunities cover the spectrum of private industry, public agencies, educational institutions, and graduate programs in engineering, science, medicine, law, and other fields. In recent years, graduates have developed careers in environmental consulting, biotechnology, the pharmaceutical industry, biomedical engineering, management consulting, and international agriculture.

The living world is all around us, and within us. The biological revolution of this century has given rise to a growing demand for engineers who have studied biology and the environment, who have strong math and science skills, who can communicate effectively, and who appreciate the challenges facing society. Agricultural and Biological Engineering is educating the next generation of engineers to meet these challenges. 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.

For further details see the department's undergraduate programs publication, available at 207 Riley-Robb Hall, or contact the field's advising coordinator, Professor Ron Pitt, at 255–2492.

The field program requirements are outlined below.

Basic Subjects	*Credits*
MATH 191 (or 193), 192, 293, 294, Calculus for Engineers and Engineering Mathematics	16
CHEM 211, Chemistry for the Applied Sciences, or equivalent	4
PHYS 112, 213, 214, Physics I, II, and III (CHEM 208 or organic chemistry may be substituted for PHYS 214)	12
Introductory biological sciences	6 or 8
ABEN 151, Introduction to Computing	4
ABEN 200, Undergraduate Seminar	1
Engineering distribution (two courses, including ENGRD 202, 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 and 350 (Engineering Applications in Biological Systems, Bio. & Env. Transport Processes), and a minimum of four agricultural and biological engineering courses (at least 12 credits) chosen from courses numbered 450 to 495	35–37
Environmental, biological or agricultural sciences (at least 3 credits of biological sciences beyond the introductory level)	7
Approved electives (at least 3 credits in the College of Agriculture and Life Sciences)	6
Total (minimum)	123

Agricultural and Biological Engineering Honors Program

Eligibility

This program is only available to seniors registered in the College of Engineering.

The Bachelor of Science degree with honors will be granted to students who, in addition to having completed the requirements for a bachelor's degree, have satisfactorily completed the honors program in the Department of Agricultural and Biological Engineering and have been recommended for the degree by the honors committee of the department. An honor's program student must enter with and maintain a cumulative GPA ≥ 3.50.

Content

An ABEN honors program shall consist of at least nine credits beyond the minimum required for graduation in ABEN. These nine credits shall be drawn from one or more of the following with at least four credit hours in the first category:

- A significant research experience or honors project under the direct supervision of an ABEN faculty member using ABEN 499, Undergraduate Research. A written senior honors thesis must be submitted as part of this component.
- A significant teaching experience under the direct supervision of a faculty member or as part of a regularly recognized course in the department (e.g., ABEN 151 or 250) under ABEN 498, Undergraduate Teaching.
- Advanced or graduate courses. These additional courses must be technical in nature, i.e., in engineering, mathematics, biology, chemistry and physics at the 400- and graduate level.

Note: no research, independent study, or teaching for which the student is paid may be counted toward the honors program.

Timing

All interested students must complete a 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. A student must be in the program for at least two semesters before graduation.

Procedures

Each applicant to the ABEN honors program must have an ABEN faculty advisor to supervise the honors program. A written approval of the faculty member who will direct the research is required. After the College verifies the student's grade-point average, the student will be officially enrolled in the honors program.

Minor in Environmental Engineering

(Offered in cooperation with the School of Civil and Environmental Engineering)

Eligibility

Engineering undergraduates affiliated with the following fields are eligible to participate in the environmental engineering minor: A&EP, CHEME, COM S, ELE E, GEOL, M&AE, MS&E, OR&IE. A fundamental challenge for the engineering profession is development of a sustainable society and environmentally responsible industry and agriculture reflecting an integration of economic and environmental objectives. We are called upon to be trustees and managers of our nation's resources, the air in our cities, and use and quality of water in our aquifers, streams, estuaries and coastal areas. This minor encourages engineering students to learn about the scientific, engineering, and economic foundations of environmental engineering so that they are better able to address environmental management issues. The requirements for the environmental engineering minor are outlined below. For further details consult the Agricultural and Biological Engineering Undergraduate Programs office, 207 Riley-Robb Hall, or the Civil and Environmental

Engineering Undergraduate Programs office, 221 Hollister Hall.

Requirements

To complete the minor, the student must take at least six (6) courses (minimum of 18 credits), chosen as follows.

Students must select courses from the following group listings, with at least one (1) course from each group.

Group A. Environmental Engineering Processes:

CEE 351	Environmental Quality Engineering
CEE 352	Water Supply Engineering
CEE 451	Microbiology for Environmental Engineering
CEE 453	Laboratory Research in Environmental Engineering
ABEN 476	Solid Waste Engineering
ABEN 477	Treatment and Disposal of Agricultural Wastes
ABEN 478	Ecological Engineering
CEE 644	Environmental Applications of Geotechnical Engineering
ABEN 651	Bioremediation
CEE 653	Water Chemistry for Environ mental Engineering
CEE 655	Pollutant Transport and Transformation in the Environment
CEE 658	Sludge Treatment, Utilization, and Disposal
CEE 654	Aquatic Chemistry

Group B. Environmental Systems:

ENGRI 113*	Introduction to Environmental Systems (*May count only if taken before the student's junior year.)
ABEN 475	Environmental Systems Analysis
CEE 529	Water and Environmental Resources Problems and Policies
CEE 597	Risk Analysis and Management
CEE 623	Environmental Quality Systems Engineering
ABEN 678	Nonpoint Source Models

Group C. Hydraulics, Hydrology and Environmental Fluid Mechanics:

CEE 331	Fluid Mechanics (CHEME 323 or M&AE 323 may be substituted for CEE 331)
CEE 332	Hydraulic Engineering
ABEN 371	Hydrology and the Environment
CEE 431/ ABEN 471	Geohydrology
CEE 432	Hydrology
CEE 435	Coastal Engineering
ABEN 473	Watershed Engineering
ABEN 474	Drainage and Irrigation Systems
CEE 633	Flow in Porous Media and Groundwater
CEE 655	Pollutant Transport and Transformation in the Environment
ABEN 671	Analysis of the Flow of Water and Chemicals in Soils
ABEN 672	Drainage

Academic Standards: a letter grade of C- or better in each course in the minor and a cumulative GPA of 2.0 or better for all courses in the minor.

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 students' 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 biological engineering, energy, environmental engineering, environmental management, food engineering, international agriculture, local roads, machine systems, soil and water engineering, and structures and environment. Elective courses are chosen from among engineering subject areas relevant to the student's interests 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 agricultural and biological engineering can qualify for the Dean's Certificate in energy, manufacturing, or bioengineering by choosing their design project and a number of electives from the designated topic areas. More information is available from the ABEN Student Services office, 207 Riley Robb Hall (255–2173), or by e-mail at abengradfield@cornell.edu.

APPLIED AND ENGINEERING PHYSICS

H. G. Craighead, director; F. W. Wise, associate director for undergraduate studies; A. L. Gaeta, director of graduate studies, B. W. Batterman, J. D. Brock, R. A. Buhrman, T. A. Cool, H. H. Fleischmann, M. S. Isaacson, V. O. Kostroun, B. R. Kusse, M. Lindau, R. V. E. Lovelace, J. Silcox, W. W. Webb; adjunct faculty: D. H. Bilderback; senior research associate: E. J. Kirkland

Bachelor of Science Curriculum

The undergraduate engineering physics curriculum is designed for students who want to pursue careers of research or development in applied science or advanced technology and engineering. Its distinguishing feature is a focus on the physics and mathematics fundamentals, both experimental and theoretical, that are at the base of modern engineering and research and have a broad applicability in these areas. By choosing areas of concentration, the students may combine this physics base with a good background in a conventional area of engineering or applied science.

The industrial demand for engineering physics 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 ENGRI 110, The Laser and Its Applications in Science, Technology, and Medicine (a freshman Introduction to Engineering course); ENGRD/A&EP 264, Computer-Instrumentation Design (a recommended sophomore engineering distribution course); A&EP 330, Modern Experimental Optics (a junior/senior course); A&EP 363, Electronic Circuits (a sophomore/junior course); PHYS 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 PHYS 112 or PHYS 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 ENGRD 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 one semester of advanced placement in math, who have received a grade of A- or better in MATH 192, may wish to explore accelerating their mathematics requirements so

as to enroll in A&EP 321 and 322 in the sophomore year. For advice on this option, consult with the A&EP associate director.

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
PHYS 410, Advanced Experimental Physics	4
A&EP 321, Mathematical Physics I; or MATH 421 (applied mathematics)	4
A&EP 322, Mathematical Physics II; or MATH 422 (applied mathematics)	4
Applications of quantum mechanics†	3 or 4

Five field-approved electives (15–19 credits), of which four must be technical. The technical electives are expected to be upper-level courses (300 or above).

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 in developing a strong, individualized educational program in their latter years, and for allowing options such as a semester or year abroad, or early graduation.

†Some courses (though the list is not all-inclusive) that will satisfy this requirement are PHYS 444, Nuclear and High-Energy Particle Physics; PHYS 454, Introductory Solid-State Physics; A&EP 438, Computational Engineering Physics; A&EP 440, Quantum and Nonlinear Optics; A&EP 609, Nuclear Physics for Applications; ELE E 430, Lasers and Optical Electronics; and ELE E 531, Quantum Electronics I.

Two of the four credits of PHYS 410 required for the BS degree in Engineering Physics can be satisfied by successfully completing A&EP/PHYS 330. The remaining two credits of PHYS 410 can then be satisfied by taking PHYS 400 for two credits, provided that the experiments completed in PHYS 400 do not overlap with those in A&EP/PHYS 330. (A list of experiments that are not appropriate will be prepared by A&EP faculty and made available in the A&EP office.) If a student chooses this option, A&EP/PHYS 330 may also count as a technical elective, provided the remaining three technical electives are four credits each.

‡If a scientific computing course was not selected as an engineering distribution course, one of these technical electives may be needed to satisfy the computing applications requirement. For students going on to graduate school a third course in mathematics is recommended.

Choosing elective courses. 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 a dual major 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 adviser to develop a coherent academic program that is in accordance with those goals. For those 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 interest, or with the associate director of the school, Professor Frank W. Wise.

Electives need not be all formal course work: qualified students are encouraged to undertake independent 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 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 average for that semester of at least 2.3.

Engineering Physics Honors Program

Eligibility

The Bachelor of Science degree with honors will be conferred upon those students who, while completing the requirements for a bachelor degree, have satisfactorily completed the honors program in the Department of Engineering Physics and have been recommended for the degree by the honors committee of the department. An honors program student must enter with and maintain a cumulative GPA≥ 3.50.

Content

The student must

1. Complete at least eight credits of field approved electives at the 400-level or higher and receive a minimum grade of an A- in each of the courses taken to fulfill this eight-credit requirement. These eight credits are in addition to the credits obtained by completing the senior thesis or special project requirement as discussed in item 2.
2. Enroll in A&EP 490 or an equivalent course over two semesters for the purpose of completing an independent research project or senior thesis under the supervision of a Cornell engineering or science faculty member. The minimum enrollment is to be two credits in the first semester and four credits in the second. The level of work required for a successful completion of this project or thesis is to be consistent with the amount of academic credit granted.

Timing

All interested students must complete a 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. A student must be in the program for at least two semesters before graduation.

Procedures

Before enrolling in A&EP 490, or the equivalent, the honors candidate must submit a brief proposal outlining the topic and scope of the proposed project or thesis and a faculty supervisor's written concurrence to the associate director for undergraduate studies. This proposal will be reviewed by the A&EP Honors Committee and either approved or returned to the candidate to correct deficiencies in the proposal. The proposed research project or senior thesis is to consist of a research, development, or design project and must go beyond a literature search. The final steps in completing the honors project are a written and oral report. The written report is to be in the form of a technical paper with, for example, an abstract, introduction, methods section, results section, conclusions section, references, and figures. This report will be evaluated by the faculty supervisor and the chair of the A&EP Honors Committee. Following the completion of the written report, an oral report is to be presented to an audience consisting of the faculty supervisor, the chair of the Honors Committee and at least one other departmental faculty member, along with the other honors candidates. The final research project course grade will be assigned by the faculty supervisor, following the oral presentation and after consultation with the chair of the Honors Committee. A minimum grade of A- is necessary for successful completion of the honors requirement.

Master of Engineering (Engineering Physics) Degree Program

The M.Eng. (Engineering Physics) degree may lead directly to employment in engineering design and development or may be a basis for further graduate work. Students have the opportunity to broaden and deepen their preparation in the general field of applied

physics, or they may choose the more specific option of preparing for professional engineering work in a particular area such as laser and optical technology, nanostructure 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 nano-structure science and technology. Core courses in this specialty include the microcharacterization of materials (A&EP 661) and the microprocessing and microfabrication of materials (A&EP 662). The design project may focus on such areas as semiconductor materials, device physics, nanostructure technology, or optoelectronics. Another area of study may be applied optics where 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 (17 to 23 credits)
3) a required special-topics seminar course (1 credit)

The design project, which is proposed by the student and approved by the program chair, is carried out on an individual basis under the guidance of a member of the university faculty. It may be experimental or theoretical in nature; if it is not experimental, a laboratory physics course is required.

The individual program of study consists of a compatible sequence of courses focused on a specific area of applied physics or engineering. It's purpose is 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 Richard 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 Frank H. T. Rhodes Hall.

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

M. L. Shuler, director; A. B. Anton, P. Clancy, C. Cohen, T. M. Duncan, J. R. Engstrom, F. A. Escobedo, P. Harriott, D. L. Koch, K. H. Lee, W. L. Olbricht, F. Rodriguez, W. M. Saltzman, P. H. Steen

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 CHEM 208 during the freshman year. The program for the last three years, for students who have taken an Introduction to Engineering course during the first year is as follows:

Semester 3	*Credits*
MATH 293, Engineering Mathematics	4
PHYS 213, Electricity and Magnetism	4
CHEM 389, Physical Chemistry I (engineering distribution)	4
ENGRD 219, Mass and Energy Balances (engineering distribution)	3
Humanities or social sciences	3
Semester 4	
MATH 294, Engineering Mathematics	4
CHEM 290–391, Physical Chemistry (field)	6
ENGRD 211, 222, or 241	3
Humanities or social sciences	3
Semester 5	
CHEM 357, Introductory Organic Chemistry	3
CHEM 251, Organic Chemistry Laboratory	2
CHEME 313, Chemical Engineering Thermodynamics	4
CHEME 323, Fluid Mechanics	3
Humanities or social sciences	3
Semester 6	
Applied Science elective†	3
CHEME 301, Nonresident Lectures	1
CHEME 324, Heat and Mass Transfer	3
CHEME 332, Analysis of Separation Processes	4
CHEME 390, Reaction Kinetics and Reactor Design	3
Humanities or social sciences	3
Semester 7	
CHEME 432, Chemical Engineering Laboratory	4
CHEME 472, Process Control	3
Electives*	6
Humanities or Social Sciences	3
Semester 8	
CHEME 462, Chemical Process Design	4
Humanities or social sciences	3
Electives*	3
Approved elective	3

*The electives in semester seven and eight comprise 6 credits of field approved electives, and 3 credits of CHEME process or systems elective. CHEME process or systems electives include CHEME 480, Chemical Processing of Electronic Materials; CHEME 564, Design of Chemical Reactors; CHEME 640, Polymeric Materials; CHEME 643, Introduction to Bioprocess Engineering; CHEME 656, Separations Using Membranes or Porous Solids; CHEME 661, Air Pollution Control.

†Applied science electives include BIOMI 290, General Microbiology Lectures; BIOBM 330, 331, 332, and 333, Principles of Biochemistry; CEE 654, Aquatic Chemistry; CHEME 480, Chemical Processing of Electronic Materials; CHEME 640, Polymeric Materials; FOOD 409, Food Chemistry; MS&E 331, Structure of Materials; MS&E 332, Electrical and Magnetic Properties of Materials; MS&E 441, Microprocessing of Materials; MS&E 449, Introduction to Ceramics; MS&E 452, Properties of Solid Polymers; any A&EP course numbered 333 or above; any CHEM course numbered 301 or above; any PHYS course numbered 300 or above.

Master of Engineering (Chemical) Degree Program

The professional master's degree, M.Eng. (Chemical), is awarded at the end of one year of graduate study with successful completion of 30 credits of required and elective courses in technical fields including engineering, mathematics, chemistry, physics, and business administration. Courses emphasize design and optimization based on the economic factors that affect design alternatives for processes, equipment, and plants. General admission and degree requirements are described in the college's introductory section.

Specific requirements include

1) two courses in advanced chemical engineering fundamentals chosen from CHEME 711, 713, 731, 732, and 751

2) two courses in applied chemical engineering science chosen from CHEME 480, 520, 564, 566, 640, 643, 656, and 661

3) a minimum of 3 credits of a design project, CHEME 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

J. F. Abel, S. L. Billington, J. J. Bisogni, Jr., W. H. Brutsaert, E. A. Cowen, R. I. Dick, J. M. Gossett, M. D. Grigoriu, D. A. Haith, K. C. Hover, A. R. Ingraffea, F. H. Kulhawy, L. W. Lion, P. L-F. Liu, D. P. Loucks, A. H. Meyburg, L. K. Nozick, T. D. O'Rourke, T. Peköz, W. D. Philpot, M. J. Sansalone, R. E. Schuler, C. A. Shoemaker, J. R. Stedinger, H. E. Stewart, M. A. Turnquist, R. N. White

Bachelor of Science Curriculum

The School of Civil and Environmental Engineering (CEE) 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, while it is not necessary to do so, students may concentrate in structural engineering, geotechnical engineering, fluid mechanics and hydrology, water resource systems, or transportation. The environmental engineering curriculum emphasizes study of environmental engineering, water resource systems, and fluid mechanics and hydrology. Sample curricula are available in the CEE Undergraduate Program office, 221 Hollister Hall.

Requirements for Admission to the Field:

Students planning to enter the field program in Civil and Environmental Engineering are required to complete the following courses before or during the first semester of the sophomore year with a grade of C– or better: for the civil option, ENGRD 202, Mechanics of Solids; for the environmental option, either ENGRD 202, Mechanics of Solids or CHEM 208, General Chemistry. In addition, the field requires a cumulative grade point average of at least 2.0 both overall and in engineering and sciences courses.

Recommended Engineering Distribution Courses:

Students in the environmental option are required to take ENGRD 202 (Mechanics of Solids), as an engineering distribution course. The second engineering distribution may be selected according to their interests, and the following engineering distribution courses are recommended: ENGRD 201 Introduction to the Physics and Chemistry of the Earth, ENGRD 219 Mass and Energy Balances, ENGRD 221 Thermodynamics, ENGRD 250 Engineering Applications in Biological Systems, BIO G 101 and 103 Biological Sciences Lecture and Laboratory, BIO G 105 Introduction to Biology, BIO G 107 General Biology, or CHEM 389 Physical Chemistry.

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 hydralics/ hydrology;

ENGRD 211, Computers and Programming, for students interested in transportation;

ENGRD 241, Engineering Computation,* for all students.

Field Program:

Environmental Engineering Option

These option requirements apply to all students in the Classes of 2000 and later. 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:

Core Courses	*Credits*
Introductory Biology‡ (BIO G 101 & 103, BIO G 105, or BIO G 107	4
ENGRD 241, Engineering Computation*	3
CEE 304, Uncertainty Analysis in Engineering†	4
CEE 323, Engineering Economics and Management	3
CEE 331, Fluid Mechanics	4
CEE 341, Introduction to Geotechnical Engineering	4
CEE 351, Environmental Quality Engineering	3
CEE 451, Microbiology for Environmental Engineering§	3
CEE 453, Laboratory Research in Environmental Engineering	3
ABEN 475, Environmental Systems Analysis	3

Additional requirements include one‡ field-approved elective and three design electives from an approved list of courses that is available in the CEE Undergraduate Program office. In addition, students must complete one technical communications course from among the courses designated ENGRC or approved communications courses. If the technical communications course is taken as an expressive art, then students must take an additional approved elective.

‡The requirement for students prior to the class of 2002 is two field-approved electives and no requirement for a core course in introductory biology.

§Students planning graduate level study in environmental engineering may take BIOMI 290 Introduction to Microbiology in place of CEE 451. These students should also take CHEM 257 or CHEM 357 Introduction to Organic Chemistry as an approved elective.

Civil Engineering Option

For the field program in Civil Engineering, students may elect to substitute CHEM 208 for PHYS 214. The following nine courses are required in addition to those required for the Common Curriculum.

Core Courses	*Credits*
ENGRD 203, Dynamics	3
ENGRD 241, Engineering Computation*	3
CEE 304, Uncertainty Analysis in Engineering†	4
CEE 323, Engineering Economics and Management	3
CEE 331, Fluid Mechanics	4
CEE 341, Introduction to Geotechnical Engineering	4
CEE 351, Environmental Quality Engineering**	3
CEE 361, Introduction to Transportation Engineering**	3
CEE 371, Structural Behavior	4

Additional requirements include a set of two field-approved electives and three design electives from an approved list of courses that is available in the school office. In addition, students must complete one technical communications course from among the courses designated ENGRC or approved communications courses. If the technical communications 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. If a student elects to use this course as a second distribution course, the student must take an additional field-approved elective to fulfill the core course requirements.

†ENGRD 270 may be accepted (by 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.

**Students may substitute CEE 372 Structural Analysis for either CEE 351 or CEE 361 if they also take CEE 473 or CEE 474. However, CEE 372 cannot count as both a core course and a field-approved elective.

Civil and Environmental Engineering Honors Program

Eligibility

The Bachelor of Science degree with honors will be granted to students who, in addition to having completed the requirements for a bachelor degree, have satisfactorily completed the honors program in Civil and Environmental Engineering and have been recommended for the degree by the faculty of the school. An honors program student must enter with and maintain a cumulative GPA≥ 3.50.

Content

A CEE honors program shall consist of at least nine credits beyond the minimum required for graduation in CEE. These nine credits shall be drawn from one or more of the following components:

1. A significant research experience or honors project under the direct supervision of a CEE faculty member using CEE 400: Senior

Honors Thesis (1–6 credits per semester). A significant written report or senior honors thesis must be submitted as part of this component.

2. A significant teaching experience under the direct supervision of a faculty member or as part of a regularly recognized course in the College of Engineering (i.e., ENGRG 470: Undergraduate Engineering Teaching or CEE 401: Undergraduate Teaching in CEE (1–3 credits per/semester).

3. Advanced or graduate courses at the 500-level or above.

The minimum number of credits in any component included in a program should be two. No research, independent study, or teaching for which the student is paid may be counted toward the honors program.

Timing

All interested students must apply no later than the beginning of the first semester of their senior year, but are encouraged to apply as early as the first semester of their junior year. All honors program students must be in the program for at least two semesters prior to graduation.

Procedures

Each applicant to the CEE honors program must have a faculty adviser or faculty mentor to supervise the student's individual program. (This need not be the student's faculty adviser.) The application to the program shall be a letter from the student describing the specific proposed honors program and include the explicit approval of the faculty adviser and the honors adviser. Each program must be approved by the CEE Curriculum Committee, although the committee may delegate approval authority to the associate director for all but unusual proposals.

Engineering Minor Programs

The School of Civil and Environmental Engineering currently offers three engineering minor programs: civil infrastructure, engineering management, and environmental engineering (offered in cooperation with the Department of Agricultural and Biological Engineering). Descriptions and requirements for each program follow:

Minor in Civil Infrastructure

Eligibility

Engineering undergraduates affiliated with the following fields are eligible to participate in the civil infrastructure minor: ABEN, A&EP, CHEME, COM S, ELE E, GEOL, M&AE, MS&E, OR&IE.

The minor in civil infrastructure is intended to introduce engineering undergraduates to the engineering methodologies of mechanics, materials, analysis, design, and construction and to show how these are used in solving problems in the development maintenance and operation of the built environment which is vital for any modern economy.

The requirements for the civil infrastructure minor are outlined below. For further details consult the Civil and Environmental Engineering Undergraduate Programs office, 221 Hollister Hall.

Requirements

To complete the minor, the student must take at least six (6) courses (minimum of 18 credits), chosen as follows:

I. Required Course: ENGRD 202 Mechanics of Solids

II. Additional Courses: choose any 5 (groupings are for information only)*

Geotechnical Engineering

CEE 341 Introduction to Geotechnical Engineering

CEE 640 Foundation Engineering

CEE 641 Retaining Structures and Slopes

CEE 644 Environmental Applications of Geotechnical Engineering

Structural Engineering

CEE 371 Structural Behavior

CEE 372 Structural Analysis

CEE 473 Design of Concrete Structures

CEE 474 Design of Steel Structures

CEE 476 Civil Engineering Materials

ABEN 481 Design of Wood Structures

CEE 672 Fundamentals of Structural Mechanics

CEE 673 Advanced Structural Analysis

Other Related Courses

CEE 332 Hydraulic Engineering

CEE 361 Introduction to Transportation Engineering

CEE 595 Construction Planning and Operations

* Other CEE courses approved by petition in advance.

Academic Standards: a letter grade of C or better for each course in the minor.

Minor in Engineering Management

Eligibility

Engineering undergraduates affiliated with the following fields are eligible to participate in the engineering management minor: ABEN, A&EP, CHEME, COM S, ELE E, GEOL, M&AE, MS&E.

This minor focuses on giving engineering students a basic understanding of engineering economics, accounting, statistics, project management methods and analysis tools necessary to manage technical operations and projects effectively. The minor provides an important set of collateral skills for students in any engineering discipline.

The requirements for the engineering management minor are outlined below. For further details, consult the Civil and Environmental Engineering Undergraduate Programs offices, 221 Hollister Hall.

Requirements

To complete the minor, the student must take at least six (6) courses (minimum of 18 credits), chosen as follows:

I. Required Courses (3):

CEE 304 Uncertainty Analysis in Engineering

or ENGRD 270 Basic Engineering Probability and Statistics

or ELE E 310 Introduction to Probability and Random Signals

CEE 323 Engineering Economics and Management

OR&IE 350 Financial and Managerial Accounting

II. Additional Courses—choose any 3*

CEE 590 Project Management

CEE 593 Engineering Management Methods I: Data, Information and Modeling

CEE 594 Engineering Management Methods II: Managing Uncertain Systems

CEE 595 Construction Planning and Operations

CEE 597 Risk Analysis and Management

NBA 401 Entrepreneurship for Engineers

*Other courses approved by petition in advance.

Academic Standards: a letter grade of C or better for each course in the minor.

Minor in Environmental Engineering

(Offered in cooperation with the Department of Agricultural and Biological Engineering)

Eligibility

Engineering undergraduates affiliated with the following fields are eligible to participate in the environmental engineering minor: A&EP, CHEME, COM S, ELE E, GEOL, M&AE, MS&E, OR&IE.

A fundamental challenge for the engineering profession is development of a sustainable society and environmentally responsible industry and agriculture reflecting an integration of economic and environmental objectives. We are called upon to be trustees and managers of our nation's resources, the air in our cities, and use and quality of water in our aquifers, streams, estuaries and coastal areas. This minor encourages engineering students to learn about the scientific, engineering, and economic foundations of environmental engineering so that they are better able to address environmental management issues.

The requirements for the environmental engineering minor are outlined below. For further details consult the Civil and Environmental Engineering Undergraduate Programs office, 221 Hollister Hall, or the Agricultural and Biological Engineering Undergraduate Programs office, 207 Riley-Robb Hall.

Requirements

To complete the minor, the student must take at least six (6) courses (minimum of 18 credits), chosen as follows:

II. Students must select courses from the following group listings, with at least one (1) course from each group.

Group A. Environmental Engineering Processes:

CEE 351 Environmental Quality Engineering

CEE 352 Water Supply Engineering

CEE 451 Microbiology for Environmental

Engineering

CEE 453 Laboratory Research in Environmental Engineering

ABEN 476 Solid Waste Engineering

ABEN 477 Treatment and Disposal of Agricultural Wastes

ABEN 478 Ecological Engineering

CEE 644 Environmental Applications of Geotechnical Engineering

ABEN 651 Bioremediation

CEE 653 Water Chemistry for Environmental Engineering

CEE 655 Pollutant Transport and Transformation in the Environment

CEE 658 Sludge Treatment, Utilization, and Disposal

CEE 654 Aquatic Chemistry

Group B. Environmental Systems:

ENGRI 113* Introduction to Environmental Systems (*May count only if taken before the student's junior year.)

ABEN 475 Environmental Systems Analysis

CEE 529 Water and Environmental Resources Problems and Policies

CEE 597 Risk Analysis and Management

CEE 623 Environmental Quality Systems Engineering

ABEN 678 Nonpoint Source Models

Group C. Hydraulics, Hydrology and Environmental Fluid Mechanics:

CEE 331 Fluid Mechanics (CHEME 323 or M&AE 323 may be substituted for CEE 331)

CEE 332 Hydraulic Engineering

ABEN 371 Hydrology and the Environment

CEE 431/ABEN 471 Geohydrology

CEE 432 Hydrology

CEE 435 Coastal Engineering

ABEN 473 Watershed Engineering

ABEN 474 Drainage and Irrigation Systems

CEE 633 Flow in Porous Media and Groundwater

CEE 655 Transport, Mixing and Transformation in the Environment

ABEN 671 Analysis of the Flow of Water and Chemicals in Soils

ABEN 672 Drainage

Academic Standards: a letter grade of C- or better in each course in the minor and a cumulative GPA of 2.0 or better for all courses in the minor.

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 (design-option) or managerial (management-option) 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, with some options indicating an intensive, full-time 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 590) and a two-course design project (CEE 501 and 502).
2) Specialization in a major concentration area—three to five courses in either environmental engineering, environmental fluid mechanics/hydrology, geotechnical engineering, structural engineering, transportation management, or water resources and environmental systems engineering.
3) Technical electives.
4) Study in a related area or areas.

Courses taken as technical electives or in the related subject area(s) may consist of graduate or advanced courses in fields related to the major concentration area, either inside or outside of the school.

For the M.Eng. (Civil) program in the engineering management option, the requirements are:

1) Five courses: Project Management (CEE 590), 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.

The School of Civil and Environmental Engineering cooperates with the the Johnson Graduate School of Management in two joint programs leading to both Master of Engineering and Master of Business Administration degrees. See the introductory section under College of Engineering.

Applications for the six-year B.S./M.Eng./M.B.A. program must be submitted at the beginning of the sixth term of study.

COMPUTER SCIENCE

C. Van Loan, chair; B. Arms, K. Birman, C. Cardie, T. Coleman, R. L. Constable, R. Elber, D. Greenberg, D. Gries, J. Halpern, J. Hartmanis, J. E. Hopcroft, D. Huttenlocher, S. Keshav, J. Kleinberg, D. Kozen, L. Lee, G. Morrisett, A. Myers, K. Pingali, R. A. Rubinfeld, F. B. Schneider, B. Selman, P. Seshadri, D. Shmoys, B. Smith, E. Tardos, R. Teitelbaum, S. Toueg, S. Vavasis, T. vonEicken, R. Zabih

Bachelor of Science Curriculum

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.

For details, visit our web site at http://www.cs.cornell.edu/ugrad

The Major

Computer Science majors take courses in algorithms, data structures, logic, programming languages, scientific computing, systems, and theory. Electives in artificial intelligence, computer graphics, computer vision, databases, multimedia, and networks are also possible. Requirements include:

- four semesters of calculus (MATH 191–192–293–294 or 111–122 (or 112)–221–222)
- two semesters of introductory computer programming (COM S 100 and ENGRD 211 or 212)
- a seven-course computer science core (ENGRD 222, COM S 280, 314, 381, 410, 414, and 482)
- two 400+ computer science electives, totaling at least 6 credits
- a computer science project course (COM S 413, 415, 418, 433, 473, 501, 514, 519, or 664)
- a 3+ credit mathematical elective course (OR&IE 270, MATH 300+, T&AM 300+, etc.)
- two 300+ courses (field approved electives) that are technical in nature and total at least six credits
- a three-course specialization in a discipline other than computer science. These courses must be numbered 300-level or greater and be 3+ credit hours each.

The program is broad and rigorous, but it is structured in a way that supports in-depth study of outside areas. Intelligent course selection can set the stage for graduate study and employment in any technical area and any professional area such as business, law, or medicine. With the advisor, the computer science major is expected to put together a coherent program of study that supports career objectives and is true to the aims of liberal education.

Computer Science Honors Program

Eligibility

The Bachelor of Science degree *with honors* will be granted to students who, in addition to having completed the requirements for a bachelor degree, have:

- qualified for *latin* honors in the College of Engineering (basically, a cumulative GPA ≥ 3.50)
- at least 8 credits of COM S course work at or above the 500-level
- at least 6 credits of COM S 490 (independent research) spread over two semesters, with a grade of A- or better each term.

See the COM S undergraduate web site for more information on eligibility: http://www.cs.cornell.edu/ugrad

Content

Honors courses may not be used to satisfy the COM S 400+ elective requirement, the COM S project requirement, the math, technical, or field approved electives, or the specialization.

Timing

Honors' determinations are made during the senior year. Students wanting to be considered for field honors should notify the Undergraduate Office in the Department of Computer Science via electronic mail at the following address: <ugrad@cs.cornell.edu>. The subject line for this message should read "HONORS TRACK". Related questions may be addressed to the ugrad e-mail alias, or candidates can call or stop by 303 Upson Hall, 255–0982.

Preparation

Arrangements for doing COM S 490 research should be made directly with faculty members in the department. Students are encouraged to discuss potential contacts with their advisers and/or browse the department's web page at http://www.cs.cornell.edu for specific leads on research opportunities.

The Department of Computer Science reserves the right to make changes to the honors program requirements at any time. Generally speaking, all members of the same graduating class in COM S will be subject to the same honors criteria.

Master of Engineering (Computer Science) Degree Program

The M.Eng. program in computer science is a one-year program that can be started in either the fall or spring semester. This program is designed to develop expertise in system design and implementation in many areas of computer science including computer networks, Internet architecture, fault-tolerant and secure systems, distributed and parallel computing, high performance computer architecture, databases and data mining, multimedia systems, computer vision, computational tools for finance, computational biology (including genomics), software engineering, programming environments and artificial intelligence.

A typical program in computer science includes several upper-division and graduate courses and a faculty-supervised project. The course and project requirements are flexible and allow students to build up a program that closely matches their interests. In particular, slightly under half the courses may be taken outside the computer science department (for example, many students choose to take several business administration courses). Project work, which may be done individually or in a small group, can often be associated with ongoing research in the Department of Computer Science in one of the areas listed above.

Cornell seniors may use the early admission option to effectively co-register for the M.Eng. program while completing the undergraduate degree. This option can be started in either the fall or spring semesters. It applies to students who have eight or fewer credits remaining to complete their undergraduate program.

For more information about the M.Eng. program in computer science and the early admission option for Cornell seniors, please consult our web page at www.cs.cornell.edu/grad/meng.

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 can consult with their adviser, the undergraduate office in 303 Upson Hall, or the Johnson School directly.

ELECTRICAL ENGINEERING

J. S. Thorp, director; J. M. Ballantyne, T. Berger, A. W. Bojanczyk, H.-D. Chiang, D. F. Delchamps, L. F. Eastman, D. T. Farley, T. L. Fine, Z. Haas, D. A. Hammer, C. Heegard, M. Heinrich, S. S. Hemami, C. R. Johnson, Jr., E. Kan, M. C. Kelley, P. M. Kintner, R. Kline, K. T. Kornegay, J. P. Krusius, R. L. Liboff, Y.-H. Lo, N. C. MacDonald, R. Manohar, P. R. McIsaac, B. A. Minch, J. A. Nation, T. W. Parks, A. Phillips Jr., C. R. Pollock, A. P. Reeves, C. E. Seyler, Jr., J. R. Shealy, R. N. Sudan, C. L. Tang, R. J. Thomas, N. Tien, S. Tiwari, L. Tong, V. Veeravalli, S. B. Wicker

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 and digital systems; 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 and space physics; and semiconductor devices and applications.

Electrical Engineering Field Program

Students planning to enter the field program in Electrical Engineering must take ENGRD 231 as an engineering distribution course. The fall of the sophomore year is the preferred term for ENGRD 231/ELE E 232 for students without advanced standing in mathematics. Electrical engineering students with an interest in computer engineering are encouraged to take ENGRD 211 as an engineering distribution course prior to entry into the field program. In addition, the field program normally begins in the spring of the sophomore year, as shown below. All of these courses (except ELE E 210 and ENGRD 231) are taught only once each academic year, either spring or fall, as indicated in the course descriptions.

Course	Credits
Field Required Courses	
ELE E 210, Introduction to Circuits for Electrical and Computer Engineers	3
ELE E 215, Introductory Integrated Circuits Laboratory	1
ELE E 232, Digital Systems Design Laboratory	1
ELE E 301, Signals and Systems I	4
ELE E 303, Electromagnetic Fields and Waves	4
ELE E 315, Electronic Circuit Design	4
Field Approved Electives (36-credit minimum in the following categories)	
Electrical Engineering Electives† (8 courses)	24 minimum
Electives Outside Field‡ (3 courses)	9 minimum
Total minimum field credits	53

ELE E 310 can be taken in place of ENGRD 270 or T&AM 310 to satisfy the college application of probability and statistics requirement.

†These electives must include three 400-level electrical engineering laboratory courses and at least two additional courses at the 400-level or above. The remaining electives may not include independent project courses, such as ELE E 391, 392, 491 or 492, and must be at the 300-level or above in Electrical Engineering.

At least one of the required electrical engineering laboratory courses must be selected from a list including ELE E 415, 425, 430, 453, 457, 475, 476, 488, 490, 497, 530, and 534. The other may be selected from the above list or from among ELE E 423, 426, 433, 438, 450, 452, 471, 472, 481, 524, 525, 526, 536, 539, 547, 554, 558, 577, and 593. (This list is dynamic and changes frequently. Always refer to the latest information in the ELE E Web Handbook.)

‡Must include one course at the 300-level or above (see *Electrical Engineering Web Handbook* for details).

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 through the department web handbook pages at http://www.ee.cornell.edu/.

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.

An electrical engineering honors program also exists for those students who so desire and meet the program entrance requirements. The honors program requires an additional senior ELE E course, a required senior year directed reading course, or a design project, or ENGRG 470, and completion of the honors seminar. Details are available via the electrical engineering homepage located through the World Wide Web at http://www.ee.cornell.edu/.

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 sophomore year 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 Web Handbook* to remain active participants.

Electrical Engineering Honors Program

Eligibility, Entry, and Continuation

A student must apply to enter the ELE E Honors Program and may do so as early as the beginning of the fifth semester or as late as the end of the sixth semester. A student must have a cumulative GPA of at least 3.5 to apply for entry. A student in the honors program whose cumulative GPA falls below 3.5 at the end of any semester will be dropped from the honors program by College of Engineering regulations. There is an additional requirement (see Honors Seminar) for entry into the program after the end of the fifth semester.

Honors Seminar

Any student in the honors program is required to take (or to have taken) an honors seminar during his or her junior year. The Honors Seminar is a 2-credit semester-course (offered spring only) consisting of a weekly series of introductory research lectures by electrical engineering faculty members. Each honors seminar enrollee will be required to write a number of short papers on topics covered in the lecture series. Many electrical engineering faculty members will give a lecture or short series of lectures as part of the Honors Seminar. Students in the honors program and students with a cumulative GPA of at least 3.5 who are considering entering the honors program must receive letter grades for the Honors Seminar.

Honors Project

Any student in the honors program is required to accumulate at least three credit hours from a senior year honors project consisting either of design, ENGRG 470, or directed reading. All honors projects should emphasize the development of communication skills. Design- and reading-oriented honors projects require explicitly a written submission summarizing and concluding the project.

Additional Coursework

Any student in the honors program is required to take at least three credit hours of advanced (senior level) ELE E coursework that has at least a 300-level prerequisite. These credit hours are in addition to any credit hours required as part of the ELE E field program.

The program described above requires honors program participants to amass at least nine credit hours over and above the 128 credit hours required for a B.S. degree; thus an honors degree requires a minimum of 137 credit hours.

Minor in Electrical Engineering

Eligibility

Engineering undergraduates affiliated with the following fields are eligible to participate in the electrical engineering minor: ABEN, A&EP, CEE, CHEME, COM S, GEOL, M&AE, MS&E*, OR&IE. (*MS&E students planning to pursue this minor must receive prior written approval from both MS&E and ELE E, via petition.)

The School of Electrical Engineering offers a minor to students who wish to complement their major field by obtaining a background in electrical engineering. The minor offers the opportunity to study analog and digital circuits, signals and systems, electromagnetic fields, and additionally specialize at higher levels in one of several different areas such as circuit design, electronic devices, communications, computer engineering, networks, or space engineering.

The requirements for the electrical engineering minor are outlined below. For further details consult the Electrical Engineering Undergraduate Programs office, 222 Phillips Hall.

Requirements

To complete the minor, the student must take at least six (6) courses (minimum of 18 credits), chosen as follows:

I. Required Courses:

ELE E 210 Introduction to Circuits for Electrical and Computer Engineers

and ELE E 215 Practicum in Circuit Design (counts as one course)

ENGRD 231 Introduction to Digital Systems

and ELE E 232 Practicum in Digital Systems (counts as one course)

II. Two (2) of the following:

ELE E 301 Electrical Signals and Systems I

ELE E 303 Electromagnetic Fields and Waves

ELE E 315 Electronic Circuit Design

III. One (1) other ELE E course at the 300 level or above (3 credit minimum)

IV. One (1) other ELE E courses at the 400 level or above (3 credit minimum)

Academic Standards: a letter grade of C- or better for each course in the minor and a cumulative GPA of 2.3 or better for all courses in the minor.

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 beyond that expected in a typical undergraduate program, including a minimum of four courses in electrical engineering. An electrical engineering design project is also required and may account for 3 to 8 credits of the M.Eng. program. Occasionally, students take part in very extensive projects and may apply for a waiver of the 8-credit maximum and increase the project component to 10 credits. Students with special career goals, such as engineering management, may apply to use up to 11 credits of approved courses that have significant technical content, but are taught in disciplines other than engineering, mathematics, or the physical sciences.

Students with advanced standing frequently take one or more graduate-level courses prior to graduation and may actually begin accumulating credit toward the Master of Electrical Engineering program in their last semester of undergraduate work. Application of credits taken while an undergraduate at Cornell must be approved in advance of the last semester of undergraduate work.

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

B. L. Isacks, chair; R. W. Kay, director of undergraduate studies; R. W. Allmendinger, W. Allmon, M. Barazangi, W. A. Bassett, J. M. Bird, L. D. Brown, L. M. Cathles, J. L. Cisne, K. Cook, L. A. Derry, C. H. Greene, T. E. Jordan, S. Mahlburg Kay, F. H. T. Rhodes, D. L. Turcotte, W. M. White

Bachelor of Science Curriculum

The Department of Geological Sciences offers two options in its field program, the geoscience option and the science of earth systems (SES) Option. The geoscience option emphasizes the structure, composition, and evolution of our planet, while the SES option is more concerned with processes on and near the earth's surface where the interactions of water, life, rock, and air produce our planetary environment. An engineering minor is available.

The geoscience option reveals the earth's turbulent history from the formation of our solar system to the plate tectonic cycles that dominate the earth's present behavior. That history is highlighted by the co-evolution of life and the Earth system from the origin of life to the modern inter-glacial phase during which our species has so proliferated. Topics of study also include the fundamental processes responsible for earthquakes, volcanic eruptions, and mountain building.

The geoscience option prepares students for advanced study in geology, geophysics, geochemistry, and geobiology, and careers in mineral and petroleum exploration or in environmental geology. Alternatively, it is a valuable major for a pre-law or pre-med program or in preparation for a career in K–12 education.

The science of earth systems (SES) Option provides an integrated view of Earth processes critical to the understanding of our environment. This scientific understanding is the primary foundation upon which to determine if, and to what degree, human societies can modify or adapt to future change. The SES option is for students interested in careers in atmospheric, hydrological and ocean sciences, environmental chemistry (biogeochemistry), and environmental geophysics. The option enables students in the College of Engineering to take part in the multidisciplinary, intercollege program in the science of earth systems (see description in Interdisciplinary Centers, Programs, and Studies). Collaborations with other departments provide breadth and depth to the program.

Geoscience Option

The geoscience option stresses a balanced overview of geological sciences with considerable flexibility and a degree of specialization achieved by careful selection of field-approved electives. Students are required to take ENGRD/GEOL 201 as an engineering distribution course. For students interested in geobiology or paleontology, BIO G 101/103–102/104 (or BIO G 109–110) are recommended. CHEM 208 may be substituted for PHYS 214.

The geoscience option requires the following courses: the introductory outdoor field course, GEOL 210, and the five core courses, GEOL 326, 355, 356, 375, and 388. Two additional GEOL field-required courses and at least one field-approved elective must be GEOL 300 through 600-level courses. The 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.

In addition, a requirement for an advanced outdoor field experience may be met by completing one of the following 4 credit options: (a) GEOL 417 (Field Mapping in Argentina, 3 credits) and GEOL 491–492 (based on field observations) for a combined 4 credit minimum; (b) GEOL 437 (Geophysical Field Methods, 3 credits) plus at least 1 credit of GEOL 491 or 492 using geophysical techniques from GEOL 434; (c) GEOL 491–492 (Undergraduate Research, 2 credits each) with a significant component of field work; or (d) an approved outdoor field course taught by another college or university (4-credit minimum).

A selection of field-approved electives may provide specializations in geophysics, geochemistry (including petrology and mineralogy), geobiology (paleontology), and geology applied to mineral and petroleum industries, environmental problems, hydrology, and civil engineering. Students intending to specialize in economic geology or pursue careers in the mining industries or mineral exploration should consider including economics courses among their liberal studies distribution courses. Students who want a more general background or who want to remain uncommitted with regard to specialty must choose at least two of their field-approved electives from the same field. The field-approved electives outside the field may be chosen from offerings in other science or engineering fields or the liberal arts, but should be at the 300 level or above. Students may request substitution of GEOL 491 and 492, Undergraduate Research, for a fourth-year field-approved elective but not if it is being used to fulfill the outdoor field requirement.

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, instruments for highly precise isotopic and element analyses, 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). 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.

Science of Earth Systems (SES) Option

The SES Option emphasizes a strong preparation 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. The option provides a rigorous base of environmental science that strongly complements Cornell's programs in environmental and agricultural engineering.

Students are required to take a second semester of chemistry, three semesters of biology, and ENGRD 201 (Physics and Chemistry of the Earth) as one of the engineering distribution courses. The option requires a set of three core courses, normally taken in the junior or senior years, which provide breadth and integration. An additional set of five intermediate to advanced courses are selected to provide depth and a degree of specialization. These courses permit the student to specialize in atmospheric, hydrologic or ocean sciences, biogeochemistry, environmental geophysics, an approved combination of these areas, or a combination with courses in economics, government, or education in preparation for further study leading to careers in environmental law or management or K-12 education.

The field requirements for the SES Option are summarized as follows. CHEM 208 is required, and may be taken instead of PHYS 214. ENGRD 201/GEOL 201 is a required engineering distribution course. The field program includes BIO G 101/103–102/104 (or BIO G 109–110), BIOES 261, the three SES core courses listed below, five additional courses selected with the advisor's approval to provide specialization in one or a combination of the areas covered by SES, and an additional field-approved elective. Two of the specialization courses will count as field-required courses, and three as field-approved electives. At least three of the field-approved electives must be non-GEOL courses. The three SES core courses include the following:

SES 301 Climate Dynamics (enroll in ASTRO 331 or SCAS 331) Fall. 4 credits;

SES 302 Evolution of the Earth System (enroll in GEOL 302 or SCAS 332) Spring. 4 credits;

SES 321 Biogeochemistry (enroll in GEOL 321 or NTRES 321) Fall. 4 credits;

Areas of specialization include at present

- climate dynamics, the study of the physical and chemical processes producing Earth's climate system;
- ocean sciences, the study of the biological, chemical and physical processes at work in the ocean;
- hydrological sciences, the study of the interactions of rock, water, snow and ice on Earth's land surfaces;
- biogeochemistry, study of element cycling near Earth's surface and how organisms both mediate and benefit from these fluxes;
- environmental geophysics, remote sensing of Earth's surface and subsurface applied to the study of the environment, global change, and natural hazards.

In addition to faculty in or associated with the Department of Geological Sciences, faculty currently associated with the SES program include the following: W. Brutsaert (CEE); R. Bryant (SCAS); P. Gierasch (ASTRO); L. Hedin (BIOES); R. Howarth (BIOES, SCAS); M. Kelley (ELE E); J.-Y. Parlange (ABEN); S. Riha (SCAS); J. Yavitt (NTRES).

Geological Science Honors Program

Eligibility

The Bachelor of Science degree with honors will be granted to students who, in addition to having completed the requirements for a bachelor degree, have satisfactorily completed the honors program in Geological Sciences and have been recommended for the degree by the honors committee of the department. An honors program student must enter with and maintain a cumulative GPA≥ 3.50.

Content

In addition to the minimum graduation requirements, a student must

1. take at least 9 credits above the minimum required for graduating and approved by the upperclass adviser;
2. have a written proposal of the honors project accepted by his or her faculty adviser and the director of undergraduate studies;
3. complete an honors thesis involving research (GEOL 491–492, 2 credits each) of breadth, depth, and quality.

Timing

A student interested in completing an honors thesis must, by the beginning of their seventh semester, have a written proposal of his/her honors project accepted by his/her adviser and the director of undergraduate studies.

Procedures

Each application to the Geological Sciences honors program must have a faculty adviser to supervise the honors program. Written approval by the faculty member who will direct the research is required. After the college verifies the student's grade-point average, the student will be officially enrolled in the honors program.

Minor in Geological Sciences

Eligibility

Engineering undergraduates affiliated with the following fields are eligible to participate in the geological sciences minor: ABEN, A&EP, CEE, CHEME, COM S, ELE E, M&AE, MS&E, OR&IE.

Whereas many engineering students will encounter and have to understand the naturally operating systems of the Earth in their professions, the tools and techniques used by earth scientists to understand these solid and fluid systems over the widest scales of space and time are of use to a wide cross-section of engineering students. This minor is designed to give a flexible set of options for students looking to complement training in their major field with a core education in either of the two tracks in Cornell Geological Sciences: SES or geoscience.

The requirements for the geological aciences minor are outlined below. For further details consult the Geological Sciences Undergraduate Programs office, 2122 Snee Hall.

Requirements

To complete the minor, the student must take at least six (6) courses (minimum of 18 credits), chosen as follows:

I. Choose 1 or 2 of these 3 courses:

ENGRD 201 Introduction to the Physics and Chemistry of the Earth

GEOL 210 Introduction to Field Methods in Geological Sciences

GEOL 203 Natural Hazards and the Science of Complexity

II. Choose at least 2 courses from the following list of core courses:

GEOL 302 Evolution of the Earth System

GEOL 321 Introduction to Biogeochemistry

GEOL 326 Structural Geology

GEOL 355 Mineralogy

GEOL 356 Petrology and Geochemistry

GEOL 375 Sedimentology and Stratigraphy

GEOL 388 Geophysics and Geotectonics

III. To complete the Minor, these 3–4 courses are to be supplemented with 2–3 additional GEOL courses at the 300 level or higher. These may include, for example, additional courses from the above list of core courses, undergraduate research courses, and outdoor field courses.

Academic Standards: a letter grade of C- or better for each course in the minor and a cumulative GPA of or better for all courses in the minor.

Master of Engineering (Geological Sciences Degree Program)

The Master of Engineering (Geological Sciences) is a one-year professional degree that provides students with intensive training for, and a fast-track into, careers in the burgeoning areas of environmental geoscience and resource exploration. Emphasis is on developing skills with cutting-edge geophysical and computational techniques for remote sensing, subsurface imaging, and modeling of subterranean fluid flow. Extensive facilities are available for GIS, image processing, and seismic and georadar field surveying. Currently, program options include geohydrology and environmental geophysics. Under development is a new option in petroleum exploration, designed for those interested in careers in the resurgent oil exploration industry. Past design projects have included field studies in areas as diverse as the Finger Lakes and the Caribbean.

The program requires 30 credits of postgraduate instruction, at least 10 of which must involve engineering design. Students must also complete a design project, worth between 3 and 12 credits, that has a significant geological component and results in substantial conclusions or recommendations.

General information on admission and degree requirements for the M.Eng. degree programs can be found in the college's introductory section.

MATERIALS SCIENCE AND ENGINEERING

J. M. Blakely, director; D. G. Ast, S. P. Baker, R. Dieckmann, E. P. Giannelis, D. T. Grubb, C. Y. Li, G. G. Malliaras, C. K. Ober, A. L. Ruoff, S. L. Sass, Y. Suzuki, M. O. Thompson, U. B. Wiesner

Bachelor of Science Curriculum

Students majoring in materials science and engineering are required to take MS&E 261, Introduction to Mechanical 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 general materials science, solid state, metallic materials, ceramic materials, polymeric materials, electronic materials, or biomaterials.

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 10 required field courses below:

MS&E 331, Structure 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 443/435, 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. A 3 credit materials processing elective.
4. Four courses in a technical specialization.
5. Twelve credits of other electives.
6. One of the elective or specialization courses must include substantial advanced chemistry (e.g., MS&E 222, CHEM 208, CHEM 357).

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. Complete MS&E 261 with a minimum grade of C prior to affiliation.

The department's core curriculum consists of all the required MS&E courses including the MS&E distribution course, the processing elective, and the four courses comprising the student's area of specialization.

An attractive and very challenging program combines the materials science and engineering curriculum with that of either electrical engineering or mechanical engineering, leading to a double major. The combination of materials science and engineering with electrical engineering is particularly well suited to students who will eventually be employed in the electronic materials industry. Mechanical engineers knowledgeable in materials science also will be well equipped for technical careers. Curricula leading to the double-major degree must be approved by both of the departments involved and students are urged to plan such curricula as early as possible.

Material Science and Engineering Honors Program

Eligibility

The Bachelor of Science degree with honors will be granted to students who, in addition to having completed the requirements for a bachelor degree, have satisfactorily completed the honors program in Materials Science and Engineering and have been recommended for the degree by the honors committee of the department. An honors program student must enter with and maintain a cumulative GPA≥ 3.50.

Content

The requirements for an honors degree in Materials Science and Engineering are:

1. Students must take at least nine credits above the minimum required for graduation in Materials Science and Engineering, so that the minimum number of credits for an honors degree is 135. These additional courses must be technical in nature, i.e., in engineering, mathematics, chemistry, and physics at the 400- and graduate-level, with selected courses at the 300-level, which must be approved by the upperclass advisers.
2. A senior honors thesis (eight credits) with a grade of at least an A.

Note: undergraduates typically enter the honors program at the beginning of their senior year (seventh semester), so that they must have a cumulative GPA equal to or greater than 3.50 at that point.

Timing

All interested students must complete a 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 to work on a senior honors thesis during the second semester of their junior year. A student must be in the program for at least two semesters before graduation.

Procedures

Each application to the Materials Science and Engineering honors program must have a faculty adviser to supervise the honors program. A written approval of the faculty member who will direct the research is required. After the student's grade-point average is verified, the student will be officially enrolled in the honors program.

Minor in Materials Science and Engineering

Eligibility

Engineering undergraduates affiliated with the following fields are eligible to participate in the materials science and engineering minor: ABEN, A&EP, CEE, CHEME, COM S, ELE E, GEOL, M&AE, OR&IE.

Materials form the core basis of many engineering disciplines including mechanical, civil, chemical, and electrical engineering. This minor provides engineers in related fields with the fundamental understanding of mechanisms that determine the performance, properties, and processing of modern materials.

The requirements for the materials science and engineering minor are outlined below. For further details consult the Materials Science and Engineering Undergraduate Programs office, 328 Bard Hall.

Requirements

To complete the minor, the student must take at least six (6) courses (minimum of 18 credits), chosen as follows:

I. One of:

MS&E 261 Introduction to Mechanical Properties of Materials

MS&E 262 Introduction to Electrical Properties of Materials

II. Two of:

MS&E 331 Structure 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

III. Three electives chosen from:

—Any MS&E course at the 200-level or above

—Selected courses in materials properties and processing (at the 300-level or above) from A&EP, CHEME, CEE, ELE E, M&AE, PHYS, and CHEM, as approved by the MS&E undergraduate coordinator.

Academic Standards: a letter grade of C or better for each course in the minor.

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 computational or theoretical 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

S. Leibovich, director; P. L. Auer, C. T. Avedisian, D. L. Bartel, J. F. Booker, J. R. Callister, D. A. Caughey, R. D'Andrea, P. R. Dawson, P. C. T. deBoer, E. M. Fisher, A. R. George, F. C. Gouldin, M. Y. Louge, J. L. Lumley, M. P. Miller, F. C. Moon, F. K. Moore, R. M. Phelan, S. B. Pope, M. L. Psiaki, E. L. Resler, Jr., S.E. Shen, K. E. Torrance, F. Valero-Cuevas, M. C. H. van der Meulen, H. B. Voelcker, K. K. Wang, Z. Warhaft, C. H. K. Williamson, N. Zabaras

Members of the faculty of the graduate Fields of Aerospace Engineering and Mechanical Engineering are listed in the *Announcement of the Graduate School.*

Bachelor of Science Curriculum in Mechanical Engineering

The upperclass field program in Mechanical Engineering is designed to provide a broad background in the fundamentals of this discipline as well as to offer an introduction to the many professional and technical areas with which mechanical engineers are concerned. 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), aeronautics, and with 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 encouraged 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 supports 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&AE 212, Mechanical Properties and Processing of Engineering Materials

M&AE 221, Thermodynamics

M&AE 225, Mechanical Design and Synthesis

T&AM 203, Dynamics

ELE E 210, Introduction to Circuits for Electrical and Computer Engineers

M&AE 323, Introductory 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 may petition for approval of two related courses to form a custom concentration.

The standard concentrations are:

Fluids/Aerospace Engineering, M&AE 305, 306, 423, 506, 507

Thermo-Fluids M&AE 423, 449, 506

Materials Processing M&AE 412, 514

Mechanical Systems M&AE 412, 417, 467, 478, 479, 565

Vehicle Engineering M&AE 306, 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, 412, 467, 479 and 486.

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 294. The course must include some material on statistics. Currently, the approved courses are T&AM 310 and OR&IE 270.

One of the field approved electives can be viewed as a technical elective and may 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 accepted. 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

courses 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)

courses 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. a technical drawing course in high school or in a community college,

b. ENGRG 102, Drawing and Engineering Design,

c. another technical drawing course at Cornell, or

d. a departmental examination.

The computer applications requirement of the Common Curriculum may be satisfied by several courses, including M&AE 479.

The writing requirement of the Common Curriculum is satisfied by M&AE 427.

Introduction to Circuits for Electrical and Computer Engineers (ELE E 210) may be replaced or supplemented by Electronic Circuits (PHYS 360).

A limited set of third-year courses is offered each summer under the auspices of the Engineering Cooperative Program.

More detailed materials describing the Mechanical Engineering Program can be obtained from the Sibley School of Mechanical and Aerospace Engineering, Upson Hall.

Preparation in Aerospace Engineering

Although there is no separate undergraduate program in aerospace engineering, students may prepare for a career in this area by majoring in mechanical engineering and taking courses from the aerospace engineering concentration such as M&AE 305, 306, 506, and 507. Students may prepare for the graduate program in aerospace engineering by majoring in mechanical engineering, in other appropriate engineering specialties such as electrical engineering or engineering physics, or in the physical sciences. Other subjects recommended as preparation for graduate study include thermodynamics, fluid mechanics, applied mathematics, chemistry, and physics.

Master of Engineering (Aerospace) Degree Program

The M.Eng. (Aerospace) degree program provides a one-year course of study for those who wish to develop a high level of competence in 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 aerodynamics, acoustics and noise, turbulent flows, rarefied and non-equilibrium flows, combustion, dynamics and control, CFD, 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. 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 the courses are part of a well-defined program leading to specific professional objectives. It is expected that all students will use technical electives to develop proficiency in mathematics beyond the minimum required of Cornell engineering undergraduates if they have not already done so before entering the program. Courses in advanced engineering mathematics or statistics are particularly recommended.

Students 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, propulsion 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 a mechanical 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 mechanical and 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 the courses are part of a well-defined program leading to specific professional objectives. It is expected that all students will use technical electives to develop proficiency in mathematics beyond the minimum required of Cornell engineering undergraduates if they have not already done so before entering the program. Courses in advanced engineering mathematics or statistics are particularly recommended.

Students should check with the M&AE graduate field office (104 Upson Hall) for additional degree requirements.

Students enrolled in the M.Eng. (Mechanical) degree program may take courses that also 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 curriculum include K. B. Cady, D. A. Hammer, R. W. Kay, V. O. Kostroun, and K. Ünlü

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, computer science, 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 Center for Nuclear Sciences 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, or equivalents, 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

NS&E 551, Nuclear Measurements in Research

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.

A&EP 661, Microcharacterization (spring, 3 credits)

ELE E 581, Introduction to Plasma Physics (fall, 4 credits)

ELE E 582, Basic Plasma Physics (spring, 4 credits)

ELE E 471/M&AE 478, Feedback Control Systems (fall, 4 credits)

ELE E 472, Digital Control Systems (spring, 4 credits)

MS&E 459, Physics of Modern Materials Analysis (spring, 3 credits)

MS&E 603, Analytical Techniques for Materials Science (spring, 4 credits)

M&AE 651, Advanced Heat Transfer (fall, 4 credits)

NS&E 484, Introduction to Controlled Fusion: Principles and Technology (spring, 3 credits)

NS&E 521, Radiation Effects in Materials (fall, 1–3 credits)

OPERATIONS RESEARCH AND INDUSTRIAL ENGINEERING

A. Avramidis, L. J. Billera, R. G. Bland, R. Cleary, R. Durrett, M. J. Eisner, D. C. Heath, P. L. Jackson, R. A. Jarrow, W. L. Maxwell, J. A. Muckstadt, N. Prabhu, J. Renegar, S. I. Resnick, R. Roundy, D. Ruppert, G. Samorodnitsky, L. W. Schruben, D. Shmoys, E. Slate, É. Tardos, M. J. Todd, L. E. Trotter, Jr., B. W. Turnbull, L. I. Weiss

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) 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 2, 3 or 4	*Credits*
ENGRD 211, Computers & Programming or ENGRD 212, Structure and Interpretation of Computer Programs	3
Term 5	
OR&IE 320, Optimization I	4
OR&IE 350, Financial and Managerial Accounting	4
OR&IE 360, Engineering Probability and Statistics II	4
A course in humanities and social sciences	3
Field-approved elective	3
Term 6	
OR&IE 310, Industrial Systems Analysis	4
OR&IE 321, Optimization II	4
OR&IE 361, Introductory Engineering Stochastic Processes I	4

Behavioral science (organizational behavior)†	3
Course in humanities and social sciences	3

†The behavioral science requirement can be satisfied by any one of several courses, including the Johnson Graduate School of Management (JGSM) course, NCC 554 (offered only in the fall), which is recommended for those contemplating the pursuit of a graduate business degree, and ILROB 170, 171, and 320.

The basic senior-year program, from which individualized programs are developed, consists of the following courses:

	Minimum credits
OR&IE 581, Simulation Modeling	2
OR&IE 582, Simulation Analysis	2
Three upperclass OR&IE electives as described below	9
Two field-approved electives (at least 3 credits must be outside OR&IE)	6
Two courses in humanities and social sciences	6
Two approved electives	6

Available OR&IE electives are as follows:

Manufacturing and distribution systems: OR&IE 414, 416, 451, 480, 481, 524, 525, and 562 and JGSM NBA 641

Optimization methods: OR&IE 431, 432, 434, 435 and 436

Applied probability and statistics: OR&IE 462, 476 (2 credits), 561, 563, 575 (2 credits), 576 (2 credits) and 577

Scholastic requirements for the field are a passing grade in every course; a grade of C- or better in each of ENGRD 211 and 270, OR&IE 310, 320, 321, 350, 360, and 361; an overall average of at least 2.0 for each term the student is enrolled in the school; an average of 2.0 or better for OR&IE field courses; and satisfactory progress toward the completion of the degree requirements. The student's performance is reviewed at the conclusion of each term.

Operations Research and Engineering Honors Program

Eligibility

The Bachelor of Science degree with honors will be granted to students who, in addition to having completed the requirements for a bachelor degree, have satisfactorily completed the honors program in Operations Research and Engineering and have been recommended for the degree by the honors committee of the department. An honors program student must enter with and maintain a cumulative GPA≥ 3.50.

Content

An OR&E honors program shall consist of at least nine credits beyond the minimum required for graduation in OR&E; so that no part of the honors program can also be used to satisfy graduation requirements. The nine credits shall be from one or more of the following with at least four hours in the first category:

1. Advanced courses in OR&IE at the 500-level or above.
2. A significant research experience or honors project under the direct supervision of an OR&IE faculty member using OR&IE 499: OR&IE Project. A significant written report must be submitted as part of this component.
3. A significant teaching experience under the direct supervision of a faculty member in OR&IE using OR&IE 490: Teaching in OR&IE, or ENGRG 470: Undergraduate Engineering Teaching.

Timing

All interested students must complete a 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 first semester of their junior year. A student must be in the program for at least two semesters before graduation.

Procedures

Each application to the OR&E honors program must have a faculty adviser to supervise the honors program. The honors adviser need not be the student's faculty adviser. The application to the program shall be a letter from the student describing the specific proposed honors program and including the explicit approval of the honors adviser. Each program must be approved by the associate director, and any changes to the student's program must also be approved by the associate director of undergraduate studies.

Engineering Minor Programs

The School of Operations Research and Industrial Engineering currently offers three engineering minor programs: engineering statistics, industrial systems and information technology, and operations research and management science. (A student may not receive credit for more than one minor offered by the School of Operations Research and Industrial Engineering.) Descriptions and requirements for each program follow:

Minor in Engineering Statistics

Eligibility

Engineering undergraduates affiliated with the following fields are eligible to participate in the engineering statistics minor: ABEN, A&EP, CEE, CHEME, COM S, ELE E, GEOL, M&AE, MS&E.

This minor requires the student to develop expertise in engineering statistics. The goal of the program is to provide the student with a firm understanding of statistical principles and engineering applications, and the ability to apply this knowledge in real-world situations.

The requirements for the engineering statistics minor are outlined below. For further details consult the Operations Research and Industrial Engineering Undergraduate Programs office, 202 Rhodes Hall.

Requirements

To complete the minor, the student must take at least six (6) courses (minimum of 18 credits), chosen as follows:

I. Required Courses:

ENGRD 270 Basic Engineering Probability & Statistics

OR&IE 360 or ELE E 310 Basic Engineering Probability & Statistics II or Introduction to Probability & Random Signals

II. Four courses (11 credits minimum) taken from the following list*:

OR&IE 361 or ELE E 411 Introductory Engineering Stochastic Processes I or Random Signals in Communications/ Signal Processing

OR&IE 476 Applied Linear Statistical Models

OR&IE 576 Regression

OR&IE 563 Applied Time Series Analysis

OR&IE 565 Applied Financial Engineering

OR&IE 575 Experimental Design

OR&IE 577 Quality Control

OR&IE 581 Simulation Modeling

OR&IE 582 Simulation Analysis

MATH 472 or BTRY 409 Basic Probability or Theory of Statistics

BTRY 602 Statistical Methods II

BTRY 603 or ILRST 411 Statistical Methods III or Statistical Analysis of Qualitative Data

ILRST 310 Statistical Sampling

ILRST 314 Graphical Methods for Data Analysis

ILRST 410 Techniques of Multivariate Analysis

*Other course options approved by petition in advance. The student should be aware that some of these courses require others as prerequisites. All these courses are cross-listed under the Department of Statistical Science.

Academic Standards: a letter grade of C- or better for each course in the minor and a cumulative GPA of 2.0 or better for all courses in the minor.

Minor in Industrial Systems and Information Technology

Eligibility

Engineering undergraduates affiliated with the following fields are eligible to participate in the industrial systems and information technology minor: ABEN, A&EP, CEE, CHEME, COM S, ELE E, GEOL, M&AE, MS&E.

The aim of this minor is to provide an in-depth education in the issues involved in the design and analysis of industrial systems, and the tools from information technology that have become an integral part of the manufacturing process. Students will become familiar with the problems, perspectives and methods of modern industrial engineering and be prepared to work with industrial engineers in designing and managing manufacturing and service operations. That is, rather than providing a comprehensive view of the range of methodological foundations of operations research, this minor is designed to give the student a focused education in the application area most closely associated with these techniques.

The requirements for the industrial systems and information technology minor are outlined below. For further details consult the Operations Research and Industrial Engineering Undergraduate Programs office, 200 Rhodes Hall.

Requirements

To complete the minor, the student must take at least six (6) courses (minimum of 18 credits), chosen as follows:

I. At least 3 of the following:

ENGRD 270 Basic Engineering Probability and Statistics

OR&IE 320 Optimization I

OR&IE 310 Industrial Systems Analysis

OR&IE 480 Information Technology for Operations Research and Industrial Technology

II. The remaining courses/credit hours from the following:

OR&IE 350 Financial and Managerial Accounting

OR&IE 416 Design of Manufacturing Systems

OR&IE 451 Economic Analysis of Engineering Systems

OR&IE 525 Production Planning and Scheduling Theory and Practice

OR&IE 552 Revenue Management

OR&IE 577 Quality Control

OR&IE 581 Simulation Modeling

Academic Standards: a letter grade of C- or better for each course in the minor and a cumulative GPA of 2.0 or better for all courses in the minor.

Minor in Operations Research and Management Science

Eligibility

Engineering undergraduates affiliated with the following fields are eligible to participate in the operations research and management science minor: ABEN, A&EP, CEE, CHEME, COM S, ELE E, GEOL, M&AE, MS&E.

The field of operations research and management science (OR/MS) aims to provide rational bases for decision making by seeking to understand and model complex situations and to use this understanding to predict system behavior and improve system performance. This minor gives the student the opportunity to obtain a wide exposure to the core methodological tools for OR/MS, including mathematical programming, stochastic and statistical models, and simulation. The intent of this minor is that the student should obtain a broad knowledge of these fundamentals, rather than train the student in a particular application domain. This way the student can adjust their advanced courses and pursue either methodological or application oriented areas of greatest interest and relevance to the overall educational goals of their program.

The requirements for the operations research and management science minor are outlined below. For further details consult the Operations Research and Industrial Engineering Undergraduate Programs office, 200 Rhodes Hall.

Requirements

To complete the minor, the student must take at least six (6) courses (minimum of 18 credits), chosen as follows:

I. Choose 3 courses from the following list:

ENGRD 270 Basic Engineering Probability and Statistics

OR&IE 320 Optimization I

OR&IE 321 Optimization II

OR&IE 360 Engineering Probability and Statistics II

OR&IE 361 Introduction Engineering Stochastic Processes I

OR&IE 581 Simulation Modeling

OR&IE 582 Simulation Analysis

II. These courses are to be supplemented with additional OR&IE courses at the 300 level or higher, so that entire program includes at least 6 courses and at least 18 credits. For example, taking the remaining 3 options on this list would suffice.

Academic Standards: a letter grade of C- or better for each course in the minor and a cumulative GPA of or better for all courses in the minor.

Master of Engineering (OR&IE) Degree Program

This two-semester professional degree program stresses applications of operations research and industrial engineering. The centerpiece of the program is a team-based project on a real problem. The course work centers on additional study of analytical techniques, with particular emphasis on engineering applications, especially in the design or improvement of systems in manufacturing, information, finance and non-profit organizations.

General admission and degree requirements are described in the introductory "Degree Programs" section. The M.Eng. (OR&IE) program is intended for three groups of students: graduates of the undergraduate field program in OR&E who wish to expand their practical knowledge of the field; Cornell undergraduates in other math-based fields who want to broaden their exposure to OR&IE; and qualified non-Cornellians with strong backgrounds from other programs in the US and abroad.

To ensure completion of the program in two semesters, the entering student should have completed courses in probability and statistics and in computer science, as well as four semesters of mathematics, through differential equations, linear algebra and multivariate calculus.

Program requirements include a core of OR&IE courses plus technical electives chosen from a broad array of offerings. The choice of a particular elective sequence plus a specific project course results in completion of one of several options within the program. These include the manufacturing option, the financial engineering option, the systems engineering option, and the semester in manufacturing. These options are offered jointly with various other Cornell departments and schools and provide the opportunity to interact on projects and in class with specialists in other engineering fields and in business. Many students select the applied operations research option, offered only by OR&IE, which has project teams made up entirely of OR&IE M.Eng. students and which offers the broadest choice of elective courses. Students interested in an option other than the applied operations research option should obtain further information from the following: manufacturing option, Center for Manufacturing Enterprise, 103 Frank H. T. Rhodes Hall, 607–255–7757; financial option, 201 Frank H. T. Rhodes Hall, semester in manufacturing option, 304 Sage Hall, 607–255–4691; systems engineering option, 218 Upson Hall, 607–255–0710.

I. For matriculants with preparation comparable to that provided by the undergraduate Field Program in Operations Research and Engineering:

Fall term	*Credits*
OR&IE 516, Case Studies	1
OR&IE 893, Applied OR&IE Colloquium	1
M.Eng. Project	1
Technical electives	12
Spring term	
OR&IE 894, Applied OR&IE Colloquium	1
M.Eng. Project	minimum of 4
Technical electives	9

II. For matriculants from other fields who minimally fulfill the prerequisite requirements (students who have the equivalent of OR&IE 520, 523, and 560 will take other OR&IE electives in their place):

Fall term	*Credits*
OR&IE 560, Engineering Probability and Statistics II	4
OR&IE 520, Optimization I	4
OR&IE 522, Topics in Linear Optimization	1
OR&IE 516, Case Studies	1
OR&IE 580, Design and Analysis of Simulated Systems	4
OR&IE 893, Applied OR&IE Colloquium	1
M. Eng. Project	1
Spring term	
OR&IE 523, Introduction to Stochastic Processes I	4
OR&IE 894, Applied OR&IE Colloquium	1
M.Eng. Project	minimum of 4
Technical electives	6

For both of the above pro forma schedules, at least 12 credit hours of the specified electives must be chosen from the list of courses offered by the School of Operations Research and Industrial Engineering.

A minimum of 30 credit hours are required to complete this program. Additional program requirements exist and are described in the *Master of Engineering Handbook*, which is available in Room 201, Frank H. T. Rhodes Hall and on the World Wide Web at www.orie.cornell.edu.

The project requirement can be filled in a variety of ways. Common elements in all project experiences include working as part of a group of three to five students on an engineering design problem, meeting with a faculty member on a regular basis, and oral and written presentation of the results obtained. Most projects address problems that

actually exist in manufacturing firms, financial firms, hospitals and other service industries.

Cooperative Program with the Johnson Graduate School of Management

Undergraduates majoring in Operations Research and Engineering may be interested in a cooperative program at Cornell that leads to both Master of Engineering and Master of Business Administration (M.B.A.) degrees. With appropriate curriculum planning such a combined B.S./M.Eng./M.B.A. program can be completed in six years.

An advantage for OR&E majors is that they study, as part of their undergraduate curriculum, several subjects that are required for the M.B.A. degree. (This is because modern management is concerned with the operation of production and service systems, and much of the analytical methodology required to deal with operating decisions is the same as that used by systems engineers in designing these systems.) An early start on meeting the business-degree requirements permits students accepted into the cooperative program to earn both the M.Eng. (OR&IE) and M.B.A. degrees in two years rather than the three years such a program would normally take.

The details of planning courses for this program should be discussed with the admissions office of the Johnson Graduate School of Management.

In accordance with this program the candidate would qualify for the B.S. degree at the end of four years, the M.Eng. (OR&IE) degree at the end of five years, and the M.B.A. degree at the end of six years.

Further details and application forms may be obtained at the office of the School of Operations Research and Industrial Engineering, Frank H. T. Rhodes Hall, and at the admissions office of the Johnson Graduate School of Management.

In addition, there are two other programs that combine an M.Eng. (OR&IE) degree and an MBA degree from Cornell. The Twelve-Month MBA Program allows students to obtain both degrees in two academic years plus the intervening summer. The combined M.Eng.-MBA Program allows students to obtain both degrees in a total of five semesters. Planning for all combined programs should be done prior to entering either component.

STATISTICAL SCIENCE DEPARTMENT

The university-wide Department of Statistical Science coordinates undergraduate and graduate study in statistics and probability. A list of suitable courses can be found in the Interdisciplinary Centers, Programs, and Studies section at the front of this catalog (see p. 15).

THEORETICAL AND APPLIED MECHANICS

J. T. Jenkins, chair; J. A. Burns, K. B. Cady, H. D. Conway, J. M. Guckenheimer, E. W. Hart, T. J. Healey, C. Y. Hui, S. Mukherjee, Y. H. Pao, S. L. Phoenix, R. H. Rand, P. Rosakis, A. L. Ruina, W. H. Sachse, S. Strogatz, A. Zehnder

Undergraduate Study

The Department of Theoretical and Applied Mechanics is responsible for courses in engineering mechanics and engineering mathematics, some of which are part of the Common Curriculum.

College Program in Engineering Science

A student may enroll in the College Program in Engineering Science, which is sponsored by the Department of Theoretical and Applied Mechanics. The College Program is described in the section on undergraduate study in the College of Engineering.

Master of Engineering (Engineering Mechanics) Degree Program

Composite materials designed to meet specific requirements of weight, strength, and rigidity are used increasingly in the manufacture of everyday structures and components. The Master of Engineering (Engineering Mechanics) degree program focuses on the mechanical behavior of advanced composite materials and structures and prepares students to play a role in the development of this new technology. Students from diverse engineering backgrounds, such as mechanics, structures, and materials, as well as aerospace and biomedical engineering, can normally complete the requirements for the professional Master of Engineering degree in one year.

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. 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.

ENGINEERING COURSES

Courses offered in the College of Engineering are listed under the various departments and schools.

Courses are identified with a standard abbreviation followed by a three-digit number.

Engineering Communications	ENGRC
Engineering Distribution	ENGRD
Engineering General Interest	ENGRG
Introduction to Engineering	ENGRI
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

Engineering Communications Courses

Courses in this category, offered by the Engineering Communications Program, develop writing and oral presentation skills relevant to engineers.

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 333 Topics in Engineering Communications
TBA. 3 credits.
Topics vary as the need and interest arise. Sample topics are: 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 334 Independent Study in Engineering Communications
TBA. Variable credits (1–3).
Students work closely with a Communications Program instructor to pursue an aspect of professional communications not available

through regular course work. Projects may involve writing technical documentation, creating user manuals, analyzing and producing technical graphics, or reading and writing about problems in engineering practice. Interested students should contact the Engineering Communications Program.

ENGRC 335 Communications For Engineering Managers (formerly ENGRC 435)

Fall, spring, summer TBA. 3 credits. Limited to 20 students per section. Prerequisite: two First-Year Writing Seminars.

This interactive workshop focuses on communications in organizational contexts common to engineering graduates. ENGRC 335 helps students to produce effective business and technical communication—written, oral, and visual. Topics include internal and external communications, balancing visual and verbal elements in documents and presentations; teamwork and leadership; running and attending meetings; management strategies; communicating to colleagues, superiors, subordinates, and clients. Case studies and other readings generate lively discussion about strategies for successful writing and management—strategies that students apply in collaborative and individual assignments. Through brief written exercises, formal and informal presentations, and a larger team project, students learn how to develop information, organize and support ideas, and address a variety of audiences. Fulfills the college technical writing requirement. Note: because space is limited, seniors are given priority.

ENGRC 350 Engineering Communications

Fall, spring, summer TBA. 3 credits. Prerequisite: two First-Year Writing Seminars. Limited to 20 students per section.

Engineering graduates spend much of their time conveying technical information to a variety of audiences. They write a range of documents, give oral presentations, and use visuals to enhance their written and oral presentations. These important tasks can seem daunting and burdensome; ENGRC 350 aims to make them manageable and interesting. This course helps students develop effective processes for drafting, editing, and revising; provides strategies for communicating specialized information in different contexts; uses material from the engineering workplace; and addresses organizational and ethical issues. Students learn to communicate effectively through diverse assignments and a longer term project (for example, a research paper, feasibility study, or users' manual). The course material generates lively class discussion, and the class size ensures ongoing attention to each student's work. Fulfills the college technical writing requirement.

Engineering Distribution Courses

Courses in this category are sophomore-level courses cross-listed with a department. These courses are intended to introduce students to more advanced concepts of engineering and may require pre- or co-requisites.

ENGRD 201 Introduction to the Physics and Chemistry of the Earth (also GEOL 201)

Fall. 3 credits. Prerequisites: PHYS 112 or 207. 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 hydrologic cycle: runoff, floods and sedimentation, groundwater flow, contaminant transport. Weathering cycle: chemical cycles, CO_2 (weathering), rock cycle, controls on global temperature (CO_2 or ocean currents), oil and mineral resources.

ENGRD 202 Mechanics of Solids (also T&AM 202)

Fall, spring. 3 credits. Prerequisite: PHYS 112, coregistration in MATH 293 or permission of instructor.

Principles of statics, force systems, and equilibrium; frameworks; mechanics of deformable solids, stress, strain, statically indeterminate problems; mechanical properties of engineering materials; axial force, shearing force, bending moment, plane stress; Mohr's circle; bending and torsion of bars; buckling and plastic behavior.

ENGRD 203 Dynamics (also T&AM 203)

Fall, spring. 3 credits. Prerequisite: T&AM 202, coregistration in MATH 294, 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, the inertia tensor. Euler equations, the gyroscope.

ENGRD 210 Introduction to Circuits for Electrical and Computer Engineers (also ELE E 210)

Fall, spring. 3 credits. Co-requisites: MATH 293 and PHYS 213.

A first course in electrical circuits, establishing the fundamental properties of circuits with application to high-speed computers and modern electronics. Topics include node and mesh analysis applied to CMOS circuit design, transient response and its impact on computer speed, sinusoidals, resonance, complex impedance, and operational amplifiers.

ENGRD 211 Computers and Programming (also COM S 211)

Fall, spring, summer. 3 credits. Credit will not be granted for both ENGRD/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 structure and organization, modules (classes), program development, proofs of program correctness, recursion, data structures and types (lists, stacks, queues, trees), object-oriented and functional programming, and analysis of algorithms. Java is the principal programming language.

ENGRD 212 Structure and Interpretation of Computer Programs (also COM S 212)

Fall, spring. 4 credits. Credit will not be granted for both ENGRD/COM S 211 and 212. Prerequisite: COM S 100 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 hierarchical data, abstract data types, polymorphic functions, object-oriented programming, infinite data types, simulation, and the interpretation of programs.

ENGRD/COM S 212 covers a wide range of topics in computer science and programming using advanced functional and object-oriented programming languages. ENGRD/COM S 211 focuses on strengthening programming skills in a more conventional programming language (Java), while still introducing important topics in computing. Either course is a suitable prerequisite for further study in the field. Appropriate transfers between ENGRD/COM S 211 and 212 (in either direction) are encouraged during the first few weeks of the semester.

ENGRD 219 Mass and Energy Balances (also CHEME 219)

Fall. 3 credits. Co-requisite: physical chemistry or permission of instructor. K. H. Lee.

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.

ENGRD 221 Thermodynamics (also M&AE 221)

Fall, spring, may be offered in summer. 3 credits. Prerequisites: MATH 192 and PHYS 112.

The definitions, concepts, and laws of thermodynamics. Applications to ideal and real gases, vapor and gas power systems, refrigeration and heat pump systems. Thermodynamics relations for simple, compressible substances. Gaseous reactions. Examples and problems will be related to contemporary aspects of power generation and broader environmental issues.

ENGRD 222 Introduction to Scientific Computation (also COM S 222)

Spring, summer. 3 credits. Prerequisites: COM S 100 and (MATH 222 or 294).

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.

ENGRD 231 Introduction to Digital Systems

Fall, spring. 3 credits. Prerequisite: COM S 100.

An introduction to basic principles, design techniques, and methodology for communication, computer, and information systems, which process digital data streams. Includes Boolean algebra, integrated circuit components, switching circuits, and systems which provide computation, data, voice, and video service.

ENGRD 241 Engineering Computation (also CEE 241)

Fall, spring. 3 credits. Prerequisites: COM S 100 and MATH 293. Co-requisite: MATH 294. W. Philpot.

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 broached. Applications are drawn from different areas of engineering.

ENGRD 250 Engineering Applications in Biological Systems (also ABEN 250)
Fall. 3 credits. Prerequisite: enrollment in an engineering curriculum. Recommended for the sophomore year. B. A. Ahner.
Case studies of engineering problems in agricultural, biological and environmental systems, including bioremediation, crop production, environmental controls, energy, biomedicine, and food engineering. Emphasis is on the application of mathematics, physics, and the engineering sciences to energy and mass balances in biological systems.

ENGRD 261 Introduction to Mechanical Properties of Materials (also MS&E 261)
Fall. 3 credits. S. P. Baker.
This course examines 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, strength, fracture resistance, creep resistance, or fatigue resistance. Flaw-tolerant design methods using fracture mechanics.

ENGRD 264 Computer-Instrumentation Design (also A&EP 264)
Fall, spring. 3 credits. Prerequisites: COM S 100. 1 lec, 1 lab.
This course covers the use of a small computer in an engineering or scientific research laboratory. Various experiments are performed using an IBM-AT style computer (80486) running Windows. 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, summer. 3 credits. Pre- or co-requisite: MATH 293.
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 included. Topics include random variables, probability distributions, expectation, estimation, testing, experimental design, quality control, and regression.

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 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 mechanical drawing experience. S-U grades optional.
Introduction to sketching, drawing, and graphic techniques useful in design, analysis, and presentation of ideas. Computer-aided design is integral to the course-work and final design project.

ENGRG 150 Engineering Seminar
Fall. 1 credit. First-year students only. S-U grades only.
Engineering freshmen meet regularly with their faculty advisors to discuss a range of engineering topics. Discussions may include the engineering curriculum and student programs, what different types of engineers do, the character of engineering careers, active research areas in the college and in engineering in general, and study and examination skills useful for engineering students. Groups may visit campus academic, engineering, and research facilities.

ENGRG 250 Technology in Society (also ELE E 250, HIST 250, S&TS 250)
Fall. 3 credits. A humanities elective for engineering students.
This course will investigate the history of technology in Europe and the United States from ancient times to the present. Topics include the economic and social aspects of industrialization; the myths of heroic inventors like Morse, Edison, and Ford; the government's regulation of technology, the origins of mass production, and the spread of the automobile and microelectronics cultures in the United States.

ENGRG 298 Inventing an Information Society (also ELE E 298 and S&TS 292)
Spring. 3 credits. Approved for humanities distribution.
Explores the history of information technology from the 1830s to the present by considering the technical and social history of telecommunications, the electric-power industry, radio, television, computers and the internet. Emphasis is placed on the changing relationship between science and technology, the economic aspects of innovation, gender and technology and other social relations of this technology.

ENGRG 323 Engineering Economics and Management (also CEE 323)
Spring, usually offered in summer for Engineering Co-op Program. 3 credits. D. P. Loucks.
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 360 Ethical Issues in Engineering (also S&TS 360)
Spring. 3 credits. A humanities elective for engineering students. Open to sophomores.
A discussion of ethical issues encountered in engineering practice, such as the rights of engineers in corporations, responsibility for actions, whistleblowing, conflicts of interest, and decision making based on cost-benefit analysis. Codes of ethics and ethical theory will be used to sort out conflicts the engineer may feel toward public safety, professional standards, employers, colleagues, and family. Students will present a case study to the class.

ENGRG 461 Entrepreneurship For Engineers (also M&AE 461)
Fall. 3 credits. Enrollment open to upper class engineers; others with permission of instructor.
See M&AE 461 for course description.

ENGRG 470 Undergraduate Engineering Teaching
Fall. 3 credits.
Engineering juniors and seniors can now earn graduation credit while helping freshmen learn mathematics, physics, chemistry, or engineering design. This course introduces apprentice teachers to cooperative learning, pedagogical theory, interpersonal/diversity issues, and practical tools for educational innovation. This course is an approved elective and can be applied toward the Honors Degree in Electrical Engineering. A 3.0 GPA is strongly recommended.

ENGRG 501 Bioengineering Seminar
Fall, spring. 1 credit. Primarily for juniors, seniors, and graduate students. K. H. Lee.
Broad survey of all aspects of bioengineering, including biomedical, bioprocess, biological, and bioenvironmental engineering and aspects of biotechnology. Sessions may be technical presentations or discussions. Sessions may occasionally be held outside of scheduled times.

ENGRG 605 Fundamentals of Biomedical Engineering I (also CHEME 605)
Fall. 1–4 credits (1 credit per section). Prerequisites: graduate standing in Engineering or Science; PHYS 213 and MATH 294 or equivalent. Undergraduates must have permission of instructor and have completed ABEN 454, CHEME 481, **or** M&AE 465. S-U grades optional for students **not** majoring or minoring in biomedical engineering. Coordinator: M. L. Shuler.
A series of four-week modules on specialized topics.

605.1 Cellular Dynamics and Cancer
1 credit. Lec. T R 1:25–2:40. Aug. 26-Sept. 23. W. L. Olbricht and staff.
Basic concepts of cell biology. Mathematical models of cell cycle, receptor-mediated signaling, and cell adhesion. Conceptual approaches for engineering solutions to cancer.

605.2 Physiological Systems
1 credit. Lec. T R 1:25–2:40. Sept. 28-Oct. 28. W. L. Olbricht.
Emphasis on development of physiologically-based pharmacokinetic models for drug delivery and on models of cardiovascular system, particularly blood flow.

605.3 Biomaterials
1 credit. Lec. T R 1:25–2:40. Nov. 2-Dec. 2. C. C. Chu.
The main objective of the biomaterials module is to provide students with an effective background in a wide range of biomaterials that include polymers, metals/alloys, and ceramics and that are currently used in human body repair. After student's completion of this module, they should have the basic and some in-depth knowledge of what biomaterials are made of, how biomaterials contribute to the saving of human lives, the criteria of materials for biomedical use, biocompatibility, failure modes of biomaterials, and the current R&D activities in biomaterials, challenges that biomaterials are facing and future direction of R&D in biomaterials.

605.4 Biomedical Engineering Project
1 credit. Organizational Meeting, Sept. 14. T 3:35–4:25. Nov. 2-Dec. 2. M. L. Shuler.
Students will work in teams on a design problem of their choice related to development of a biomedical device or procedure. Each team will prepare a written report.

ENGRG 606 Fundamentals of Biomedical Engineering II (also CHEME 606)
Spring. 1–4 credits. Prerequisites: graduate standing in engineering or science; PHYS 213 and MATH 294 or equivalent. Undergraduates must have permission of instructor and have completed ABEN 454, CHEME 481, or M&AE 465. S-U grades optional for students not majoring or minoring in biomedical engineering. Coordinator: M. L. Shuler.
A series of 1 and 2-credit modules on specialized topics.

606.1 Artificial Organs and Tissue Engineering
1 credit. Prerequisite: ENGRG 605, Section 03 (Biomaterials). Lec. T R 1:25–2:40. Jan. 25-Feb. 22. W. L. Olbricht and staff.
An introduction to the use of cells, biological molecules, and synthetic materials as the basis for building artificial organs and encouraging tissue regeneration. The section will discuss the physiological and engineering issues underlying the use of synthetic, extracorporeal systems (e.g., membrane-based dialysis devices), composite implantable materials (e.g., drug-delivery systems and nerve regeneration guides), and hybrid cell/polymer implantable systems (e.g., engineered tissues).

606.2 Biomedical Instrumentation and Diagnosis
1 credit. Lec. T R 1:25–2:40. Feb. 24-March 30. Preregistration with the instructor before December 22, 1999 is required. C. D. Montemagno.
Perspective on the use of advanced instrumentation for the diagnosis and treatment of disease and the investigation of fundamental biological processes. The basic theory and application of different microscopic and spectroscopic methods, imaging tomographies, and micro-electromechanical devices to biological systems will be explored. A two day trip to Cornell University Medical Center to learn techniques of functional MRI is required.

606.3 Biomechanics of Musculoskeletal Systems
2 credits. Lec. T R 1:25–4:40. April 4-May 4. D. L. Bartel, C. E. Farnum.
Integrated lecture/laboratory experience. The anatomy and function of the canine hindlimb will be explored in dissection laboratories and through demonstration of a non-invasive technique, computed tomography. Methods of approximating functional joint loads will be discussed, and physical testing will be demonstrated. A computer model of the stifle (knee) joint will be created by combining knowledge of the anatomy and the mechanical environment.

Introduction to Engineering Courses

Courses in this category are freshman-level courses intended to introduce students to various aspects of engineering. They have no prerequisites and are always cross-listed with a department.

ENGRI 110 The Laser and Its Applications in Science, Technology, and Medicine (also A&EP 110)
Fall, spring. 3 credits.
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.

ENGRI 111 Materials by Design (also MS&E 111)
Fall. 3 credits. E. P. Giannelis.
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 such as disposable camera or portable cassette player. Emphasis is placed on materials identification and their selection to perform an engineering function.

ENGRI 112 Introduction to Chemical Engineering (also CHEME 112)
Fall, spring. 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 (re)definition 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.

ENGRI 113 Introduction to Environmental Systems (also CEE 113)
Fall. 3 credits. M. L. Weber-Shirk.
We will explore the environmental engineering systems that make New York City possible. We will discuss the engineering required to provide clean water and to remove the garbage from NYC sidewalks. We will evaluate NYC's current strategies and future options as their watersheds become more populated and their landfill is closed. See www.cee.cornell.edu/cee113/ for more information.

ENGRI 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 transmitter-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.

ENGRI 115 Engineering Applications of Operations Research (also OR&IE 115)
Fall, spring. 3 credits. Enrollment not open to OR&IE upper-class majors.
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.

ENGRI 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 bridges, skyscrapers, long-span structures and shell structures. 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.

ENGRI 117 Introduction to Mechanical Engineering (also M&AE 117)
Fall or spring, to be determined. 3 credits. Two lectures and one lab per week.
An introduction to the wide range of topics of current interest in mechanical engineering.

ENGRI 118 Design Integration: A Portable CD Player (also MS&E 118 and T&AM 118)
Spring. 3 credits.
This course examines the roles of various engineering disciplines on the design of a portable compact disc (CD) player. Students are introduced to elements of mechanical, electrical, materials, environmental, manufacturing, and computer engineering as related to the CD player. Laboratory sessions and demonstrations are used to illustrate the principles of design.

[ENGRI 120 Introduction to Biomedical Engineering (also CHEME 120)
Fall. 3 credits. Not offered fall 1999; next offered fall 2000. W. M. Saltzman.
Introduction to the fundamental science and engineering that spawned the biotechnology revolution—technologies of cell cultures, DNA, and antibodies—and the relationship between biomedical science, bioengineering, and the growing biomedical product industry. Case studies of the development of biotechnical processes, from discovery to clinical use, will include processes for vaccines, antibiotics, cancer chemotherapy, protein pharmaceuticals, and organ transplantation.]

ENGRI 121 Fission, Fusion, and Radiation (also A&EP 121 and NS&E 121)
Spring. 3 credits. S-U grades optional for students outside the College of Engineering. K. B. Cady.
Lecture-laboratory course on (1) the physical nature and biological effects of nuclear radiation; (2) benefits and hazards of nuclear energy; (3) light-water reactors, breeder reactors, and fusion reactors; and (4) uses of nuclear radiation in research. Laboratory demonstrations involve Cornell's research reactor; detection of nuclear radiation; activation analysis using gamma-ray spectroscopy; neutron radiography; and pulsed power generators for fusion research.

ENGRI 122 Earthquake! (also GEOL 122)
Fall. 3 credits. L. D. Brown.
The science of natural hazards and strategic resources is explored. Techniques for locating and characterizing earthquakes, and assessing the damage 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.

ENGRI 124 Designing Materials for the Computer (also MS&E 124)
Spring. 3 credits. 3 lectures. C. K. Ober.
Introduces the materials, processes and properties of the semiconductors, polymers, ceramics, and metals used in the microelectronics industry to form integrated circuits, electronic devices and displays. This course examines lithographic processing, metallization, diffusion, ion implantation, oxidation and other processes used in fabricating electronic devices and their packages. The technology of displays will be discussed including liquid crystal displays and light emitting devices.

[ENGRI 125 Global Environment (also GEOL 125)
Fall. 3 credits. Not offered 1999–2000.
W. M. White, L. A. Derry.
Wise environmental management requires an understanding of natural chemical interactions. Examines natural chemical cycles among atmosphere, biosphere, hydrosphere, and the solid Earth; the impact of man's activity on them, including the greenhouse effect, ozone hole, acid rain, and water pollution. Laboratory sessions include environmental chemical analysis and computer simulation.]

ENGRI 126 Introduction to Telecommunications
Fall. 3 credits.
This course introduces the technologies that underlie wired and wireless telecommunication systems. The course begins with an introduction to telephony and the public switched telephone network. Modems and cellular telephony are then introduced, along with ISDN and BISDN. The course concludes with an introduction to ATM and TCP/IP. The course will include both lectures and laboratory demonstrations. The students will have the opportunity to design communication systems, and to determine their performance through simulations.

ENGRI 127 Introduction to Entrepreneurship and Engineering Enterprise (also M&AE 127)
Spring. 3 credits. Enrollment open to engineering students; others with permission of instructor.
This course provides a solid introduction to the entrepreneurial process to students in engineering. The main objective is to identify and to begin to develop skills in the engineering work that occurs in high-growth, high-tech ventures. Basic engineering management issues, including the entrepreneurial perspective, opportunity recognition and evaluation, and gathering and managing resources will be covered. Technical topics such as the engineering design process, product realization, and technology forecasting will be discussed. Guest lecturers will provide material for analysis and class discussion.

ENGRI 185 Art, Archaeology, and Analysis (also ARKEO 285, ART 372, ARTH 200, GEOL 200, and PHYS 200)
Spring. 3 credits. 3 lectures. R. Kay.
An interdepartmental course on the use of techniques of science and engineering in cultural research. Applications of physical and physiological principles to the study of archaeological artifacts and works of art. Historical and technical aspects of artistic creation. Analyses by modern methods to deduce geographical origins, and for exploration, dating and authentication of cultural objects. Does not meet liberal studies distribution requirement for Engineering.

AGRICULTURAL AND BIOLOGICAL ENGINEERING

For complete course descriptions, see the Agricultural and Biological Engineering listing in the College of Agriculture and Life Sciences section or visit the department web site <http://www.cals.cornell.edu/dept/aben/>.

ABEN 104 Introduction to Programming in Java and Fortran
Spring. 4 credits. Each lab limited to 22 students. S-U grades optional. Fee, $15.

ABEN 151 Introduction to Computing
Fall. 4 credits. Prerequisite: MATH 191 or equivalent (co-registration permissible). Each lab and recitation section limited to 22 students.

ABEN 200 Life after Graduation
Spring. 1 credit. S-U grades optional.

ABEN 250 Engineering Applications in Biological Systems (also ENGRD 250)
Fall. 3 credits. Prerequisite: enrollment in an engineering curriculum. Recommended for the sophomore year.
For description, see ENGRD 250.

ABEN 300 Career Development
Spring. 1 credit. Prerequisites: ABEN 200 or permission of instructor. S-U grades optional.

ABEN 301 Energy Systems
Spring. 3 credits. Prerequisite: college physics.

ABEN 350 Biological and Environmental Transport Processes
Fall. 3 credits. Prerequisites: MATH 294 and fluid mechanics (co-registration permissible).

ABEN 365 Properties of Biological Materials
Spring. 3 credits. Prerequisites: one semester of math and physics. S-U grades optional.

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. S-U grades optional. Not open to freshmen.

ABEN 371 Hydrology and the Environment (also SCAS 371 and GEOL 204)
Spring. 3 credits. Prerequisite: one course in calculus.

ABEN 385 Mechanics in the Earth and Environmental Sciences
Spring. 4 credits. S-U grades optional.

ABEN 411 Biomass Processing: Modelling and Analysis
Spring. 3 credits. Prerequisites: ABEN 250, ABEN 350 (or any course in heat and mass transport); BIOBM 331, 332 or BIOMI 290.

ABEN 425 Science and Technology of Environmental Management
Fall. 3 credits. Open to seniors and graduate students only. Letter grades only.

ABEN 435 Principles of Aquaculture
Spring. 3 credits. Prerequisite: minimum junior standing.

ABEN 449 Computational Tools for Engineers
Spring. 3 credits. Prerequisite: completion of the undergraduate engineering math sequence or permission of instructor. S-U grades optional.

ABEN 450 Bioinstrumentation
Fall. 4 credits. Prerequisites: linear differential equations, physics or electrical science, computer programming and use of spreadsheets.

ABEN 453 Computer-Aided Engineering: Applications to Biomedical and Food Processes
Spring. 3 credits. Prerequisite: computer programming (ABEN 151 or COM S 100) and heat and mass transfer (ABEN 350 or equivalent).

ABEN 454 Physiological Engineering
Fall. 3 credits. Corequisite: fluid mechanics.

ABEN 456 Biomechanics of Plants
Fall. 3 credits. Prerequisites: upper division undergraduate or graduate status, completion of introductory sequence in biology and one year of calculus, or permission of instructor. S-U grades optional.

ABEN 471 Geohydrology (also CEE 431 and GEOL 445)
Fall. 3 credits. Prerequisites: MATH 294 and ENGRD 202.
For description, see CEE 431.

ABEN 473 Watershed Engineering
Fall. 3 credits. Prerequisite: fluid mechanics or hydrology.

ABEN 474 Drainage and Irrigation Design
Spring. 3 credits. Prerequisites: fluid mechanics or hydrology.

ABEN 475 Environmental Systems Analysis
Fall. 3 credits. Prerequisites: computer programming and one year of calculus.

ABEN 476 Solid Waste Engineering
Spring. 3 credits. Prerequisites: one semester of physics and chemistry.

[ABEN 477 Treatment and Disposal of Agricultural Wastes
Fall. 3 credits. Prerequisites: one environmental science course and at least junior-level standing; or permission of instructor. Not offered 1999–2000.]

ABEN 478 Ecological Engineering
Spring. 3 credits. Prerequisite: junior-level environmental quality engineering course or equivalent.

ABEN 481 Design of Wood Structures
Spring. 3 credits. Prerequisite: ENGRD 202.

ABEN 482 Biothermal Engineering
Spring. 3 credits. Prerequisites: ABEN 250 and 350, or equivalent.

ABEN 491 Highway Engineering (also CEE 462)
Fall. 3 credits. Prerequisites: junior standing in engineering, fluid mechanics, and soil mechanics (may be taken concurrently).

ABEN 494 Special Topics in Agricultural and Biological Engineering
Fall, spring. 1–4 credits. S-U grades optional.

ABEN 496 Senior Design in Agricultural and Geological Engineering
Fall, spring. 1–3 credits. Prerequisite: senior standing in ABEN engineering program or permission of instructor. Completed independent study form (available in 140 Roberts Hall) is required to register.

ABEN 497 Individual Study in Agricultural and Biological Engineering
Fall, spring. 1–4 credits. 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. S-U grades optional. Completed independent study form (available in 140 Roberts Hall) is required to register.

ABEN 498 Undergraduate Teaching
Fall, spring. 1–4 credits. Prerequisite: written permission of instructor. Completed independent study form (available in 140 Roberts Hall) is required to register.

ABEN 499 Undergraduate Research
Fall, spring. 1–3 credits. Prerequisites: written permission of instructor; adequate training for work proposed. Normally reserved for seniors in upper two-fifths of their class. Completed independent study form (available in 140 Roberts Hall) is required to register.

ABEN 551/552 Agricultural and Biological Engineering Design Project
Fall, 551; spring, 552. 3–6 credits. Prerequisite: admission to the M.Eng. (Agricultural and Biological) degree program.

ABEN 651 Bioremediation: Engineering Organisms to Clean Up the Environment
Spring. 3 credits. Prerequisites: BIOMI 290 or BIOMI 398 or BIOMI 331 or permission of instructor.

ABEN 652 Instrumentation: Sensors and Transducers
Spring. 3 credits. Prerequisites: linear differential equations, introductory chemistry and introductory physics, or permission of instructor.

ABEN 655 Thermodynamics and Its Applications
Spring. 3 credits. Prerequisite: MATH 293 or equivalent.

ABEN 671 Analysis of the Flow of Water and Chemicals in Soils
Fall. 3 credits. Prerequisites: four calculus courses and fluid mechanics.

ABEN 672 Drainage
Spring. 4 credits. Prerequisites: ABEN 471 and two calculus courses. S-U grades optional. Offered alternate years.

[ABEN 677 Treatment and Disposal of Agricultural Wastes
Fall. 3 credits. Prerequisite: permission of instructor. Not offered 1999–2000.]

ABEN 678 Nonpoint Source Models
Spring. 3 credits. Prerequisites: computer programming and calculus.

ABEN 685 Biological Engineering Analysis
Spring. 4 credits. Prerequisite: T&AM 310 or permission of instructor.

ABEN 692 Pavement Engineering (also CEE 643)
Spring. 4 credits. Limited to engineering seniors and graduate students. Prerequisite: one introductory course in soil mechanics or highway engineering.

ABEN 694 Graduate Special Topics in Agricultural and Biological Engineering
Fall, spring. 1–4 credits. S-U grades optional.

ABEN 697 Graduate Individual Study in Agricultural and Biological Engineering
Fall, spring. 1–6 credits. Prerequisite: permission of instructor. S-U grades optional.

ABEN 700 General Seminar
Fall. 1 credit. S-U grades only.

ABEN 750 Orientation to Graduate Study
Fall. 1 credit. S-U grades only. Limited to newly joining graduate students.

ABEN 754 How to Manage a Watershed (also ARME 754 and GOVT 644)
Spring. 2–3 credits. S-U grades optional.

ABEN 771 Soil and Water Engineering Seminar
Fall, spring. 1–3 credits. Prerequisite: graduate status or permission of instructor. S-U grades optional.

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

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

ABEN 800 Master's-level Thesis Research
Fall, spring. 1–15 credits. Prerequisite: permission of advisor. S-U grades only.

ABEN 900 Graduate-level Thesis Research
Fall, spring. 1–15 credits. Prerequisite: permission of advisor. S-U grades only. Variable credit for Ph.D. research before the "A" exam is passed.

ABEN 901 Doctoral-level Thesis Research
Fall, spring. 1–15 credits. Prerequisite: passing of Admission Candidacy Exam and permission of advisor. S-U grades only.

APPLIED AND ENGINEERING PHYSICS

A&EP 110 The Laser and Its Applications in Science, Technology, and Medicine (also ENGRI 110)
Fall, spring. 3 credits.
This is a course in the Introduction to Engineering series. For description, see ENGRI 110.

A&EP 121 Fission, Fusion, and Radiation (also ENGRI 121 and NS&E 121)
Spring. 3 credits. S-U grades optional for students outside the College of Engineering. K. B. Cady.
This is a course in the Introduction to Engineering series. For description, see ENGRI 121.

A&EP 217 Electricity and Magnetism (also PHYS 217)
Fall, spring. 4 credits. Prerequisites: approval of student's advisor and permission of the instructor; coregistration in PHYS 216 or knowledge of special relativity at the level of PHYS 116; MATH 192 or equivalent and coregistration in MATH 293 or equivalent. Staff.
Intended for students who have done well in PHYS 112 or 116 (or the equivalent) and in mathematics who desire a more analytic treatment than that of PHYS 213. At the level of *Electricity and Magnetism*, by Purcell. Recommended for prospective engineering physics majors. A placement quiz may be given early in the semester, permitting those students who find the material too abstract or analytical to transfer into PHYS 213 without difficulty.

A&EP 264 Computer-Instrumentation Design (also ENGRD 264)
Fall, spring. 3 credits. Prerequisites: COM S 100. 1 lec, 1 lab.
For description, see ENGRD 264.

A&EP 321 Mathematical Physics I
Fall, summer. 4 credits. Prerequisite: MATH 294. Intended for upper-level undergraduates in the physical sciences.
Review of vector analysis; complex variable theory, Cauchy-Rieman conditions, complex Taylor and Laurent series, Cauchy integral formula and residue techniques, conformal mapping; Fourier Series; Fourier and Laplace transforms; ordinary differential equations;

separation of variables. Texts: *Mathematical Methods for Physicists*, by Arfken; *Mathematical Physics*, by Butkov.

A&EP 322 Mathematical Physics II
Spring. 4 credits. Prerequisite: A&EP 321. Second of the two-course sequence in mathematical physics intended for upper-level undergraduates in the physical sciences.
Partial differential equations, Bessel functions, spherical harmonics, separation of variables, wave and diffusion equations, Laplace, Helmholtz and Poisson's Equations, transform techniques, Green's functions; integral equations, Fredholm equations, kernals; complex variables, theory, branch points and cuts, Riemann sheets, method of steepest descent; tensors, contravariant and covariant representations; group theory, matrix representations, class and character. Texts: *Mathematical Methods for Physicists*, by Arfken; *Mathematical Physics*, by Butkov.

A&EP 330 Modern Experimental Optics (see also PHYS 330)
Fall. 4 credits. Enrollment limited. Prerequisites: PHYS 214 or equivalent. E. Bodenschatz.
A practical laboratory course in basic and modern optics. The various 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.

A&EP 333 Mechanics of Particles and Solid Bodies
Fall, summer. 4 credits. Prerequisites: PHYS 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 Thorton).

A&EP 355 Intermediate Electromagnetism
Fall, summer. 4 credits. Prerequisites: PHYS 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, quasistatics and magnetic circuit design. Emphasis is on developing proficiency with analyical and numerical solution techniques in order to solve real-world design problems.

A&EP 356 Intermediate Electrodynamics
Spring. 4 credits. Prerequisite: A&EP 355 and coregistration in A&EP 322 or equivalent, or permission of instructor.
Topics: electromagnetic waves, waveguides, transmission lines, dispersive media, radiation, special relativity, interference phenomena. Emphasis on physical concepts and developing ability to design/analyze microwave circuits and antenna arrays.

A&EP 361 Introductory Quantum Mechanics
Spring. 4 credits. Prerequisites: A&EP 333 or PHYS 318; coregistration in A&EP 322 or equivalent and in A&EP 356 or PHYS 326.
A first course in the systematic theory of quantum phenomena. Topics include wave mechanics, the Dirac formalism, angular momentum, the hydrogen atom, and perturbation theory.

A&EP 363 Electronic Circuits (also PHYS 360)
Fall, spring. 4 credits. Prerequisites: PHYS 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 403 Introduction to Nuclear Science and Engineering (also ELE E 403, M&AE 458 and NS&E 403)
Fall. 3 credits. Prerequisite: PHYS 214 and MATH 294.
For description see NS&E 403.

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 333 and 356 or equivalent.
Elasticity and Fluid Mechanics: basic phenomena of elasticity, simple beams, stress and strain tensors, materials equations, equations of motion, general beam equations, waves; fluids: basic phenomena, Navier Stokes equation, scaling laws, Reynolds and Froude numbers, Poisseuille flows, Stokes drag on sphere, boundary layers, invicid and incompressible flows, potential flow, conservation laws, Bernoulli equation, vorticity and circulation, life of wings, jets, instabilities, introduction to turbulence. Projects in combination with AEP 438 possible. At the level of Lai, Rubin and Krempl, *Continuum Mechanics*, and Tritton, *Introduction to Fluid Mechanics*.

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; coregistration in 361 permitted.
Numerical computation (derivatives, integrals, differential equations, matrices, boundary-value problems, relaxation, Monte Carlo methods, etc.) will be introduced and applied to engineering physics problems that cannot by 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
Spring. 4 credits. Prerequisites: A&EP 356, A&EP 361 or equivalent.
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, propagation of ultrashort pulses, solitons, optical phase conjugation, optical resonance and two-level atoms, atom cooling and trapping, multiphoton processes, spontaneous and simulated scattering, ultra-intense laser-matter interactions.

A&EP 450 Introductory Solid State Physics (also PHYS 454)
Fall. 4 credits. Prerequisites: A&EP 361 or equivalent, co-enrollment in A&EP 423 or equivalent.
An introduction to the physics of crystalline solids. Crystal structures; electronic states; lattice vibrations; metals, insulators and semiconductors. Computer simulations of the dynamics of electrons and ions in solids. Optical properties, magnetism, and superconductivity are covered as time allows. The majority of the course will address the foundations of the subject, but time is devoted to modern and/or technologically important topics such as quantum size effects. At the level of *Introduction to Solid State Physics* by Kittel, or *Solid State Physics* by Ashcroft and Mermun.

A&EP 470 Biophysical Methods (also BIONB 470)
Spring. 3 credits. Prerequisites: solid knowledge of basic physics and mathematics through the sophomore level; some knowledge of cellular biology helpful but not required. Letter grades only.
An overview of the diversity of modern biophysical experimental techniques used in the study of biophysical systems at the cellular and molecular level. Topics covered will include methods that examine both structure and function of biological systems, with emphasis on the applications of these methods to biological membranes. The course format will include assigned literature reviews by the students on specific biophysics topics and individual student presentations on these topics. The course is intended for students of the engineering, physics, chemistry, and biological disciplines who seek an introduction to modern biophysical experimental methods.

A&EP 484 Introduction to Controlled Fusion: Principles and Technology (also ELE E 484, M&AE 459 and NS&E 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. Offered on demand.
For description, see NS&E 484.

A&EP 490 Independent Study in Engineering Physics
Fall, spring. Credit to be arranged.
Laboratory or theoretical work in any branch of engineering physics under the direction of a member of the faculty. The study can take a number of forms; for example, design of laboratory apparatus, performance of laboratory measurements, computer simulation or software developments, theoretical design and analysis. Details to be arranged with respective faculty member.

A&EP 550 Applied Solid State Physics
Spring. 3 credits. Prerequisites: A&EP 356, 361, 423, 450 (or equivalent).
Directed at students who have had an introductory course in solid state physics at the level of Kittel. This course will concentrate on the application of the quantum mechanical theory of solid state physics to semiconductor materials, solid state electronic devices, solid state detectors and generators of electromagnetic radiation, superconducting devices and materials, the nonlinear optical properties of solids, ferromagnetic materials, nanoscale devices and mesoscopic quantum mechanical effects. The course will stress the basic, fundamental physics underlying the applications rather than the applications themselves. At the level of *Introduction to Applied Solid State Physics* by Dalven.

A&EP 606 Introduction to Plasma Physics (also ELE E 581)
Fall. 4 credits. Prerequisites: ELE E 303 or equivalent.
For description, see ELE E 581.

A&EP 607 Basic Plasma Physics (also ELE E 582)
Spring. 4 credits. Prerequisites: ELE E 581 and A&EP 606.
For description, see ELE E 582.

A&EP 633 Nuclear Reactor Engineering (also NS&E 633)
Fall. 4 credits. Prerequisite: introductory course in nuclear engineering. Offered on demand. K. B. Cady.
The fundamentals of nuclear reactor engineering, reactor siting and safety, fluid flow and heat transfer, control, environmental effects, and radiation protection.

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 that define and limit the various processes. At the level of Brodie and Muray.

A&EP 751 M ENG Project
Fall, spring. 6–12 credits to be arranged. Required for candidates for the M.Eng. (Engineering Physics) degree.
Independent study under the direction of a member of the university faculty. Students participate in an independent research project through work on a special problem related to their field of interest. A formal and complete research report is required.

A&EP 753 Special Topics Seminar in Applied Physics
Fall. 1 credit. Prerequisite: undergraduate physics. Required for candidates for the M.Eng. (Engineering Physics) degree and recommended for seniors in engineering physics.
Special topics in applied science, with focus on areas of applied physics and engineering that are of current interest. Subjects chosen are researched in the library and presented in a seminar format by the students. Effort is made to integrate the subjects within selected subject areas such as atomic, biological, computational, optical, plasma, and solid-state physics, or microfabrication technology, as suggested by the students and coordinated by the instructor.

CHEMICAL ENGINEERING

CHEME 112 Introduction to Chemical Engineering (also ENGRI 112)
Fall, spring. 3 credits. Limited to freshmen. T. M. Duncan, C. Cohen.
This is a course in the Introduction to Engineering series. For description, see ENGRI 112.

[CHEME 120 Introduction to Biomedical Engineering (also ENGRI 120)
Fall. 3 credits. Not offered fall 1999; next offered fall 2000. W. M. Saltzman.
This is a course in the Introduction to Engineering series. For description, see ENGRI 120.]

CHEME 219 Mass and Energy Balances (also ENGRD 219)
Fall. 3 credits. Corequisite: physical or organic chemistry or permission of instructor. K. H. Lee.
For description, see ENGRD 219.

CHEME 301 Nonresident Lectures
Spring. 1 credit. P. Clancy.
Lecturers from industry and from selected departments of the university provide information to assist students in their post-graduate plans.

CHEME 313 Chemical Engineering Thermodynamics
Fall. 4 credits. Corequisite: physical chemistry. A. B. Anton.
A study of the first and second laws and their consequences for chemical systems. Thermodynamic properties of pures fluids, solids, and mixtures; phase and chemical reaction equilibrium; heat effects in batch and flow processes; power cycles and refrigeration.

CHEME 323 Fluid Mechanics
Fall. 3 credits. Prerequisites: CHEME 219 and engineering mathematics sequence. P. H. Steen.
Fundamentals of fluid mechanics. Macroscopic and microscopic balances. Applications to problems involving viscous flow.

CHEME 324 Heat and Mass Transfer
Spring. 3 credits. Prerequisite: CHEME 323. W. L. Olbricht.
Fundamentals of heat and mass transfer. Macroscopic and microscopic balances. Applications to problems involving conduction, convection, and diffusion.

CHEME 332 Analysis of Separation Processes
Spring. 4 credits. Prerequisites: CHEME 313 and 323. P. Clancy.
Analysis of separation processes involving phase equilibria and mass transfer. Phase equilibria; binary and multicomponent distillation; liquid-liquid extraction; gas absorption, absorption, membrane separations.

CHEME 390 Reaction Kinetics and Reactor Design
Spring. 3 credits. Prerequisites: CHEME 313 and 323. D. L. Koch.
A study of chemical reaction kinetics and principles of reactor design for chemical processes.

CHEME 391 Physical Chemistry II (also CHEM 391)
For description, see CHEM 391.

CHEME 432 Chemical Engineering Laboratory
Fall. 4 credits. Prerequisites: CHEME 323, 324, 332, and 390. K. E. Ackley and staff.
Laboratory experiments in fluid dynamics, heat and mass transfer, kinetics, other operations. Correlation and interpretation of data. Technical report writing.

CHEME 462 Chemical Process Design
Spring. 4 credits. Prerequisite: CHEME 432. K. E. Ackley and staff.
A consideration of process and economic alternatives in selected chemical processes; design and assessment.

CHEME 472 Feedback Control Systems
Fall. 3 credits. Prerequisites: CHEME 324 and 390, or permission of instructor. A. B. Anton.
Analysis techniques, performance specifications, and analog-feedback-compensation methods for single-input, single-output, linear, time-invariant systems. Laplace transforms and transfer functions are the major mathematical tools. Design techniques include root-locus and frequency response methods. (Lectures shared with M&AE 478 and ELE E 471.)

CHEME 480 Chemical Processing of Electronic Materials
Spring. 3 credits. A. B. Anton.
Introduction to chemical processing of semiconductor materials for the manufacture of microelectronic devices, with specific emphasis on thermodynamics, transport phenomena, and kinetics. Topics include semiconductor properties and behavior, microelectronic device operation, thermochemistry of deposition and etching reactions, vacuum transport, plasmas, PVD, oxidation, diffusion, CVD, and statistical process control.

[CHEME 481 Biomedical Engineering
Spring. 3 credits. Prerequisite: CHEME 324 or equivalent or permission of instructor. Not offered 1999–2000; next offered 2000–2001. W. M. Saltzman.
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. T. M. Duncan and M. Ackley.
Methods of instruction in chemical engineering acquired through discussions with faculty and by assisting with the instruction of freshmen and sophomores.

CHEME 492 Research Principles and Practices
Spring. 1 credit. T. M. Duncan.
Introduces research procedures, including documenting and reporting research (writing and speaking), experimental design, data analysis, visual display of quantitative information, serendipity (capitalizing on accidents), inadvertent self-deception (recognizing and avoiding). Also includes social aspects of research, such as professional ethics, applying to graduate school, and graduate student life.

CHEME 520 Chemical, Polymer, Biomedical, and Electronic Materials Processing
Spring. 1–5 credits (1 credit per section).

520.1 An Overview of Chemical Processing
1 credit. Jan. 24-Feb. 23. T. M. Duncan.
An introduction to chemical engineering design and analysis-mathematical modeling, graphical methods and dynamic scaling. Open to non-chemical engineers only.

520.2 Introduction to Biomedical Engineering
1 credit. Jan. 24-Feb. 23. W. M. Saltzman.
Meets concurrently with CHEME 481.

520.3 Introduction to Electronic Materials Processing
1 credit. Jan. 24-Feb. 23. A. B. Anton.
Meets concurrently with CHEME 480.

520.4 Introduction to Polymer Processing
1 credit. Feb. 25-Mar. 27. C. Cohen.
Overview and simple quantitative analyses of several plastic processes with an emphasis on the role of rheology in polymer processing.

520.5 Chemical Engineering Processing Units and Equipment
1 credit. Mar. 29-May 5. K. E. Ackley and A. M. Center.
A hands-on survey of standard chemical processing equipment-structure and operation-with emphasis on trouble-shooting techniques.

CHEME 562 Managing Chemical Process Design
Fall. 1 or 2 credits. Prerequisite: CHEME 462. K. E. Ackley.
Guidance and evaluation of chemical process designs developed by teams of chemical engineers.

[CHEME 564 Design of Chemical Reactors
Spring. 3 credits. Prerequisite: CHEME 390 or equivalent. Not offered 1999–2000; next offered 2000–2001. P. Harriott.
Design, scale-up, and optimization of chemical reactors with allowance for heat and mass transfer and nonideal flow patterns. Homework problems feature analysis of published data for gas-solid, gas-liquid, and three-phase reaction systems.]

CHEME 565 Design Project
Fall, spring. 3 or 6 credits. Required for students in the M.Eng. (Chemical) program.
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 572 Managing Business Development Solutions
Fall. 3 credits. A. M. Center.
A case study approach to introduce the typical fundamental factors driving a business venture, to examine how to develop implementation strategies for the venture and to learn the project management skills necessary to successfully implement the venture.

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 605 Fundamentals in Biomedical Engineering I (also ENGRG 605)
Fall. 1–4 credits (1 credit per section). Prerequisites: graduate standing in Engineering or Science; PHYS 213 and MATH 294 or equivalent. Undergraduates must have permission of instructor and have completed ABEN 454, CHEME 481 or M&AE 465. S-U grades optional for students not majoring or minoring in biomedical engineering.
For description, see ENGRG 605.

CHEME 606 Fundamentals in Biomedical Engineering II (also ENGRG 606)
Spring. 1–4 credits. Prerequisites: graduate standing in engineering or science; PHYS 213 and MATH 294 or equivalent. Undergraduates must have permission of instructor and have completed ABEN 454, CHEME 481 or M&AE 465. S-U grades optional for students not majoring or minoring in biomedical engineering.
For description, see ENGRG 606.

CHEME 640 Polymeric Materials
Fall. 3 credits. F. Rodriguez.
Chemistry and physics of the formation and characterization of polymers. Principles of fabrication.

CHEME 643 Introduction to Bioprocess Engineering
Fall. 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.

CHEME 656 Separations Using Membranes or Porous Solids
Spring. 3 credits. Prerequisites: CHEME 324 and 332. P. Harriott.
Diffusion of small molecules in gases, liquids, and solids. Membrane separation processes including gas separation, pervaporation, reverse osmosis, and ultrafiltration. Purification of gases and liquids by adsorption, ion exchange, and chromatography.

CHEME 661 Air Pollution Control
Spring. 3 credits. P. Harriott.
Origin of air pollutants, U.S. emission standards, dispersion equations. Design of equipment for removal of particulate and gaseous pollutants formed in combustion and chemical processing.

CHEME 675 Synthetic Polymer Chemistry (also MS&E 671 and CHEM 671)
Fall. 4 credits. Prerequisites: CHEM 359–360 or equivalent or permission of instructor.
For description, see CHEM 671.

CHEME 711 Advanced Chemical Engineering Thermodynamics
Fall. 3 credits. Prerequisite: CHEME 313 or equivalent. P. Clancy.
Postulatory approach to thermodynamics. Legendre transformations. Equilibrium and stability of general thermodynamic systems. Applications of thermodynamic methods to advanced problems in chemical engineering. Introduction to statistical mechanical ensembles, phase transitions, Monte Carlo methods, and theory of liquids.

CHEME 713 Chemical Kinetics and Dynamics
Spring. 3 credits. Prerequisite: CHEME 390 or equivalent. F. Escobedo.
Microscopic and macroscopic viewpoints. Connections between phenomenological chemical kinetics and molecular reaction dynamics. Reaction cross sections, potential energy surfaces, and dynamics of bimolecular collisions. Molecular beam scattering. Transition state theory. Unimolecular reaction dynamics. Complex chemically reacting systems: reactor stability, multiple steady states, oscillations, and bifurcation. Reactions in heterogeneous media. Free-radical mechanisms in combustion and pyrolysis.

CHEME 731 Advanced Fluid Mechanics and Heat Transfer
Fall. 3 credits. Prerequisites: CHEME 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.

CHEME 732 Diffusion and Mass Transfer
Spring. 2 credits. Prerequisite: CHEME 731 or equivalent. P. H. Steen.
Conservation equations in multicomponent systems, irreversible thermodynamics, dispersion, and Brownian diffusion. Mass transfer for convective diffusion in liquids. Application to a variety of problems such as coagulation of aerosols, diffusion through films and membranes, liquid-liquid extraction, chemical vapor deposition, polymer rheology and diffusion, and reaction-diffusion systems.

CHEME 741 Selected Topics in Biochemical Engineering
Fall. 1 credit (may be repeated for credit). Prerequisite: CHEME 643 or permission of instructor. M. L. Shuler and W. M. Saltzman.
Discussion of current topics and research in biochemical engineering for graduate students.

CHEME 745 Physical Polymer Science I
Fall. 3 credits. Co-requisite: CHEME 711 or equivalent. Offered alternate years. C. Cohen.
Thermodynamic properties of dilute, semidilute, and concentrated solutions from both classical and scaling approaches. Characterization techniques of dilute solutions: osmometry, light scattering, viscometry, and sedimentation. Rubber elasticity; mechanical and thermodynamic properties of gels. Polymer melts: equations of state and glass transition phenomena.

CHEME 751 Mathematical Methods of Chemical Engineering Analysis
Fall. 4 credits. A. B. Anton.
Application of advanced mathematical techniques to chemical engineering analysis. Mathematical modeling, scaling, regular and singular perturbations, multiple scales, asymptotic analysis, linear and nonlinear ordinary and partial differential equations, statistics, data analysis and curve fitting.

CHEME 753 Analysis of Nonlinear Systems: Stability, Bifurcation, and Continuation
Fall. 3 credits. Prerequisite: CHEME 751 or equivalent. Offered alternate years. P. H. Steen.
Elements of stability and bifurcation theory. Branch-following techniques. Stability of discrete and continuous systems. Application to elasticity, reaction-diffusion, and hydrodynamic systems using software for continuation problems.

CHEME 790 Seminar
Fall, spring. 1 credit each term.
General chemical engineering seminar required of all graduate students in the Field of Chemical Engineering.

CHEME 792 Principles and Practices of Graduate Research
Fall, spring. 1 credit. T. M. Duncan and staff.
A colloquium/discussion group series for first-year graduate students. Topics include the culture and responsibilities of graduate research and the professional community; the mechanics of conducting research (experimental design, data analysis, serendipity in research, avoiding self-deception), documenting research (lab notebooks, computer files), and reporting research (writing a technical paper and oral presentations).

CHEME 890 Thesis Research
Fall, spring. Variable credit.
Thesis research for the M.S. degree in chemical engineering.

CHEME 990 Thesis Research
Fall, spring. Variable credit.
Thesis research for the Ph.D. degree in chemical engineering.

CIVIL AND ENVIRONMENTAL ENGINEERING

Courses in the School of Civil and Environmental Engineering are offered in three broad mission areas: Civil Infrastructure, Environment, and Systems Engineering and Information Technology. Within each mission area are several areas of specialization. The following are the course numbers and titles listed by specialization within each mission area. Some courses are listed in two or more mission areas because the course content is relevant to multiple areas. The School also offers a number of general courses that are not unique to one mission area. Full course descriptions follow in the subsequent section and are listed in numerical order.

General

CEE 113 Introduction to Environmental Systems (also ENGRI 113) (F,3cr.)

CEE 116 Modern Structures (also ENGRI 116) (F,3cr.)

CEE 241 Engineering Computation (also ENGRD 241) (F,S,3cr.)

CEE 304 Uncertainty Analysis in Engineering (F,4cr.)

CEE 308 Introduction to CADD (F,S,1cr.)

CEE 309 Special Topics in Civil and Environmental Engineering (F,S,var.)

CEE 323 Engineering Economics and Management (also ENGRG 323) (S,Su,3cr.)

CEE 400 Senior Honors Thesis (F,S,var.)

CEE 401 Undergraduate Engineering Teaching in CEE (F,S,var.)

Civil Infrastructure

See also: CEE 116, CEE 241, CEE 304, CEE 308, CEE 503 and CEE 595

Geotechnical Engineering

CEE 341 Introduction to Geotechnical Engineering (S,4cr.)

CEE 501/502 Design Project in Geotech/Structures (F,S,3cr.)

CEE 602 Civil Infrastructure Seminar (F,1cr.)

CEE 640 Foundation Engineering (F,3cr.)

CEE 641 Retaining Structures and Slopes (S,3cr.)

CEE 643 Pavement Engineering (S,4cr.)

CEE 644 Environmental Applications of Geotechnical Engineering (S,3cr.)

CEE 649 Special Topics in Geotechnical Engineering (F,S,var.)

CEE 740 Engineering Behavior of Soils (F,3cr.)

CEE 741 Rock Engineering (S,3cr.)

CEE 744 Advanced Foundation Engineering (S,2cr.)

CEE 745 Soil Dynamics (S,3cr.)

CEE 746 Embankment Dam Engineering (S,2cr.)

CEE 749 Research in Geotechnical Engineering (F,S, var.)

CEE 840 Thesis—Geotechnical Engineering (F,S,var.)

Structural Engineering

CEE 116 Modern Structures (F,3cr.)

CEE 371 Structural Behavior (S,4cr.)

CEE 372 Structural Analysis (F,Su,4cr.)

CEE 473 Design of Concrete Structures (S, 4cr.)

CEE 474 Design of Steel Structures (S,4cr.)

CEE 476 Civil Engineering Materials (F,4cr.)

CEE 501/502 Design Project in Geotech/Structures (F,S,3cr.)

CEE 602 Civil Infrastructure Seminar (F,S,1cr.)

CEE 671 Random Vibration (F,3cr.)

CEE 672 Fundamentals of Structural Mechanics (F,3cr.)

CEE 673 Advanced Structural Analysis (F,3cr.)

CEE 675 Concrete Materials and Construction (S,3cr.)

CEE 677 Stochastic Mechanics (F,3cr.)

CEE 770 Engineering Fracture Mechanics (F,3cr.)

CEE 772 Finite Element Analysis for Mechanical, Structural and Aerospace Applications (S,3cr.)

CEE 774 Advanced Structural Concrete (F,3cr.)

CEE 775 Structural Concrete Systems (S,3cr.)

CEE 776 Advanced Design of Metal Structures (F,3cr.)

CEE 777 Advanced Behavior of Metal Structures (S,3cr.)

CEE 779 Structural Dynamics and Earthquake Engineering (S,3cr.)

CEE 783 Civil and Environmental Engineering Materials Project (F,S,var.)

CEE 785 Research in Structural Engineering (F,S,var.)

CEE 786 Special Topics in Structural Engineering (F,S,var.)

CEE 880 Thesis—Structural Engineering (F,S,var.)

Environment

See also CEE 113, CEE 241, and CEE 304

Environmental Engineering

CEE 351 Environmental Quality Engineering (S,3cr.)

CEE 352 Water Supply Engineering (F,3cr.)

CEE 451 Microbiology for Environmental Engineering (F,3cr.)

CEE 453 Laboratory Research in Environmental Engineering (S,3cr.)

CEE 501/502 Design Project in Environmental Engineering (F,S,3cr.)

CEE 601 Water Resources and Environmental Engineering Seminar (F,1cr.)

CEE 653 Water Chemistry for Environmental Engineering (F,3cr.)

CEE 654 Aquatic Chemistry (S,3cr.)

CEE 655 Transport, Mixing and Transformation in the Environment (F,3cr.)

CEE 658 Sludge Treatment, Utilization, and Disposal (S,3cr.)

CEE 659 Environmental Quality Engineering Seminar (S,1cr.)

CEE 750 Research in Environmental Engineering (F,S,var.)

CEE 755 Physical/Chemical Processes (F,3cr.)

CEE 756 Biological Processes (S,3cr.)

CEE 757 Physical/Chemical Processes Laboratory I (F,2cr.)

CEE 758 Biological Processes Laboratory II (S,2cr.)

CEE 759 Special Topics in Environmental Engineering (F,S,var.)

CEE 850 Thesis—Environmental Engineering (F,S,var.)

Environmental Systems

See Systems Engineering and Information Technology mission areas for a listing of courses in Environmental and Public Systems.

Environmental Fluid Mechanics and Hydrology

CEE 331 Fluid Mechanics (F,Su,4cr.)

CEE 332 Hydraulic Engineering (S,4cr.)

CEE 431 Geohydrology (also GEOL 445 and ABEN 471) (F,3cr.)

CEE 432 Hydrology (S,3cr.)

CEE 435 Coastal Engineering (S,4cr.)

CEE 501 Design Project in Fluid Mechanics and Hydrology (F,S,3cr.)

CEE 601 Water Resources and Environmental Engineering Seminar (F,1cr.)

CEE 630 Advanced Fluid Mechanics (F,3cr.)

CEE 631 Flow and Contaminant Transport Modeling in Ground Water (S,3cr.)

CEE 632 Hydrology (S,3cr.)

CEE 633 Flow in Porous Media and Ground Water (F,3cr.)

CEE 634 Boundary Layer Meteorology (F,3cr.)

CEE 635 Small and Finite Amplitude Water Waves (S,3cr.)

CEE 636 Environmental Fluid Mechanics (S,3cr.)

CEE 638 Hydraulics Seminar (S,1cr.)

CEE 639 Special Topics in Hydraulics (F,S,var.)

CEE 655 Transport, Mixing and Transformation in the Environment (F,3cr.)

CEE 732 Computational Hydraulics (F,3cr.)

CEE 735 Research in Hydraulics (F,S,var.)

CEE 830 Thesis—Fluid Mechanics and Hydrology (F,S,var.)

Systems Engineering and Information Technology

See also CEE 113, CEE 241, and CEE 304

Engineering Management

CEE 590 Project Management (F,S,4cr.)

CEE 591 Engineering Management Project (F,3cr.)

CEE 592 Engineering Management Project (S,3cr.)

CEE 593 Engineering Management Methods I: Data, Information, and Modeling (F,3cr.)

CEE 594 Engineering Management Methods II: Managing Uncertain Systems (S,3cr.)

CEE 595 Construction Planning and Operations (F,3cr.)

CEE 596 Current Topics in Construction Management (S,3cr.)

CEE 597 Risk Analysis and Management (S,3cr.)

CEE 692 Special Topics in Engineering Management (F,S,var.)

CEE 694 Research in Engineering Management (F,S,var.)

Environmental and Public Systems

CEE 323 Engineering Economics and Management (also ENGRG 323) (S,Su,3cr.)

CEE 423 Environmental Quality Systems Analysis (S,3cr.)

CEE 528 Public Political Economy (also ECON 569) (S,4cr.)

CEE 529 Water and Environmental Resources Problems and Policies (F,3cr.)

CEE 597 Risk Analysis and Management (S,3cr.)

CEE 620 Water Resources Systems I (F,3cr.)

CEE 621 Water Resources Systems II: Stochastic Hydrology (S,3cr.)

CEE 623 Environmental Systems Engineering (S,3cr.)

CEE 628 Environmental and Water Resources Systems Analysis Seminar (S,1cr.)

CEE 722 Environmental and Water Resources Systems Analysis Research (F,S,var.)

CEE 729 Special Topics in Environmental and Water Resources Systems Analysis (F,S,var.)

CEE 820 Thesis—Environmental and Water Resources Systems (F,S,var.)

Remote Sensing

CEE 411 Remote Sensing: Environmental Applications (also SCAS 411) (S,3cr.)

CEE 610 Remote Sensing Fundamentals (F,3cr.)

CEE 615 Digital Image Processing (S,3cr.)

CEE 617 Project—Remote Sensing (F,S,var.)

CEE 618 Special Topics—Remote Sensing (F,S,var.)

CEE 710 Research—Remote Sensing (F,S,var.)

CEE 810 Thesis—Remote Sensing (F,S,var.)

Systems Engineering

CEE 504 Applied Systems Engineering (also M&AE 591, ELE E 595, OR&IE 512) (F,3cr.)

CEE 509 Heuristic Methods of Optimization (also COM S 574) (S,3cr.)

CEE 603 Systems Engineering and Information Technology Seminar (F,1cr.)

Transportation

CEE 361 Introduction to Transportation Engineering (S,Su,3cr.)

CEE 462 Highway Engineering (also ABEN 491) (F,3cr.)

CEE 463 Transportation and Information Technology (F,3cr.)

CEE 464 Transportation Systems Design (S,3cr.)

CEE 561 Urban Transportation Planning and Modeling (F,3cr.)

CEE 663 Transportation Network Analysis (S,3cr.)

CEE 762 Transportation Research (F,S,var.)

CEE 764 Special Topics in Transportation (F,S,var.)

CEE 860 Thesis—Transportation Engineering (F,S,var.)

CEE 113 Introduction to Environmental Systems (also ENGRI 113)
Fall. 3 credits. Not open (without instructor's permission) to upper-division engineering students. M. Weber-Shirk.
This is a course in the Introduction to Engineering series. For description, see ENGRI 113.

CEE 116 Modern Structures (also ENGRI 116)
Fall. 3 credits. A. R. Ingraffea.
This is a course in the Introduction to Engineering series. For description, see ENGRI 116.

CEE 241 Engineering Computation (also ENGRD 241)
Fall, spring. 3 credits. Prerequisites: COM S 100 and MATH 293. Corequisite: MATH 294. W. Philpot.
For description, see ENGRD 241.

CEE 304 Uncertainty Analysis in Engineering
Fall. 4 credits. CEE Engineering Co-op students may substitute summer ENGRD 270. Prerequisite: first-year calculus. J. R. Stedinger.
Introduction to probability theory and statistical techniques, with examples from civil, environmental, agricultural, and related disciplines. Course covers data presentation, commonly used probability distributions describing natural phenomona and material properties, parameter estimation, confidence intervals, hypothesis testing, simple linear regression, and nonparametric statistics. Examples include structural reliability, windspeed/flood distributions, and models of vehicle arrivals.

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 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. D. P. Loucks.
For description, see ENGRG 323.

CEE 331 Fluid Mechanics
Fall; usually offered in summer for Engineering Co-op Program. 4 credits. Prerequisite: ENGRD 202 (may be taken concurrently). P. L.-F. Liu.

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. Not offered 1999–2000. Staff.
Application of fluid-mechanical principles to problems of engineering practice and design: hydraulic machinery, water-distribution systems, open-channel design, river engineering, groundwater flow, and pollutant dispersal. Lectures supplemented by laboratory work and a design project.]

CEE 341 Introduction to Geotechnical Engineering
Spring. 4 credits. Prerequisite: ENGRD 202. H. E. Stewart.
Soil as an engineering material. Chemical and physical nature of soil. Engineering properties of soil. Stresses and stress analysis of soil. Basic theory and design for water flow in soil, one-dimensional consolidation of clay and silts, and shear-strength problems. Introduction to slope stability, earth pressure, geosynthetics, and landfill and waste-containment issues. Introduction to laboratory testing. Synthesis of soil analysis and laboratory-test results for the design of engineering structures.

CEE 351 Environmental Quality Engineering
Spring. 3 credits. J. J. Bisogni.
Introduction to engineering aspects of environmental quality control. Quality parameters, criteria, and standards for water and wastewater. Elementary analysis pertaining to the modeling of pollutant reactions in natural systems, and introduction to design of unit processes for water and wastewater treatment.

CEE 352 Water Supply Engineering
Fall. 3 credits. Prerequisites: CEE 351 and previous/concurrent enrollment in CEE 451 or BIOMI 290. R. I. Dick.
Analysis of contemporary threats to human health from water supply systems. Criteria and standards for potable-water quality. Water-quality control theory. Design of water supply facilities.

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 intersection and network analysis. Institutional and energy issues; environmental impacts.

CEE 371 Structural Behavior
Spring. 4 credits. Prerequisite: ENGRD 202. A. R. Ingraffea.
Fundamental concepts of structural engineering: behavior, analysis, and design. Loads, structural materials, structural form, statically determinate analysis, approximate analysis of indeterminate systems. Use of interactive graphical analysis programs. Fundamentals of behavior of steel and concrete members. Introduction to limit states design.

CEE 372 Structural Analysis
Fall; usually offered in summer for Engineering Co-op Program. 4 credits. Prerequisite: CEE 371. S. Billington.
Fundamentals of statically indeterminate structures. Moment-area and virtual-work methods of displacement computation. Matrix flexibility and stiffness methods. Moment distribution analysis. Influence lines. Computer applications to practical structures. The art of structural modeling for analysis and design. Role and limitations of analysis in design.

CEE 400 Senior Honors Thesis
Fall, spring. 1–6 credits. Staff.
Available to students admitted to the CEE Honors Program. Supervised research, study, and/or project work resulting in a written report or honors thesis.

CEE 401 Undergraduate Engineering Teaching in CEE
Fall, spring. 1–3 credits. Prerequisite: permission of instructor. Staff.
Methods of instruction developed through discussions with faculty and by assisting with the instruction of undergraduates under the supervision of faculty.

CEE 411 Remote Sensing: Resource Inventory Methods (also SCAS 411)
Spring. 3 credits. Prerequisite: permission of instructor. S. C. DeGloria.
For description, see SCAS 411.

[CEE 423 Environmental Quality Systems Analysis
Spring. 3 credits. Prerequisites: MATH 294 and systems (CEE 323). Intended for undergraduates who have not taken OR&IE 320 or ABEN 475. Most lectures concurrent with CEE 623. Not offered 1999–2000. 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 ground water. See CEE 623 for a description of environmental applications. CEE 423 students do additional work on optimization fundamentals and do not do the main CEE 623 design project.]

CEE 431 Geohydrology (also GEOL 445 and ABEN 471)
Fall. 3 credits. Prerequisites: MATH 294 and ENGRD 202. L. Cathles.
Intermediate-level study of aquifer geology, groundwater flow, and related design factors. Includes description and properties of natural aquifers, ground water hydraulics, soil water, and solute transport.

[CEE 432 Hydrology
Spring. 3 credits. Prerequisite: CEE 331. Intended for undergraduates. Lectures concurrent with CEE 632. Not offered 1999–2000. W. H. Brutsaert.
Introduction to hydrology as a description of the water cycle and the role of water in the natural environment, and other issues for environmental engineers. See description for CEE 632.]

CEE 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 451 Microbiology for Environmental Engineering
Fall. 3 credits. Prerequisite: two semesters of college chemistry. J. M. Gossett.
An introduction to fundamental aspects of microbiology, organic chemistry, and biochemistry pertinent to environmental engineering. Topics include nomenclature and principal reactions of organic compounds; characteristics of bacteria, fungi, algae, protozoa and viruses relevant to water and wastewater; pathogens, disease, and immunity; environmental influences on microorganisms; bioenergetics; enzymes and metabolism; microbial genetics; and microbial ecology. This is an introductory course; consequently, it is inappropriate for those who have taken BIOMI 290 or equivalent.

CEE 453 Laboratory Research in Environmental Engineering
Spring. 3 credits. Prerequisites: CEE 351 or permission of instructor. M. L. Weber-Shirk.
Laboratory investigations of reactor flow characteristics; acid rain/lake chemistry; contaminated soil-site assessment, risk assessment, and remediation; pollutant dispersion/transport in rivers; drinking water filtration for pathogen removal; oxygen sag in rivers; and biodegradation in landfills. Design of laboratory experiments, development of laboratory methods, and use of experimental data are emphasized. See www.cee.cornell.edu/cee453/ for more information.

CEE 462 Highway Engineering (also ABEN 491)
Fall. 3 credits. Prerequisites: junior standing in engineering, fluid mechanics, and soil mechanics (may be taken concurrently). L. H. Irwin.
For description, see ABEN 491.

CEE 463 Transportation and Information Technology
Fall. 3 credits. L. K. Nozick.
Improvements in the utilization of existing facilities has become an important objective in transportation planning. This course examines the role of computer and telecommunications technologies to achieve these improvements. Specific attention is focused on the development of analyses to evaluate the benefits of inclusion of these technologies in transportation systems.

CEE 464 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 473 Design of Concrete Structures
Spring. 4 credits. Corequisites: CEE 372 or permission of instructor. S. Billington.
Behavior and design of reinforced concrete and structures. Discussion of how forces are transferred through elements of building system. Semester project requiring the design of a reinforced concrete structure.

CEE 474 Design of Steel Structures
Spring. 4 credits. Prerequisite: CEE 372 or permission of instructor. T. Peköz.
Behavior and design of steel members, connections, and structures. Discussion of structural systems for buildings and bridges.

CEE 476 Civil Engineering Materials
Fall. 4 credits. Prerequisites: ENGRD 202, ENGRD 261, PHYS 214 and CEE 371 (CEE 371 may be taken concurrently). P. Petrina.
Mechanical properties of concrete, metals, masonry, plastics, wood, and other structural materials. Stress-strain behavior and failure criteria. Nondestructive and destructive testing techniques for the evaluation of structures and the quality control of materials. Laboratory experiments.

CEE 501 Civil and Environmental Engineering Design Project I
Fall. 3 credits. Required for students in the M.Eng. (Civil) program. Staff.
Design of major civil engineering project. Planning and preliminary design in fall term; final design in January intersession (CEE 502).

CEE 501 Design Project in Environmental Fluid Mechanics and Hydrology
Fall, spring. 3 credits. Required for students in the M.Eng. (Civil) program. Staff.
Design of major fluid mechanics/hydrology project.

Design Project in Environmental Engineering
Fall. 3 credits. Required for students in the M.Eng. (Civil) program. R. I. Dick.
Design of a major environmental engineering project.

Design Project in Environmental Systems
Fall. 3 credits. Required for students in the M.Eng. (Civil) program. D. P. Loucks.
Design of a major environmental systems project.

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. Prerequisite: CEE 501. Staff.
A continuation of CEE 501.

CEE 504 Applied Systems Engineering (also M&AE 591, ELE E 595, OR&IE 512)
Fall. 3 credits. Permission of instructor. Staff.
For description, see M&AE 591.

CEE 509 Heuristic Methods for Optimization (also COM S 574)
Spring. 3 or 4 credits. Prerequisites: CEE/ENGRD 241 or COM S/ENGRD 211 or 212 or 222 or graduate standing, or permission of instructor.
This course will describe a variety of heuristic search methods including simulated annealing, tabu search, genetic algorithms, derandomized evolution strategy, random walk, and direct search algorithms. Algorithms will be used to find values of discrete and/or continuous variables arising in optimization and model fitting. Applications will be discussed in a range of areas including some of the following: artificial intelligence, scheduling, economics, water quality protection, telecommunications, circuit design, engineering mechanics. The advantages and disadvantages of heuristic search methods for both serial and parallel computation will be discussed in comparison to other optimization algorithms.

CEE 528 Public Political Economy (also ECON 539)
Spring. 4 credits. R. E. Schuler.
For description, see ECON 539.

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 resources. Organization and public policies in the federal system.

CEE 561 Urban Transportation Planning and Modeling
Fall. 3 credits. Prerequisites: CEE 361, statistics and probability, or permission of instructor. Designed for seniors with appropriate background and graduate students from CEE, CRP, and CIPA. A. H. Meyburg.
This course is intended to expose interested students to modern transportation planning practiceand to the analytical tools necessary to engage in this field. Emphasis will be on passenger transportation in the urban context. The course discusses the legislative, political, and economic contexts of urban transportation planning (UTP). It presents the travel demand estimation process and the associated models and approaches. Finally, it evaluates the forecasting results and assesses energy and environmental impacts.

CEE 590 Project Management
Fall, spring. 4 credits. Prerequisite: permission of instructor. M. A. Turnquist and F. J. Wayno.
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.

CEE 591 Engineering Management Project
Fall. 3 credits. Prerequisite: permission of instructor. Staff.
An intensive evaluation of the management aspects of a major engineering project or system. Most students will work on a large group project in the area of project management, but students may also work singly or in small groups on an engineering management topic of special interest to them.

CEE 592 Engineering Management Project
Spring. 3 credits. Prerequisite: permission of instructor. Staff.
A continuation of CEE 591.

CEE 593 Engineering Management Methods I: Data, Information, and Modeling
Fall. 3 credits. Prerequisites: OR&IE 270 or CEE 304 or equivalent. D. P. Loucks.
Methods for managing data and transforming data into information. Modeling as a means to synthesize information into knowledge that can form the basis for decisions and actions. Application of statistical methods and optimization to managerial problems in project scheduling, quality control, forecasting, and resource allocation.

CEE 594 Engineering Management Methods II: Managing Uncertain Systems
Spring. 3 credits. Prerequisite: CEE 593 or permission of instructor. L. K. Nozick.
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.

CEE 595 Construction Planning and Operations
Fall. 3 credits. Staff.
A course on the fundamentals of construction planning: organization of the worksite, construction planning, scheduling, and cost estimating, bidding, temporary structures, applications of computer methods, and the relationships among owners, designers, contractors, suppliers, and developers.

CEE 596 Current Topics in Construction Management
Spring. 3 credits. Prerequisite: CEE 595 or equivalent. Staff.
This course will focus on recent trends in the professional management of construction projects and organizations. It will draw from literature, practicing construction managers, software producers, and research. The course seeks to identify and evaluate trends and prepare students for management positions in engineering design and construction.

CEE 597 Risk Analysis and Management
Spring. 3 credits. Prerequisite: CEE 304 or OR&IE 270 or equivalent. J. R. Stedinger.
Course develops a working knowledge of risk terminology and reliability engineering, analytic tools and models used to analyze environmental and technological risks, and social and psychological risk issues. Discussions address life risks in the U.S., transportation risks, industrial accidents, waste incineration, air pollution modeling, public health, regulatory policy, risk communication, and risk management.

CEE 601 Water Resources and Environmental Engineering Seminar
Fall. 1 credit.
Presentation of topics of current interest.

CEE 602 Civil Infrastructure Seminar
Fall, spring. 1 credit.
Presentation of topics of current interest.

CEE 603 Systems Engineering and Information Technology Seminar
Fall, spring. 1 credit.
Presentation of topics of current interest.

CEE 610 Remote Sensing Fundamentals (also SCAS 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 aquisition; data analysis and interpretation; and project design.

CEE 615 Digital Image Processing
Spring. 3 credits. Prerequisites: facility with algebra and trigonometry (e.g., MATH 109) and statistics (e.g., CEE 304 or ARME 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
On demand. 1–6 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 620 Water-Resources Systems I
Fall. 3 credits. Prerequisite: CEE 323 or equivalent. D. P. Loucks.
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. J. R. Stedinger.
Course examines statistical, time series, and stochastic optimization methods used to address water resources planning and management problems involving uncertainty objectives and hydrologic inputs. Statistical issues include maximum likelihood, and moments estimators; censored datasets and historical information; probability plotting; Bayesian inference; regionalization methods; ARMA models; multivariate stochastic streamflow models; stochastic simulation; and stochastic reservoir-operation optimization models.

[CEE 623 Environmental Quality Systems Engineering
Spring. 3 credits. Prerequisites: MATH 294 and optimization (ABEN 475, or OR&IE 320/520). Not offered 1999–2000. C. A. Shoemaker.
Applications of optimization, simulation methods, and uncertainty analysis to the prevention and remediation of pollution. Case studies include regional waste and wastewater treatment, restoration of dissolved oxygen levels in rivers, and reclamation of contaminated groundwater. Applications use linear programming, integer, dynamic, nonlinear programming, and sensitivity analysis.]

CEE 628 Environmental and Water Resources Systems Analysis Seminar
Spring. 1 credit. Prerequisite: permission of instructor. C. A. Shoemaker.
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 630 Advanced Fluid Mechanics
Fall. 3 credits. Prerequisite: CEE 331. Not offered 1999–2000. Staff.
Introduction to tensor analysis; conservation of mass, momentum, and energy. Rigorous treatment includes study of exact solutions of Navier-Stokes equations. Asymptotic approximations at low and high Reynolds numbers. Similitude and modeling. Laminar diffusion of momentum, mass and heat.]

CEE 631 Flow and Contaminant Transport Modeling in Groundwater
Spring. 3 credits. Prerequisites: MATH 294 or equivalent, ENGRD 241 or experience in numerical methods and programming, and elementary fluid mechanics. P. L.-F. Liu.
Potential flows and their calculation. Numerical methods include finite difference, finite elements, and boundary elements. Fundamental equations of saturated and unsaturated flow in porous media. Flow in fractured media. Numerical modeling of transport in porous media. Diffusion and advective diffusion in one, two, and three dimensions. Anisotropy. Additional terms for reactive substances. The course will include the use of computer programs.

[CEE 632 Hydrology
Spring. 3 credits. Prerequisite: CEE 331. Not offered 1999–2000. W. H. Brutsaert.
Introduction to hydrology as a description of the water cycle and the role of water in the natural environment, and other issues for environmental engineers. Physical and statistical prediction methods for design related to hydrologic processes. Hydrometeorology and evaporation. Infiltration and base flow. Surface runoff and channel routing. Linear and nonlinear hydrologic systems. Storage routing and unit hydrograph methods.]

CEE 633 Flow in Porous Media and Groundwater
Fall. 3 credits. Prerequisite: CEE 331. W. H. Brutsaert.
Fluid mechanics and equations of single-phase and multiphase flow; methods of solution. Applications involve aquifer hydraulics, pumping wells; drought flows; infiltration, groundwater recharge; land subsidence; seawater intrusion, miscible displacement; transient seepage in unsaturated materials.

[CEE 634 Boundary Layer Meteorology
Fall. 3 credits. Prerequisite: CEE 331 or permission of instructor. Not offered 1999–2000. W. H. Brutsaert.
Physical processes in the lower atmospheric environment: turbulent transport in the atmospheric boundary layer, surface-air interaction, disturbed boundary layers, radiation. Applications include sensible and latent heat transfer from lakes, plant canopy flow and evapotranspiration, turbulent diffusion from chimneys and cooling towers, and related design issues.]

[CEE 635 Small and Finite Amplitude Water Waves
Spring. 3 credits. Prerequisite: CEE 435 or equivalent. Not offered 1999–2000. P. L.-F. Liu.
Review of linear and nonlinear theories of ocean waves. Discussions on the applicability of different wave theories to engineering problems.]

[CEE 636 Environmental Fluid Mechanics
Spring. 3 credits. Prerequisite: CEE 655 or permission of instructor. Not offered 1999–2000. E. A. Cowen.
Mechanics of layered and continuously stratified fluids: internal waves, density currents, selective withdrawal, and baroclinic motions. Turbulence in stratified fluids. Jets and plumes and their behavior in the environment. Turbulent diffusion, shear flow dispersion, wave-induced and tidal mixing processes. Applications to mixing processes in rivers, lakes, estuaries and oceans.]

CEE 638 Hydraulics Seminar
Spring. 1 credit. Open to undergraduates and graduates and required of graduate students majoring in hydraulics or hydraulic engineering. P. L.-F. Liu.
Topics of current interest in fluid mechanics, hydraulic engineering, and hydrology.

CEE 639 Special Topics in Hydraulics
On demand. 1–6 credits. Staff.
Special topics in fluid mechanics, hydraulic engineering, or hydrology.

CEE 640 Foundation Engineering
Fall. 3 credits. Prerequisite: CEE 341. F. H. Kulhawy.
Soil exploration, sampling, and in-situ testing techniques. Bearing capacity, stress distribution, and settlement. Design of shallow and deep foundations. Compaction and site preparation. Seepage and dewatering of foundation excavations.

CEE 641 Retaining Structures and Slopes
Spring. 3 credits. Prerequisite: CEE 341. Staff.
Earth pressure theories. Design of rigid, flexible, braced, tied-back, slurry, and reinforced soil structures. Stability of excavation, cut, and natural slopes. Design problems stressing application of course material under field conditions of engineering practice.

CEE 643 Pavement Engineering (also ABEN 692)
Spring. 4 credits. Limited to engineering seniors and graduate students. Prerequisite: one introductory course in soil mechanics or highway engineering. L. H. Irwin.
For description, see ABEN 692.

CEE 644 Environmental Applications of Geotechnical Engineering
Spring. 3 credits. Prerequisite: CEE 341 or equivalent. T. D. O'Rourke.
Principles of hydrogeology, contaminant migration, and remediation technologies related to geotechnical and environmental engineering. Emphasis on environmental site assessment, site feasibility studies, selection of remediation procedures, and engineered landfills. Design problems are based on real projects and involve visits from practicing engineers.

CEE 649 Special Topics in Geotechnical Engineering
On demand. 1–6 credits. Staff.
Supervised study of special topics not covered in the formal courses.

CEE 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 CHEM 287–288. Not offered 1999–2000. 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-equilibria computational techniques. In-depth coverage of topics covered in CEE 653.]

CEE 655 Transport, Mixing and Transformation in the Environment
Fall. 3 credits. Prerequisite: CEE 331. E. A. Cowen.
Application of fluid mechanics to problems of transport, mixing, and transformation in the water environment. Introduction to advective, diffuse, and dispersive processes in the environment. Boundary interactions: air-water and sediment-water processes. Introduction to chemical and biochemical transformation processes. Applications to transport, mixing, and transformation in rivers, lakes, and coastal waters.

CEE 658 Sludge Treatment, Utilization, and Disposal
Spring. 3 credits. Prerequisite: CEE 352 or permission of instructor. R. I. Dick.
Analysis of the quantity and quality of residues produced from municipal and industrial water-supply and pollution-control facilities and other residue-producing processes. Alternatives for reclaiming or disposing of hazardous and nonhazardous residues. Performance of treatment processes for altering sludge properties prior to reuse or ultimate disposal. Considerations in selecting and integrating of sludge-management processes.

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 663 Transportation Network Analysis
Spring. 3 credits. Prerequisites: CEE 463 or CEE 464, or permission of instructor. M. A. Turnquist.
Topics in flow prediction and estimation for transportation networks, including equilibrium assignment, stochastic network loading, trip table estimation, dynamic vehicle allocation and routing/scheduling models.

[CEE 671 Random Vibration
Fall. 3 credits. Prerequisites: M&AE 326, CEE 779, and OR&IE 260; or equivalent and permission of the instructor. Not offered 1999–2000. M. D. Grigoriu.
Review of random-process theory, simulation, and first-passage time. Linear random vibration: second-moment response descriptors and applications from fatigue; seismic analysis; and response to wind, wave, and other non-Gaussian load processes. Nonlinear random vibration: equivalent linearization, perturbation techniques, Fokker-Planck and Kolmogorov equations, Itô calculus, and applications from chaotic vibration, fatigue, seismic analysis, and parametrically excited systems.]

CEE 672 Fundamentals of Structural Mechanics
Fall. 3 credits. M. D. Grigoriu.
Theory of elasticity, energy principles, plate flexure, failure theories for structural design, beams on elastic foundation, finite-difference method, plate theory, introduction to finite-element method.

CEE 673 Advanced Structural Analysis
Fall. 3 credits. Prerequisites: CEE 372 and computer programming. J. F. Abel.
Matrix analysis of structures, computer programming of displacement (stiffness) method, use of interactive graphical analysis programs, solution methods, errors and accuracy, special analysis procedures, virtual work in matrix analysis, and introduction to nonlinear analysis and finite-element methods.

[CEE 675 Concrete Materials and Construction
Spring. 3 credits. Prerequisite: CEE 376 or equivalent. Offered alternate years. Not offered 1999–2000. K. C. Hover.
Materials science, structural engineering, and construction technology involved in the materials aspects of the use of concrete. Cement chemistry and physics, mix design, admixtures, engineering properties, testing of fresh and hardened concrete, and the effects of construction techniques on material behavior.]

[CEE 677 Stochastic Mechanics
Fall. 3 credits. Prerequisite: permission of instructor. Not offered 1999–2000. M. D. Grigoriu.
Review of concepts of probability theory, random processes, and random fields. Analytical and numerical methods for reliability analysis. Methods for solution of random eigenvalue problems, equilibrium of uncertain systems and systems with random imperfections, and propagation problems in stochastic systems. Applications include stochastic finite elements, probabilistic fracture mechanics, and dynamic Daniels systems.]

CEE 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.

CEE 694 Research in Engineering Management
On demand. 1–6 credits. Staff.
The student may select an area of investigation in engineering management. Results should be submitted to the instructor in charge in the form of a research report.

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 722 Environmental and Water Resources Systems Analysis Research
On demand. 1–6 credits. 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. 1–6 credits. Staff.
Supervised study, by individuals or small groups, of one or more specialized topics not covered in regular courses.

[CEE 732 Computational Hydraulics
Fall. 3 credits. Prerequisite: elementary fluid mechanics or permission of instructor. Offered alternate years. Not offered 1999–2000. Staff.
Numerical methods for solving hydraulics and fluid-mechanics problems. Solutions for elliptic, parabolic, and hyperbolic equations. Finite-difference, finite-element, and boundary-integral methods.]

CEE 735 Research in Hydraulics
On demand. 1–6 credits. Staff.
The student may select an area of investigation in fluid mechanics, hydraulic engineering, or hydrology. The work may be either experimental or theoretical in nature. Results should be submitted to the instructor in charge in the form of a research report.

CEE 740 Engineering Behavior of Soils
Fall. 3 credits. Prerequisite: CEE 341. H. E. Stewart.
Detailed study of the physiochemical nature of soil. Stress states due to geostatic loading and stress-history effects. In-depth evaluation of stress-strain-strength, compressibility, and hydraulic conductivity of natural soils. Field-testing methods for determining properties based on laboratory testing.

[CEE 741 Rock Engineering
Spring. 3 credits. Prerequisite: CEE 341 or permission of instructor. Recommended: introductory geology. Not offered 1999–2000. Staff.
Geological and engineering classifications of intact rock, discontinuities, and rock masses. Laboratory and field evaluation of properties. Stress states and stress analysis. Design of foundations on, and openings in, rock masses. Analysis of the stability of rock slopes.]

[CEE 744 Advanced Foundation Engineering
Spring. 2 credits. Prerequisite: CEE 640. Not offered 1999–2000. 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. 3 credits. Prerequisite: permission of instructor. Not offered 1999–2000. H. E. Stewart.
Study of soil behavior under dynamic loading conditions. Foundation design for vibratory loadings. Introductory earthquake engineering including field and laboratory techniques for determining dynamic soil properties and liquefaction potential. Design of embankments and retaining structures under dynamic loading conditions.]

[CEE 746 Embankment Dam Engineering
Spring. 2 credits. Prerequisites: CEE 641 and 741, or permission of instructor. Not offered 1999–2000. F. H. Kulhawy.
Principles of analysis and design for earth and rockfill dams. Materials, construction methods, internal and external stability, seepage and drainage, performance monitoring, abutment and foundation evaluation. Introduction to tailings dams.]

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 750 Research in Environmental Engineering
On demand. 1–6 credits. Staff.
For students who want 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 Physical/Chemical Processes
Fall. 3 credits. Prerequisite: previous or concurrent enrollment in CEE 653 or permission of instructor. J. J. Bisogni.
Theoretical and engineering aspects of chemical and physical phenomena and processes applicable to the removal of impurities from water, wastewater, and industrial wastes and to their transformation in the environment. Analysis and design of treatment processes and systems.

CEE 756 Biological Processes
Spring. 3 credits. Prerequisites: an introductory course in microbiology and CEE 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 the environment. Biokinetic analysis and design of biological treatment process.

CEE 757 Physical/Chemical Processes Laboratory I
Fall. 2 credits. Prerequisite: concurrent enrollment in CEE 653 and CEE 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 Biological Processes Laboratory II
Spring. 2 credits. Prerequisite: 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. 1–6 credits. Staff.
Supervised study in special topics not covered in formal courses.

CEE 762 Transportation Research
On demand. 1–6 credits. 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. 1–6 credits. Staff.
Advanced subject matter not covered in depth in other regular courses.

[CEE 770 Engineering Fracture Mechanics
Fall. 3 credits. Prerequisite: CEE 772 or permission of instructor. Offered alternate years. Not offered 1999–2000. A. R. Ingraffea.
Fundamentals of fracture-mechanics theory. Energy and stress-intensity approaches to fracture. Mixed-mode fracture. Fatigue-crack propagation. Finite- and boundary-element methods in fracture mechanics. Introduction to elastic-plastic fracture mechanics. Interactive computer graphics for fracture simulation. Laboratory techniques for fracture-toughness testing of metals, concrete, and rock.]

CEE 772 Finite Element Analysis (also M&AE 680 and T&AM 666)
Spring. 3 credits. Prerequisites: T&AM 663 or equivalent. Staff.
For description, see M&AE 680.

CEE 773 Structural Reliability
Fall. 3 credits. Prerequisite: permission of instructor. Offered alternate years. M. D. Grigoriu.
Review of probability theory, practical measures for structural reliability, second-moment reliability indices, probability models for strength and loads, probability-based design codes, reliability of structural systems, imperfection-sensitive structures, fatigue, stochastic finite-element techniques, elementary concepts of probabilistic fracture mechanics.

CEE 774 Advanced Structural Concrete
Fall. 3 credits. Prerequisite: undergraduate course in concrete structures. S. Billington.
Behavior of structural concrete focusing on how behavior is modeled and transferred into design tools. Discussion of approaches to structural concrete design and specific design tools. Topics include design code philosophies, material properties, prestressing, serviceability, ductility enhancement and plasticity methods including strut and tie modeling.

CEE 775 Structural Concrete Systems
Spring. 3 credits. Prerequisites: CEE 774 or equivalent. S. Billington.
Behavior and design of structural concrete building and bridge systems. Modeling techniques for the material scale, the structural component scale and the structural system scale including frame analysis, finite element analysis and strut & tie modeling. Topics include slab, wall and frame systems, box girder bridge systems, and precast concrete.

CEE 776 Advanced Design of Metal Structures
Fall. 3 credits. Prerequisite: CEE 374 or equivalent. T. Pekoz.
Preliminary design of structural systems. Behavior and design of members and connections. Behavior and computer-aided design of building frames.

[CEE 777 Advanced Behavior of Metal Structures
Spring. 3 credits. Prerequisite: CEE 374 or equivalent. Not offered 1999–2000. T. Pekoz.
Analysis of elastic and inelastic stability. Behavior and design of hot-rolled and cold-rolled steel and aluminum members, elements, and frames. Critical review of design specifications.]

CEE 779 Structural Dynamics and Earthquake Engineering
Spring. 3 credits. M. D. Grigoriu.
Modal analysis, numerical methods, and frequency-domain analysis. Introduction to earthquake-resistant design.

CEE 783 Civil and Environmental Engineering Materials Project
On demand. 1–3 credits. Staff.
Individual projects or reading and study assignments involving engineering materials.

CEE 785 Research in Structural Engineering
On demand. 1–6 credits. Staff.
Pursuit of a branch of structural engineering beyond what is covered in regular courses. Theoretical or experimental investigation of suitable problems.

CEE 786 Special Topics in Structural Engineering
On demand. 1–6 credits. Staff.
Individually supervised study or independent design or 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.

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.

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.

CEE 830 Thesis—Fluid Mechanics and Hydrology
Fall, spring. 1–12 credits. Students must register for credit with the professor at the start of each term. Staff.
A thesis resarch topic is selected by the student with the advice of the faculty member in charge and is pursued either independently or in conjunction with others working on the same topic.

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.

CEE 850 Thesis—Environmental 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.

CEE 860 Thesis—Transportation 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.

CEE 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.

CEE 341 Introduction to Geotechnical Engineering
Spring. 4 credits. Prerequisite: ENGRD 202. H. E. Stewart.
Soil as an engineering material. Chemical and physical nature of soil. Engineering properties of soil. Stresses and stress analysis of soil. Basic theory and design for water flow in soil, one-dimensional consolidation of clay and silts, and shear-strength problems. Introduction to slope stability, earth pressure, geosynthetics, and landfill and waste-containment issues. Introduction to laboratory testing. Synthesis of soil analysis and laboratory-test results for the design of engineering structures.

CEE 640 Foundation Engineering
Fall. 3 credits. Prerequisite: CEE 341. F. H. Kulhawy.
Soil exploration, sampling, and in-situ testing techniques. Bearing capacity, stress distribution, and settlement. Design of shallow and deep foundations. Compaction and site preparation. Seepage and dewatering of foundation excavations.

CEE 641 Retaining Structures and Slopes
Spring. 3 credits. Prerequisite: CEE 341. Staff.
Earth pressure theories. Design of rigid, flexible, braced, tied-back, slurry, and reinforced soil structures. Stability of excavation, cut, and natural slopes. Design problems stressing application of course material under field conditions of engineering practice.

CEE 643 Pavement Engineering (also ABEN 692)
Spring. 4 credits. Limited to engineering seniors and graduate students. Prerequisite: one introductory course in soil mechanics or highway engineering. L. H. Irwin.
For description, see ABEN 692.

CEE 644 Environmental Applications of Geotechnical Engineering
Spring. 3 credits. Prerequisite: CEE 341 or equivalent. T. D. O'Rourke.
Principles of hydrogeology, contaminant migration, and remediation technologies related to geotechnical and environmental engineering. Emphasis on environmental site assessment, site feasibility studies, selection of remediation procedures, and engineered landfills. Design problems are based on real projects and involve visits from practicing engineers.

CEE 649 Special Topics in Geotechnical Engineering
On demand. 1–6 credits. Staff.
Supervised study of special topics not covered in the formal courses.

CEE 740 Engineering Behavior of Soils
Fall. 3 credits. Prerequisite: CEE 341. H. E. Stewart.
Detailed study of the physiochemical nature of soil. Stress states due to geostatic loading and stress-history effects. In-depth evaluation of stress-strain-strength, compressibility, and hydraulic conductivity of natural soils. Field-testing methods for determining properties based on laboratory testing.

[CEE 741 Rock Engineering
Spring. 3 credits. Prerequisite: CEE 341 or permission of instructor. Recommended: introductory geology. Not offered 1999–2000. Staff.
Geological and engineering classifications of intact rock, discontinuities, and rock masses. Laboratory and field evaluation of properties. Stress states and stress analysis. Design of foundations on, and openings in, rock masses. Analysis of the stability of rock slopes.]

[CEE 744 Advanced Foundation Engineering
Spring. 2 credits. Prerequisite: CEE 640. Not offered 1999–2000. 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. 3 credits. Prerequisite: permission of instructor. Not offered 1999–2000. H. E. Stewart.
Study of soil behavior under dynamic loading conditions. Foundation design for vibratory loadings. Introductory earthquake engineering including field and laboratory techniques for determining dynamic soil properties and liquefaction potential. Design of embankments and retaining structures under dynamic loading conditions.]

[CEE 746 Embankment Dam Engineering
Spring. 2 credits. Prerequisites: CEE 641 and 741, or permission of instructor. Not offered 1999–2000. F. H. Kulhawy.
Principles of analysis and design for earth and rockfill dams. Materials, construction methods, internal and external stability, seepage and drainage, performance monitoring, abutment and foundation evaluation. Introduction to tailings dams.]

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.

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, summer. 2 credits. No prerequisites. S-U grades only. Credit cannot be applied toward the Engineering degree.
This course is designed for students who intend to take COM S 100 but are not adequately prepared for that course. Basic programming concepts and problem analysis are studied. The programming language used is Java. Students with previous programming experience should not take this course.

COM S 100 Introduction to Computer Programming
Fall, spring, summer. 4 credits.
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 Java. COM S 100 also includes a brief introduction to MATLAB. The course does not presume previous programming experience. Programming assignments are tested and run on interactive, stand-alone microcomputers. During the fall semester, 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
Fall. Prerequisite: MATH 111, 191, or equivalent.
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 Introduction to Cognitive Science (also COGST 101, LING 170, and PSYCH 102)
Fall. 3 credits.
For description, see COGST 101.

COM S 113 Introduction to C
Fall, spring. 1 credit. Weeks 5–8. Prerequisite: COM S 100 or equivalent programming experience. Credit is granted for both COM S 113 and 213 only if 113 is taken first. S-U grades only.
A brief introduction to the C programming language and standard libraries. Unix accounts will be made available for students wishing to use that system for projects, but familiarity with Unix is not required. (Projects may be done using any modern implementation of C). COM S 213 (C++ Programming) includes much of the material covered in 113. Students planning to take COM S 213 normally do not need to take 113.

COM S 114 Unix Tools
Fall, spring. 1 credit. Weeks 1–4. Prerequisite: COM S 100 or equivalent programming experience. S-U grades only.
An introduction to Unix, including shell commands, emacs, the file system, and software tools like grep, find, make, awk, and perl. Knowledge of some programming language like Java, C, C++, Pascal, or Fortran is expected, but projects will not assume expertise in any particular language.

COM S 130 Creating Web Documents
Fall. 3 credits.
Interactive on-line media such as the World Wide Web are revolutionizing the way we communicate. This course introduces students with little or no computer background to tools and techniques for creating interactive documents. Topics covered will include HTML authoring, scripting languages, interaction techniques, data mining, and incorporating sound, video, and images in documents.

COM S 201 Cognitive Science in Context Laboratory: Explorations of Cognitive Science in Ecological Settings (also COGST 201 and PSYCH 201)
Fall or spring. 4 credits. Limited to 24 students. Prerequisite: Introduction to Cognitive Science (PSYCH 102/COGST 101/COM S 101) or written permission of the instructor. Discussion and demos, M W 10:10; lab, M or W 1:25–4:25, plus additional hours to be arranged.
B. Halpern and staff.
For description, see COGST 201.

COM S 202 Transition to Java
Fall, spring. Weeks 1–4. 1 credit. Prerequisites: COM S 100; COM S 212/ENGRD 212 recommended.
A brisk introduction to the Java programming language. Students are expected to be familiar with recursion and abstract data types as taught in COM S 212.

COM S 211 Computers and Programming (also ENGRD 211)
Fall, spring, summer. 3 credits. Credit will not be granted for both COM S/ENGRD 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 structure and organization, modules (classes), program development, proofs of program correctness, recursion, data structures and types (lists, stacks, queues, trees), object-oriented and functional programming, and analysis of algorithms. Java 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/ENGRD 211 and 212. Prerequisite: COM S 100 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 hierarchical data, abstract data types, polymorphic functions, object-oriented programming, infinite data types, simulation, and the interpretation of programs.

COM S/ENGRD 212 covers a wide range of topics in computer science and programming using advanced functional and object-oriented programming languages. ENGRD/COM S 211 focuses on strengthening programming skills in a more conventional programming language (Java), while still introducing important topics in computing. Either course is a suitable prerequisite for further study in the field. Appropriate transfers between ENGRD/COM S 211 and 212 (in either direction) are encouraged during the first few weeks of the semester.

COM S 213 C++ Programming
Fall, spring. 2 credits. Prerequisite: COM S/ENGRD 211 or 212 or equivalent programming experience. Students who plan to take COM S 113 and 213 must take 113 first. S-U grades only.
An intermediate-level introduction to the C++ programming language and the C/C++ standard libraries. Topics include basic statements, declarations, and types; stream I/O; user defined classes and types; derived classes, inheritance, and object-oriented programming; exceptions and templates. Recommended for students who plan to take advanced courses in computer science that require familiarity with C++ or C. Students planning to take COM S 213 normally do not need to take COM S 113; 213 includes most of the material taught in 113.

COM S 222 Introduction to Scientific Computation (also ENGRD 222)
Spring, summer. 3 credits. Prerequisites: COM S 100 and (MATH 222 or MATH 294).
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.

COM S 280 Discrete Structures
Fall, spring. 4 credits. Pre- or corequisite: COM S/ENGRD 211 or 212 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; algebraic structures.

COM S 314 Introduction to Digital Systems and Computer Organization
Fall, spring. 4 credits. Prerequisite: COM S/ENGRD 211 or 212 or equivalent.
Introduction to computer organization. Topics include representation of information, machine and assembly languages, processor organization, input/output devices, memory hierarchies, combinatorial and sequential circuits, data path and control unit design, and RISC pipelining. The course features several major projects, including a full RISC processor design.

COM S 381 Introduction to Theory of Computing
Fall, summer. 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 381 and COM S 481 (in either direction) are encouraged during the first few weeks of instruction.
An introduction to the modern theory of computing: automata theory, formal languages, and effective computability.

[COM S 400 The Science of Programming
Spring. 4 credits. Prerequisite: COM S 280 or equivalent. Not offered every year; next offering TBA. Not offered 1999–2000.
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 409 Data Structures and Algorithms for Computational Science
Spring. 4 credits. Prerequisite: COM S 211 or 212 or equivalent programming experience. This course is not open to COM S majors. Credit will not be granted for both COM S 409 and 410.
Data structures and algorithms with emphasis on those useful for computational science. This course is intended for students outside of the Department of Computer Science whose work involves a significant amount of computing. Topics include basic data structures as well as more advanced topics. Emphasis is placed on the use of abstract data types and on how best to select appropriate data structures.

COM S 410 Data Structures
Fall, spring, summer. 4 credits. Prerequisite: COM S 280 or permission of instructor.

Practical and important data structures and their implementations, with an emphasis on the use of analysis to determine the most efficient algorithm in a given situation. Detailed study of searching and sorting methods.

[COM S 411 Programming Languages and Logics
Fall. 4 credits. Prerequisite: COM S 410 or permission of instructor. Not offered fall 1999; semester to be announced.
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
Spring. 3 credits. Prerequisites: COM S 314, 410, and 381 or 481. Corequisite: COM S 413.
Overview of the internal structure of modern compilers, with emphasis on implementation techniques. Topics covered include lexical scanning, simple parsing techniques, symbol-table manipulation, type-checking routines, code generation, and simple optimizations. The course entails a compiler implementation project.

COM S 413 Practicum in Compilers and Translators
Spring. 2 credits. Prerequisites: COM S 314, 410, and 381 or 481. Corequisite: COM S 412.
A compiler implementation project related to COMS 412.

COM S 414 Systems Programming and Operating Systems
Fall, summer. 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 multiprogramming, virtual memory, and various input-output devices. All the programming for the project is in a high-level language.

COM S 417 Computer Graphics and Visualization (also ARCH 374)
Spring. 3 credits. Prerequisite: COM S/ ENGRD 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/ENGRD 211 or 212. Recommended: COM S 314. Co-requisite: COM S 417.
Programming assignments dealing with interactive computer graphics and visualization of scientific data.

COM S 421 Numerical Analysis
Fall. 4 credits. Prerequisites: MATH 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 432 Introduction to Database Systems
Fall. 3 credits. Prerequisites: (COM S/ ENGRD 211 or 212) and COM S 410. Recommended: COM S 213 and strong programming skills in C, C++ or Java.
Introduction to modern relational database systems. Concepts covered include storage structures, access methods, query languages, query processing and optimization, transaction processing and database design theory.

The course primarily covers the internals of database systems, and includes many large programming assignments.

COM S 433 Practicum in Database Systems
Fall. 2 credits. Corequisite: COM S 432.
Students will implement a simple relational database system with coding assignments ranging from disk management to high-level query processing. This provides a thorough understanding of database system internals.

[COM S 444 Distributed Systems and Algorithms
Fall. 4 credits. Pre- or co-requisite: COM S 414 or permission of instructor. Not offered every year. Not offered 1999–2000.
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 472 Foundations of Artificial Intelligence
Fall. 3 credits. Prerequisites: (COM S/ ENGRD 211 or 212) and COM S 280 or equivalent.
A challenging introduction to the major subareas and current research directions in artificial intelligence. Topics include knowledge representation, heuristic search, problem solving, natural-language processing, game-playing, logic and deduction, planning, and machine learning.

COM S 473 Practicum in Artificial Intelligence
Fall. 2 credits. Prerequisite: (COM S/ ENGRD 211 or 212) and COM S 280 or equivalent. Corequisite: COM S 472.
Project portion of COM S 472. Topics include knowledge representation systems, search procedures, game-playing, automated reasoning, concept learning, reinforcement learning, neural nets, genetic algorithms, planning, and truth maintenance.

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 481. Corrective transfers between COM S 481 and 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, summer. 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 MATH 486)
Fall or spring. 4 credits. Prerequisites: MATH 222 or 294, COM S 280 or equivalent (such as MATH 332, 432, 434, 481), and some additional course in mathematics or theoretical computer science.
Propositional and predicate logic, compactness and completeness by tableaux, natural deduction, and resolution. Equational logic. Herbrand Universes and unification. Rewrite rules and equational logic, Knuth-Bendix method and the congruence-closure algorithm and lambda-calculus reduction strategies. Topics in Prolog, LISP, ML, or Nuprl. Applications to expert systems and program verification.

COM S 490 Independent Reading and Research
Fall, spring. 1–4 credits.
Independent reading and research for undergraduates.

COM S 501 Software Engineering: Technology and Technique
Fall. 4 credits. Prerequisite: COM S 410 and knowledge of the C programming language.
An introduction to the problems of building large, reliable software systems and the methods, languages, and tools used in modern software development. Topics include software life-cycle models, software analysis and design, verification and validation, reliability, engineering ethics and professionalism. Programming topics include modularity, data abstraction, object-oriented programming, and effective use of C++. General techniques will be complemented with programming experience using industrial-strength languages and tools.

COM S 513 System Security
Spring. 4 credits. Prerequisites: COM S 414 or 519 and familiarity with JAVA programming language.
This course discusses security and survivability for computers and communications networks. The course will include discussions of policy issues (e.g. the national debates on cryptography policy) as well as the discussions of the technical alternatives for implementing the properties that comprise "trustworthiness" in a computing system. Mechanisms for authoriza-

tion and authentication as well as cryptographic protocols will be covered.

COM S 514 Intermediate Computer Systems

Fall or spring. 4 credits. Prerequisites: COM S 414 or permission of instructor.

This course focuses on practical issues in designing and implementing distributed software. Topics vary depending upon instructor. Recent offerings have covered object-oriented software development methodologies and tools, distributed computing, fault-tolerant systems, and network operating systems or databases. Students undertake a substantial software project. Many students obtain additional project credit by co-registering in COM S 490, 515, or 790.

COM S 515 Practicum in Systems

Fall or spring. 1–2 credits. Co-requisite: COM S 514.

The practical aspects of modern software 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. Some students take COM S 490 or 790 instead of COM S 515.

COM S 519 Engineering Computer Networks

Fall. 4 credits. Prerequisites: COM S 314 and 410, or permission of instructor.

Introduction to telephone, IP, and ATM networks. Techniques for system design and protocol layers. Detailed introduction to networking protocols in the areas of multiple access, switching, scheduling, routing, naming and addressing, error control, flow control, and traffic management. Overview of important protocols in the Internet and telephone networks. Protocol implementation techniques. The course is project-oriented and requires familiarity with C programming.

COM S 522 Computational Tools and Methods for Finance

Spring. 4 credits. Prerequisites: programming experience (e.g., C, FORTRAN, or MATLAB), some knowledge of numerical methods, especially numerical linear algebra.

This course provides a hands-on introduction to computational methods and tools used in finance. We study both the underlying methods and efficient implementation. The MATLAB Financial Toolbox, along with additional MATLAB tools, will be used extensively. The underlying numerical techniques discussed include nonlinear least-squares procedures (regression), basic linear algebra, linear and nonlinear optimization, finite-difference methods for PDEs, quadratic programming (and linear complementarity problems), specialized tree (and lattice) evaluation methods.

COM S 574 Heuristic Methods for Optimization (also CEE 509)

Spring. 3 or 4 credits. Prerequisites: COM S/ENGRD 211 or 212 or 222 or CEE/ENGRD 241, or graduate standing, or permission of instructor.

This course will describe a variety of heuristic search methods including simulated annealing, tabu search, genetic algorithms, derandomized evolution strategy, random walk, and direct search algorithms. Algorithms will be used to find values of discrete and/or continuous variables arising in optimization and model fitting. Applications will be discussed in a range of areas including some of the following: artificial intelligence, scheduling, economics, water quality protection, telecommunications, circuit design, engineering mechanics. The advantages and disadvantages of heuristic search methods for both serial and parallel computation will be discussed in comparison to other optimization algorithms.

COM S 601 System Concepts

Fall. 3 credits. Prerequisites: open to students enrolled in the COM S Ph.D. program.

This course teaches broadly applicable principles of computing system design and analysis. For example, the principle of locality of reference used in caching, virtual memory, and network service hints. Such broadly applicable abstractions will be discussed along with their implementations in a variety of settings. Case studies from the systems literature will be employed throughout.

COM S 611 Advanced Programming Languages

Fall. 4 credits. Graduate standing or permission of instructor.

A study of programming paradigms: functional, imperative, concurrent and logic programming. Models of programming languages, including the lambda calculus. Type systems, polymorphism, modules, and other object-oriented constructs. Program transformations, programming logic, and applications to programming methodology.

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 multiprocessors: 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. Not offered every year; semester to be announced.

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 protocols, consistency in distributed systems, fault-tolerance, knowledge and knowledge-based protocols, performance, scheduling, concurrency control, and authentication and security issues.

COM S 618 Principles of Distributed Computing—Message-Passing

Fall. 4 credits. Prerequisite: mathematical maturity and some basic knowledge of distributed systems. Offered in odd-numbered years.

This course focuses on research in message-passing distributed computing. It covers the fundamental problems and presents some of the latest results and open questions in message-passing 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 619 Principles of Distributed Computing—Shared Memory

Fall. 4 credits. Prerequisites: mathematical maturity and some basic knowledge of distributed systems. Offered in even-numbered years. Not offered fall 1999.

This course focuses on research in shared-memory distributed computing. It covers fundamental problems and paradigms of shared-memory systems. Topics include linearizability and other models of consistency, non-blocking and wait-free computation, universal constructions of wait-free objects, the atomic snapshot problem, the k-set consensus problem, bounded concurrent timestamps, etc.]

COM S 621 Matrix Computations

Fall. 4 credits. Prerequisites: MATH 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. Offered in odd-numbered years. Not offered spring 2000.

Modern algorithms for the numerical solution of multidimensional optimization problems and simultaneous nonlinear algebraic equations. Emphasis is on efficient, stable, and reliable numerical techniques with strong global convergence properties: quasi-Newton methods, modified Newton algorithms, and trust-region procedures. Special topics may include large-scale optimization, quadratic programming, and numerical approximation.]

COM S 624 Numerical Solution of Differential Equations

Spring. 4 credits. Prequisite: previous exposure to numerical analysis (e.g., COM S 421 or 621) and differential equations, and knowledge of MATLAB. Offered in even-numbered years.

Finite difference methods for the solution of ordinary and partial 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, finite element methods, Hamiltonian problems, and computational issues such as mesh generation and sparse matrix computation for PDES.

COM S 626 Computational Molecular Biology
Spring. 4 credits. Prerequisites: familiarity with linear programming, numerical solutions of ordinary differential equations and non-linear optimization methods.
Problems and algorithms in computational molecular biology. Topics include sequences (alignment, scoring functions, complexity of searches and alignment, secondary structure prediction, families and function), the protein folding problem (lattice models, lattice searches, the HP model, chemical potentials, statistical potentials, funnels, complexity and model verification, global optimization, homology, threading), and the dynamics of complex biosystems (the Molecular Dynamics method, long range forces, statistics of flexible systems, reduced models).

[COM S 631 Multimedia Systems
Spring. 4 credits. Prerequisites: COM S 414 or permission of instructor. Not offered 1999–2000.
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 processing of digital video, including algorithms for special effects and automatic extraction of content, and applications of parallel architectures to video processing.]

COM S 632 Advanced Database Systems
Spring. 4 credits. Prerequisite: COM S 432/433 or permission of instructor.
A variety of advanced issues ranging from transaction management to query processing to data mining. Extensive paper reading and discussion. Development of a term project with research content.

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 671 Introduction to Automated Reasoning
Fall. 4 credits. Prerequisite: (COM S 611 and graduate standing) or permission of instructor.
Topics in modern logic needed to understand and use automated reasoning systems such as HOL, Nuprl, and PVS. Special emphasis on type theory and logic and on tactic-oriented theorem proving.

COM S 672 Advanced Artificial Intelligence
Spring. 4 credits. Prerequisites: COM S 472 or permission of instructor.
Artificial intelligence (AI) provides many computational challenges. This course covers a variety of areas in AI, including knowledge representation, automated reasoning, learning, game-playing, and planning, with an emphasis on computational issues. Specific topics include stochastic reasoning and search procedures, properties of problem encodings, issues of syntax and semantics in knowledge representation, constraint satisfaction methods and search procedures, and critically constrained problems and their relation to phase-transition phenomena. In addition, connections between artificial intelligence and other fields, such as statistical physics, operations research, and cognitive science are explored.

COM S 674 Natural Language Understanding
Spring. 3 credits. Prerequisites: COM S 472 or permission of instructor. Not offered every year.
This course presents an introduction to natural language processing, the primary concern of which is the study of human language use from a computational perspective. The course will cover syntactic analysis, semantic interpretation, and discourse processing, via symbolic and statistical approaches. Possible topics include information extraction, natural language generation, memory models, ambiguity resolution, finite-state methods, mildly context-sensitive formalisms, deductive approaches to interpretation, machine translation, and machine learning of natural language.

[COM S 676 Reasoning about Knowledge
Fall. 4 credits. Prerequisites: mathematical maturity and an acquaintance with propositional logic. Offered even-numbered years. Not offered fall 1999.
Knowledge plays a crucial role in distributed systems, game theory, and artificial intelligence. Material examines formalizing reasoning about knowledge and the extent to which knowledge is applicable to those areas. Issues: common knowledge, knowledge-based programs, applying knowledge to analyzing distributed systems, attainable states of knowledge, and modeling resource-bounded reasoning, and connections to game theory.]

COM S 677 Reasoning about Uncertainty
Fall. 4 credits. Prerequisites: mathematical maturity and an acquaintance with propositional logic. Offered odd-numbered years.
Examines formalizing reasoning about and representing uncertainty, using formal logical approaches as a basis. Topics: logics of probability, combining knowledge and probability, probability and adversaries, conditional logics of normality, Bayesian networks, qualitative approaches to uncertainty, going from statistical information to degrees of belief. Connections to game theory.

COM S 681 Analysis of Algorithms
Fall. 4 credits. Prerequisite: (COM S 381 or 481, and graduate standing) 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 682 Theory of Computing
Spring. 4 credits. Prerequisite: (COM S 381 or 481) and (COM S 482 or 681) or permission of instructor.
Advanced treatment of theory of computation, computational-complexity theory, and other topics in computing theory.

COM S 686 Logics of Programs
Spring. 4 credits. Prerequisites: COM S 481, 682, and (MATH 481 or MATH/COM S 486).
Topics in logics of programs and program verification. Possible topics include: Floyd/Hoare logic, modal logic, dynamic logic, temporal logic, process logic, automata on infinite objects and their relation to program logics, the Rabin tree theorem, the modal mu-calculus, games and alternating automata, applications to type inference, set constraints, Kleene algebra.

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 611, 613, 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 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, 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
Fall, spring. 1–4 credits (to be arranged). Prerequisite: permission of instructor. S-U grades only.

COM S 754 Systems Research Seminar
Fall, spring. 1 credit.

COM S 772 Seminar in Artificial Intelligence
Fall, spring. 4 credits. Prerequisites: permission of instructor.

COM S 773/774 Proseminar in Cognitive Studies I & II (also COGST, PHIL, LING, and PSY 773/774)
Fall, 773; spring, 774. 4 credits.
For description, see COGST 773/774.

COM S 775 Seminar in Natural Language Understanding
Fall, spring. 2 credits.
Informal weekly seminar in which current topics in natural language understanding and computational linguistics are discussed.

COM S 789 Seminar in Theory of Algorithms and Computing
Fall, spring. 4 credits. Prerequisite: permission of instructor. S-U grades only.

COM S 790 Special Investigations in Computer Science
Fall, spring. Prerequisite: permission of a computer science adviser. Letter grade only.
Independent research or Master of Engineering project.

COM S 890 Special Investigations in Computer Science
Fall, spring. Prerequisite: permission of a computer science adviser. S-U grades only.
Master of Science degree research.

COM S 990 Special Investigations in Computer Science
Fall, spring. Prerequisite: permission of a computer science adviser. S-U grades only. Doctoral research.

ELECTRICAL ENGINEERING

ELE E 210 Introduction to Circuits for Electrical and Computer Engineers (also ENGRD 210)
Fall, spring. 3 credits. Co-requisites: MATH 293 and PHYS 213.
A first course in electrical circuits, establishing the fundamental properties of circuits with application to high-speed computers and modern electronics. Topics include node and mesh analysis applied to CMOS circuit design, transient response and its impact on computer speed, sinusoidals, resonance, complex impedance, and operational amplifiers.

ELE E 215 Introductory Integrated Circuits Laboratory
Fall, spring. 1 credit. Pre or co-requisite: ENGRD 210.
Laboratory course to develop skills with modern instrumentation, and to explore the design and operation of electrical circuits used in computers, amplifiers, and signal processing.

ELE E 232 Digital Systems Design Laboratory
Fall, spring. 1 credit. Pre- or co-requisite: ENGRD 231.
An introduction to digital systems design using computer-aided design (CAD) tools. Students complete a sequence of 8 experiments covering combinational logic, sequential circuits, counters, data transfer and microcontroller design. Hands-on experience is provided by designing, implementing and testing an 8 bit microcontroller using a field programmable gate array (FPGA).

ELE E 250 Technology in Society (also ENGRG 250, HIST 250 and S&TS 250)
Fall. 3 credits. A humanities elective for engineering students.
For description, see ENGRG 250.

ELE E 291–292 Sophomore 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. Students must make individual arrangements with a faculty sponsor prior to registration and submit request for Independent Project form to the Electrical Engineering Undergraduate Office.

ELE E 298 Inventing an Information Society (also ENGRG 298 and S&TS 292)
Spring. 3 credits. Approved for humanities distribution.
For description, see ENGRG 298.

ELE E 301 Signals and Systems I
Fall. 4 credits. Prerequisites: a grade of at least C+ in ENGRD 210 and C in MATH 293 and 294.
Continuous-time signals and linear time-invariant systems, continuous-time convolution and impulse response, Fourier series and transforms of continuous-time signals, the Sampling Theorem, amplitude modulation and time- and frequency-division multiplexing, bilateral Laplace transforms and applications, discrete-time convolution and z-transforms with applications to discrete-time linear time-invariant systems.

ELE E 302 Signals and Systems II: Discrete-Time Systems and Signal Processing
Spring. 4 credits. Prerequisite: ELE E 301.
Review of discrete-time convolution and bilateral z-transforms with discrete-time linear time-invariant systems applications. Unilateral z-transforms and difference equations. Discrete-time Fourier transforms. Sampling and reconstruction of continuous-time signals. DFTs and FFTs and attendant computational issues. Introduction to digital filter design techniques with special emphasis on: linear-phase FIR filters; FIR filter design using windowing, frequency sampling, and least squares; and IIR filter design using impulse invariance and bilinear transformation.

ELE E 303 Electromagnetic Fields and Waves
Fall. 4 credits. Prerequisites: grades of C or better in PHYS 213, 214 and MATH 294.
Maxwell's equations in differential form; wave equation; plane electromagnetic waves; phase and group velocities; Poynting's theorem, complex dielectric constant; wave reflection and transmission; guided waves on transmission lines; transient pulse propagation; elementary dipole antenna; analysis of wireless communication links.

ELE E 306 Fundamentals of Quantum and Solid-State Electronics
Spring. 4 credits. Prerequisites: PHYS 214 and MATH 294.
Introductory quantum mechanics and solid-state physics necessary for modern solid-state electronic devices. Topics include the formalism and methods of quantum mechanics, the hydrogen atom, the structure of simple solids, energy bands, Fermi-Dirac statistics, and the basic physics of semiconductors. Applications include quantum wells and the p-n junction.

ELE E 310 Introduction to Probability and Random Signals
Spring. 4 credits. Prerequisite: MATH 294. This course may be used in place of ENGRD 270 to help satisfy the engineering distribution requirement.
Introduction to the theory of probability as a basis for modeling random phenomena and signals, calculating the response of systems, and making estimates, inferences, and decisions in the presence of chance and uncertainty. Applications will be given in such areas as communications, and device modeling, probability, characteristic functions; nonlinear transformations of data; expectation, correlation; and the central limit theorem.

ELE E 311 Electrical Engineering Honors Seminar
Spring. 2 credits variable.
Students registered for this course are required to attend all of the colloquia lectures. Summary papers are required. Honors students who take the seminar for letter grade are required to write two summary papers for two credits. Non-honors students, who must take the seminar pass/fail, are required to write one summary paper for one credit. Each summary paper reviews a topic presented during the term.

ELE E 314 Computer Organization
Spring. 4 credits. Prerequisites: ENGRD 231 and ELE E 232.
Basic computer organization. Topics include performance metrics, data formats, instruction sets, addressing modes, computer arithmetic, microcoded and pipelined datapath design, memory hierarchies including caches and virtual memory, I/O devices, bus-based I/O systems. Students will learn assembly language programming and design a simple pipelined processor.

ELE E 315 Electronic Circuit Design
Fall, spring. 4 credits. Prerequisites ELE E 210 and ELE E 215.
Design of electronic circuits for computers, signal processing, communication, microelectronics, optoelectronics, measurements and control.

ELE E 328 Dynamic Systems in Communication and Control
Spring. 3 credits. Prerequisite: ELE E 301.
Task-driven introduction to discrete-time dynamic system analysis and design, with emphasis on digital communication and control systems. Format is to introduce a particular design task, abstract it to a linear algebra problem, solve it numerically using MATLAB, and study solution in terms of original application. Applications of interest: dial-up modem telephone channel degradation identification, terrestrial microwave radio channel multipath equalization for wireless communication, satellite-tracking antenna azimuth control, and effect of re-transmit protocols on distribution of steady-state communication network flows.

ELE E 391–392 Junior Electrical Engineering Project
Fall, 391; spring, 392. 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. Students must make individual arrangements with a faculty sponsor prior to registration and submit a request for Independent Project form to the Electrical Engineering Undergraduate Office.

ELE E 403 Introduction to Nuclear Science and Engineering (also A&EP 403, M&AE 458 and NS&E 403)
Fall. 3 credits. Prerequisites: PHYS 214 and MATH 294.
For description, see NS&E 403.

ELE E 407 Quantum and Solid State Electronics II
Fall. 4 credits. Prerequisite: some previous knowledge of quantum mechanics.
Angular momentum; effective potential; spin states; atom-radiation interaction; oscillator strengths; LCAO; lattice waves; thermal properties of xtals; thermal energy; metals; electron and phonon contributions to specific heat; metallic conductivity; thermal conduction in metals; electron and hole E vs k curves; effective mass; E(k) surface and m* from cyclotron resonance; k- p expansion; plasma dispersion relation; EM waves in a metal; plasmons; polaritons (TO phonons + EM wave); LST relation; surface and interface plasmons; optical properties of xtals; excitons (Mott-Wannier and Frenkel); polarizability; Landau theory ferroelectric transition; piezoelectricity. Elements of superconductivity: Josephson Junction and the SQUID device. Schottky and Frenkel defects; Schottky barrier; heterostructures and solid-state lasing; resonant tunnel diode; optical detectors. Conduction in amorphous media.

ELE E 411 Random Signals in Communications and Signal Processing
Fall. 3 credits. Prerequisite: ELE E 301 and 310 or equivalent.
Introduction to models for random signals in discrete and continuous time; Markov chains, Poisson process, queuing processes, power spectral densities, Gaussian random process. Response of linear systems to random signals. Elements of estimation and inference as they arise in communications and digital signal processing systems.

ELE E 413–414 Hybrid Electric Vehicle
Fall, 413; spring, 414.
The Cornell Hybrid Electric Vehicle (CUHEV) Project focuses on the design, development, testing and competition of a Hybrid Electric Vehicle through a team structure. Students work in teams that include powertrain, business, fairing, ergonomics, control, alternate power unit and suspension. Students are required to design an entire vehicle and to plan and execute its manufacture. The vehicle is competed in a national competition, usually in late May each year. There are two to three design reviews, weekly presentations and team leader meetings in addition to any meetings the teams require to complete the project. There is a team selection process so students interested in the project should contact team leaders or a faculty advisor prior to registering for the course.

ELE E 415 Global Position System Theory and Design (also M&AE 415)
Fall. 4 credits. Prerequisites: ELE E 301 and ELE E 303 or permission of the instructor.
A laboratory course using the Global Positioning System as a model for examining space-based engineering systems. The course consists of lectures, laboratories, and a design project. The laboratory is based on a GPS engine development system and covers the navigation solution, receiver design and function, and differential GPS.

ELE E 423 Computer Methods in Digital Signal Processing
Spring. 4 credits. Corequisite: ELE E 328 or permission of instructor. Satisfies undergraduate computer-applications requirement.
Basic computational techniques used in signal processing and communications. Fast algorithms for multidimensional transforms. Solution of structured systems of linear equations. Algorithms for linear least squares estimation problems. Influence of quantization and finite precision arithmetic on the accuracy of numerical methods. Influence of the architecture of modern microprocessors on the design and performance of numerical algorithms.

ELE E 425 Digital Signal Processing
Fall. 4 credits. Prerequisites: ELE E 301, ELE E 302 and ELE E 310.
An advanced course in digital signal processing. Topics include correlation, practical DSP, quantization; A/D and D/A conversion, delta-sigma modulation; quantization effects in digital filters and structural implications; multirate DSP including sampling rate conversion and filter bank theory; wiener filtering, spectral estimation; and an introduction to two-dimensional sampling and Fourier techniques.

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, emphasizing individual student projects. Design is done with signal-processing hardware and by computer simulation. Topics include filter design, spectral analysis, speech coding, speech processing, digital recording, adaptive noise cancellation, and digital signal synthesis.

ELE E 430 Lasers and Optical Electronics
Fall. 4 credits with lab; may be taken for 3 credits without lab. Prerequisite: ELE E 303 or equivalent.
An introduction to the operation and application of lasers. Material covered includes diffraction-limited optics, Gaussian 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.

ELE E 432 MicroElectro Mechanical Systems (MEMS)
Spring. 3 credits. Prerequisite: ELE E 315 or permission of instructor.
Introductory course to MEMS: microsensors, microactuators, and microrobots. Fundamentals of MEMS including materials, microstructures, devices and simple microelectromechanical systems, scaling electronic and mechanical systems to the micrometer/nm-scale, material issues, and the integration of micromechancial 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.

ELE E 433 Microwave Integrated Circuits
Fall. 4 credits; may be taken for 3 credits without laboratory. Prerequisites: ELE E 303 and ELE E 306.
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 438 VLSI Digital System Design
Spring. 4 credits. Prerequisites: ENGRD 231, ELE E 232 and ELE E 315.
Custom CMOS VLSI design as seen by a system designer. Emphasis on structured design methodologies for digital VLSI systems. Topics include MOS transistors, design rules for MOS integraded 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 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; broad band switching; protocols; asynchronous transfer mode systems.

ELE E 450 Electric Power Systems
Spring. 3 credits.
The objective is to acquaint the student with modern electric power system operation and control. Aspects of the restructuring of the industry and its implications for planning and operation objectives and methods will be explored. Topics include unit commitment, economic dispatch, optimal power flow, control of generation, system security and reliability, state-estimation, analysis of system dynamics and system protection.

[ELE E 453 Integrated Circuit Design
Fall. 4 credits. Prerequisites: ELE E 301 and ELE E 315 or equivalent. ELE E 457 recommended as a corequisite. May not be offered 1999–2000.
Introduction to analysis and design of digital and analog MOS and bipolar integrated circuits (IC). Computer-aided design. Common building blocks for digital and analog applications (inverters, switches, single-stage units, sources, sinks, differential pairs, active loads). Steady-state and transient analysis, frequency response and noise. Overview of common IC designs (microprocessors, memories, amplifiers).]

ELE E 457 Silicon Semiconductor Electronics
Fall. 4 credits with lab. Prerequisite: ELE E 315 and ELE E 306 or equivalent.
Fundamentals on semiconductor carrier transport and band diagrams. The device operational principles, modeling, simulation, and measurement on pn-junction diodes, Schottky diodes, photodiodes, bipolar transistors (BJT) and MOSFET. A heavy emphasis will be put on the MOSFET physics for advanced VLSI technology. Six labs cover detailed IV and CV measurements and modeling on devices in the wafer level and in standard packages.

[ELE E 462 Artificial Intelligence and Expert Systems for Telecommunication Networks
Spring. 3 credits. Prerequisite: ELE E 310 or some familiarity with random variables. May not be offered 1999–2000.
In the last two or three years a surprising number of connections between AI and telecommunications have been identified. Significant discoveries in the area of wireless systems (e.g. a variety of network control algorithms) have been found to be straightforward restatements of old results from the field of Artificial Intelligence. (We may hope that the reverse is the case, as well.) It also is becoming clear that, to provide an acceptable level of performance, the next generation of wireless multimedia systems will need some degree of predictive "cognitive" capacity. This senior/introductory graduate course focuses on the expert system side of AI. It has been designed to provide a foundation in the development and analysis of expert systems with an emphasis on telecommunications engineering applications. The students will develop a background in the theory of expert systems, and then be given an opportunity to apply their knowledge in an area of their choice. Areas of discussion will include: rule-based expert systems, probabilistic systems, Bayesian networks, and the propagation of evidence.]

ELE E 467 Telecommunication Systems I
Fall. 4 credits. Prerequisites: ELE E 301 and ELE E 310. Suggested co-requisite: ELE E 411.
An introduction to analog and digital modulation and demodulation techniques. Topics include: analog signal representation and filtering; analog amplitude modulation (AM) and frequency modulation (FM); digital pulse amplitude modulation (PAM); digital transmission via carrier modulation: amplitude-shift keying (ASK), phase-shift keying (PSK), quadrature amplitude modulation (QAM); fundamentals of random processes, white Gaussian noise; effect of noise on analog modulation techniques; error probabilities for digital transmission through additive white Gaussian noise (AWGN) channels.

ELE E 468 Telecommunication Systems II
Spring. 4 credits. Prerequisite: ELE E 467 or permission of instructor. Suggested prerequisite: ELE E 411.
Fundamentals of digital communications. Topics include: digital source coding, Huffman coding, sampling, quantization, analog source coding; optimum receivers for digital transmission through additive white Gaussian noise (AWGN) channels, matched filters; channel capacity and error control coding; digital transmission through bandlimited AWGN channels, inter-symbol interference (ISI), equalization techniques; phase-locked loops (PLL); trellis-coded modulation (TCM); spread-spectrum communication systems.

ELE E 471 Feedback Control Systems (also M&AE 478)
Fall. 4 credits. Prerequisite: ELE E 301 or M&AE 326 or permission of instructor.
For description, see M&AE 478.

ELE E 475 Computer Architecture
Fall. 4 credits. Prerequisites: ELE E 314 or COM S 314.
Topics include instruction set principles, advanced pipelining, data and control hazards, multi-cycle instructions, dynamic scheduling, branch prediction, instruction-level parallelism, high-performance memory hierarchies. Students will learn the issues and tradeoffs involved in the design of computer systems. Labs involve the design of a processor at the RTL level.

ELE E 476 Digital Systems Design Using Microcontrollers
Spring. 4 credits. Prerequisite: ELE E 314 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 and 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.

ELE E 482 Plasma Processing of Electronic Materials (also MS&E 482)
Spring. 3 credits. Prerequisite: PHYS 213 and 214 or their equivalents offered on demand.
Fundamental principles that govern partially ionized, chemically reactive plasma discharges and their applications to processing electronic materials. Topics include simple models of low pressure, partially ionized plasmas, collision phenomena, diffusive processes, plasma chemistry and surface processes. Examples and their applications to electronic materials processing will be discussed in detail.

ELE E 484 Introduction to Controlled Fusion: Principles and Technology (also A&EP 484, M&AE 459 and NS&E 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. Offered on demand.
For description, see NS&E 484.

ELE E 486 Electromagnetic Waves and Communication
Spring. 3 credits. Prerequisite: ELE E 303.
This course is recommended for students who wish to obtain a greater understanding of the fundamentals of guided waves, high data rate electronics and wireless communication. Topics to be covered will include: vector and scalar potentials, transmission lines, waveguides, fiber optics, antenna arrays, propagation in different environments including interference and diffraction.

ELE E 487 Introduction to Antennas and Radar
Fall. 3 credits. Prerequisites: ELE E 301 and ELE E 486 (or a grade of B or better in ELE E 303).
Fundamentals of antenna theory, including gain and effective area, near and far fields, phased arrays, aperture antennas and aperture synthesis. Fundamentals of radar, including detection, tracking, Doppler shifts, sampling, range and frequency aliasing. Synthetic aperture radars and remote sensing from aircraft and satellites; over-the-horizon (OTH) radars and ionospheric propagation effects; radar astronomy techniques.

ELE E 488 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 490 Practicum in Systems Engineering
Spring. 3 credits. 1 credit of Engineering Design. Offered only if sufficient interdisciplinary interest is available.
Concepts involved with bringing an engineered product to reality. The course employs techniques from Systems Engineering with a knowledge of the Internet, computer networks, microprocessor systems, and semiconductor devices, to create a prototype engineered product: a web-based home monitoring device. Included will be system design concepts including product cycle, product specification, including UL safety issues and new product testing, RFI and product test. We also develop the full details of a business plan through product launch and support. A final team product prototype is required as are weekly presentations during the semester. Teams must contain students from ELE E, M&AE, OR&IE, and COM S. Each student presents at least one weekly lecture on an assigned topic.

ELE E 491–492 Senior Electrical Engineering Project
Fall, 491; spring, 492. 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. Students must make individual arrangements with a faculty sponsor prior to registration for this course and submit a request for an independent project form to the Electrical Engineering undergraduate office.

ELE E 495 Introduction to Point and Space Groups (also MS&E 495)
Fall. 4 credits. S-U grades only. R. L. Liboff.
Topics include definition of groups; classes, subgroups, character tables, bases, irreducible representations, great orthogonality theorem, symmetry group, Caley's theorem, Young diagrams, cosets and invariant subgroups, the factor group, space groups, translation and crystallographic point groups, the star of k and the group of k, and application to solid state and semiconducting materials.

ELE E 495–499 Special Topics in Electrical Engineering
1–4 credits.
Seminar, reading course, or other special arrangement agreed on by the students and faculty members concerned.

ELE E 515–516 Applied Signal Processing Systems Design
515, fall; 516, spring. Variable credits.
Project-level design of systems in the area of signal processing and general instrumentation, including digital signal processing hardware, audio, speech, and analog interfacing. Students pursue individual projects and coordinate ideas and resources with other students with related interest.

ELE E 521 Theory of Linear Systems
Fall. 4 credits. Prerequisite: ELE E 302 or permission of instructor. Recommended: a good background in linear algebra and linear differential equations.
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, fundamentals of 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. Required prerequisite: ELE E 328; recommended prerequisite: ELE E 468.
Fundamentals of theory for adaptive filters intended for digital communication systems applications. Channel equalization for intersymbol interference removal in wireless and wired communication is used to motivate adaptive filter design issues of current interest. Assignments will consist of reports on adaptive digital filter algorithms and their simulated evaluation.

ELE E 526 Signal Representation and Modelling
Fall. 4 credits. Prerequisites: ELE E 425.
Sampling and signal reconstruction. Approximation theory. Linear inversion theory. Exponential signal modelling. Multirate filter banks, wavelets, and lifting.

ELE E 530 Fiber and Integrated Optics
Spring. 4 credits with lab. 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 structure in waveguides, mode coupling, dispersion and bandwidth limitations, optical sources based on semiconductors, detectors and noise, modulation techniques, nonlinear effects in optical waveguides, and optical sensors.

ELE E 531 Quantum Electronics I
Fall. 4 credits. Prerequisites: ELE E 306 and 407, or PHYS 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 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.
Physics of materials and structures useful in semiconductor electronic and photonic devices, including crystal structure, energy bands, effective mass, phonons, classical low-field transport, high-field and ballistic charge carrier transport, electron scattering by phonons, optical absorption, reflection, optical emissions, deep levels as charge carrier traps, surface and interface effects. On the level of *Compound Semiconductor Device Physics* by S. Tiwari.

ELE E 536 Micro/Nanofabrication Technology
Spring. 4 credits. 3 credits without lab with permission. Prerequisites: ELE E 453, or ELE E 457 or ELE E 439 or equivalent, or permission of instructor.
Fabrication of ultra-large scale integrated circuits (ULSI), microelectromechanics (MEMS), active matrix liquid crystal displays (AMLCD), and optoelectronic integrated circuits (OEIC). Lithography, diffusion, ion implantation, thin film deposition, etching, metallization, and precision assembly. Process integration for CMOS, BiCMOS, ECL, MEMS, AMLCD's, and OEIC's. Hands-on microfabrication laboratory with full MOS/MEMS process.

ELE E 537 Electronic System Packaging
Fall. 4 credits. 3 credits without project with permission of instructor. Prerequisites: ENGRD 231 and ELE E 315 or ELE E 453 or ELE E 457 or ELE E 439 or equivalent or permission of instructor.
Physical integration of circuits, chips, packages, modules, boards, and cabinets into electronic systems. Computer, communication, and wireless systems. Portable, desktop, and cabinet level computers. Handset, base station, and switch level communication systems. Physical architecture; electrical and optical signal distribution; power and ground distribution; signal integrity, electromagnetic interference (EMI), and electromagnetic compatibility (EMC); low power and mixed signal circuit/system design; energy management and cooling; assembly and manufacturing; measurements; computer and wireless system case studies.

ELE E 539 Advanced Digital Integrated Circuits
Fall and spring. 5 credits. Required prerequisites: ELE E 439.
This course aims to convey a knowledge of advanced concepts on circuit design for digital LSI and VLSI components in state-of-the-art CMOS technologies. Emphasis is on the circuit design, optimization, and layout of either very high speed, high density or low power circuits for use in applications such as micro-processors, signal and multimedia processors, memory and periphery. Special attention will be devoted to the most important challenges facing digital circuit designers today and in the coming decade, being the impact of scaling, deep submicron effects, interconnect, signal integrity, power distribution and consumption, and timing. This year, special attention will be given to the following topics: high performance design techniques, low power design techniques, and the impact of interconnect. This will be reflected in both the lectures and the desired projects.

[ELE E 542 Parallel Processing
Spring. 3 credits. Prerequisite: ELE E 541. May not be offered 1999–2000.
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 multicomputers and massively parallel processors are also discussed.]

ELE E 547 Computer Vision
Fall. 4 credits. Prerequisites: ELE E 302 (or COM S 280 and 314) or consent of instructor.
Computer acquisition and analysis of image data with emphasis on techniques for robot vision. This course will concentrate on descriptions of objects at three levels of abstraction: segmented images (images organized into subimages that are likely to correspond to interesting objects), geometric structures (quantitative models of image and world structures), and relational structures (complex symbolic descriptions of images and world structures). The programming of several computer-vision algorithms will be required.

ELE E 548 Digital Image Processing
Spring. 3 credits. Prerequisites: ELE E 411, ELE E 425, familiarity with linear algebra.
Introduction to image processing through seven major topics: perception, statistical modeling, transforms, 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 549 Visual Motion Seminar
Spring. 1 credit. May not be offered 1999–2000.
This seminar will provide an overview of motion as used in both coding and analysis of digital video, through examination of motion estimation and motion segmentation techniques. Topics include an introduction to digital video, techniques for computing motion, both block-based and pixel-based motion estimation, MPEG motion coding,

Hausdorff-based motion estimation, motion-based tracking, and various techniques for motion segmentation. An emphasis will be placed on recent research results.]

ELE E 554 Advanced Analog VLSI Circuit Design

Spring. 4 credits. Prerequisite: ELE E 453 or permission of instructor.

Overview of devices available to analog integrated circuit designers in modern CMOS processes: capacitors, MOSFETs, floating-gate MOSFETs, and BJTs. Basic building blocks for analog VLSI circuits: differential pairs, current mirrors, operational transconductance amplifiers, multi-tanh circuits, and translinear circuits. Layout of analog and mixed signal integrated circuits. Integrated continuous-time and discrete-time signal processing circuits. Digital-to-analog and analog-to-digital conversion techniques. Students will work in small teams to design a small-scale analog functional module.

ELE E 558 Compound Semiconductor Electronics

Spring. 4 credits with lab. Prerequisites: ELE E 457 or equivalent.

Electronic properties of advanced semiconductor structures using compound semiconductor materials and heterojunctions. Fundamentals of carrier transport and scattering. Properties of direct bandgap semiconductors and quantum wells. Advanced semiconductor devices including metal-semiconductor transistors (FETs), modulation-doped FETs, and heterojunction bipolar transistors (HBTs). High-frequency operation of compound semiconductor devices. Six two-week labs, which include low-temperature carrier transport, optical absorption and emission, and electrical characterization of compound semiconductor devices.

ELE E 561 Error-Control Codes

Spring. 4 credits. Prerequisite: ELE E 301 or ELE E 521 or equivalent. A strong familiarity with linear algebra is assumed.

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. Hamming and Singleton bounds for error-correcting codes. The construction and decoding of Bose-(Ray) Chaudhuri-Hocquenghem (BCH) and Reed-Solomon (RS) 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. Flow control and capacity assignment algorithms, ATM networks.

ELE E 565 Statistical Signal Processing

Fall. 4 credits. Prerequisite: ELE E 411.

This course introduces basic theory and techniques in parameter estimation and statistical signal processing. For estimating deterministic parameters, we consider minimum variance unbiased estimation, Cramer-Rao lower bound, linear models, best linear unbiased estimators, maximum likelihood (ML) estimation, least squares methods, recursive estimation, and methods of moments. For estimating random parameters, we discuss minimum mean square error (MMSE) estimation, and maximum a posteriori (MAP) estimation, Wold decomposition and spectral factorization, Wiener and Kalman filters. Finally, as applications of basic estimation theory, we examine channel and signal estimation techniques for digital communications. Applications in array signal processing and frequency estimation are discussed throughout the course.

ELE E 566 Wireless Networks

Spring. 4 credits. Prerequisites: ELE E 445 and ELE E 411.

An introductory course in mobile and wireless networks. The course is targeted mainly at the graduate level, but is open to undergraduates. The course covers fundamental techniques in the design and operation of the first and the second generation wireless networks: cellular systems, medium access techniques, control of a mobile session and a mobile call, signaling in mobile networks, mobility management techniques, common air interfaces (AMPS, IS-136, IS-95, GSM), wireless data (CDPD, Mobitex), Internet mobility, Personal Communication Services (PCS), etc.

ELE E 567 Topics in Digital Communications

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 LZ, LZW, and arithmetic coding, applied to files, speech, images, and video.

ELE E 568 Mobile Communication Systems

Spring. 4 credits. Prerequisite: ELE E 411 and ELE E 467; corequisite: ELE E 468.

Theory and analysis of mobile communication systems, with an emphasis on understanding the unique characteristics of these systems. Topics include: cellular planning, mobile radio propagation and path loss, characterization of multipath and fading channels, modulation and equalization techniques for mobile radio systems, source coding techniques, multiple access alternatives, CDMA system design, and capacity calculations.

ELE E 571 Asynchronous VLSI Design

Fall. 3 credits. Prerequisite: ELE E 314 or COM S 314.

An introductory course in asynchronous design. The course is targeted at the graduate and advanced undergraduate level. The course will be about the design of clockless digital circuits whose correct operation is relatively independent of delays in gates and wires. Emphasis will be placed on the synthesis of circuits by program transformations. Topics include: circuits as concurrent programs, delay-insensitive design techniques, synthesis of circuits from programs, timing analysis and performance optimization, pipelining, and case studies of complex asynchronous designs.

ELE E 572 Parallel Computer Architecture

Spring. 3 credits. Prerequisites: ELE E 314 and ELE E 475, or equivalent.

Principles and tradeoffs in the design of parallel architectures. Emphasis on latency, bandwidth, and synchronization in parallel machines. Case studies illustrate the history and techniques of shared-memory, message-passing, dataflow, and data-parallel machines. Additional topics include memory consistency models, cache coherence protocols, and interconnection network topologies. Architectural studies presented through lecture and some research papers.

ELE E 577 Feedforward Neural Networks

Fall. 4 credits. Prerequisite: ELE E 310.

Feedforward neural networks (multi-layer perceptrons) are computing systems formed out of many highly interconnected nonlinear memoryless elements that are arranged in a parallel architecture that is loosely modeled on that of the brain. Our focus is on their roles as pattern classifiers, signal processors, estimators, and forecasters and on their role in communication systems. We explore neural networks through mathematical analyses and extensive simulation studies using MATLAB.

ELE E 581 Introduction to Plasma Physics (also A&EP 606)

Fall. 4 credits. Prerequisites: ELE E 303 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, plasma technology, and controlled fusion.

ELE E 582 Basic Plasma Physics (also A&EP 607)

Spring. 4 credits. Prerequisites: ELE E 581 or A&EP 606. Offered upon demand.

Boltzmann and Vlasov Equations; dielectric tensor; waves in hot-magnetized plasma; Landau and cyclotron damping; microinstabilities; drift waves, low-frequency stability; test particles, Cerenkov emission; fluctuations; collisional effects; applications.

ELE E 583 Electrodynamics

Fall. 4 credits. Prerequisite: ELE E 301 and ELE E 304 or equivalent. 3 lecs.

Maxwell's equations, electromagnetic potentials, integral representations of the electromagnetic field, Green's functions. Special theory of relativity, Lienard-Wiechert potentials, radiation from accelerated charges, Cerenkov radiation. Electrodynamics of dispersive dielectric and magnetic media. At the level of *Classical Electrodynamics*, by Jackson.

ELE E 584 Microwave Theory
Spring. 4 credits. Prerequisites: ELE E 301 and 304 or equivalent. 3 lecs, 1 rec.
Theory of passive microwave devices. Modal analysis of inhomogeneous waveguides and cavities. Waveguide excitation, perturbation theory. Nonreciprocal waveguide devices. Scattering matrix analysis of multiport junctions, resonant cavities, directional couplers, circulators. Periodic waveguides, coupled-mode theory.

ELE E 585 Ionospheric and Magnetospheric Physics
Fall. 3 credits. Prerequisites: Physics through 214 or equivalent, introductory chemistry, ELE E 486 or equivalent.
The structure and dynamics of the ionosphere and magnetosphere; charged particle production, loss and transport; coupling to the neutral atmosphere; ionospheric instabilities; high-latitude currents and plasma convection; solar wind and magnetic storms; particle acceleration processes; waves in the ionosphere and magnetosphere.

ELE E 587 Energy Seminar (also NS&E 545 and M&AE 545)
Fall. 1 credit.
Energy resources, their conversion to electricity or mechanical work, and the environmental consequences of the energy cycle will be discussed by faculty members from several departments in the University, and by outside experts. Examples of topics to be surveyed are energy resources, and economics, coal-based electricity generation; nuclear reactors; solar power; energy conservation by users; and air-pollution control.

[ELE E 588 Advanced Radio Wave Propagation and Scattering
Spring. 3 credits. Prerequisite: ELE E 487 or permission of instructor. Not offered every year. Not offered 1999–2000.
Propagation in a plasma (the ionosphere) with a magnetic field, WKB theory (for a slowly varying medium), and full wave theory (near the level of reflection). Theory of scattering from random media, particularly "incoherent" scattering from a plasma in thermal equilibrium and the radar techniques used to measure the properties of this scatter.]

ELE E 591 Advanced Device Physics and Device Integration
Fall. 4 credits. Prerequisites: ELE E 457 and ELE E 535, or permission of instructor.
An integrated study of properties of micro- and nano-scale electronic and optical devices with emphasis on implementation in circuits. Topics include fundamental properties, scaling and limits, effect of design on digital or analog circuit operation, effect of variations, nano-scale quantum and size effects, and unification of the needs of circuits (integration, low power, high speed, high frequency, etc.) with device behavior. Devices include transistors and memories in silicon and silicon-on-insulator, and small optical structures.

ELE E 593 Bioelectric Signal Analysis and Processing
Fall. 3 credits. Prerequisites: some analog circuit design, and a knowledge of C programming and MATLAB. ELE E 425 helpful.
Measurement and computer-aided analysis of low-level biological signals in the presence of background noise. Electrocardiography, A/D conversion, filtering, signal conditioning, and data compression techniques will be investigated. The human surface ECG forms the signal source in much of the course. Pattern classification and non-linear dynamical system analysis will be introduced. Four major team design projects are required in lieu of examinations.

ELE E 595–599 Advanced Topics in Electrical Engineering
Fall, spring. 1–4 credits.
Seminar, reading course, or other special arrangement agreed on by the students and faculty members concerned.

ELE E 595 Applied Systems Engineering (also CEE 504, M&AE 591, OR&IE 512)
Fall. 3 credits. Permission of instructor.
Fundamental ideas of systems engineering, and their application to design and development of various types of engineered systems. Defining system requirements, creating effective project teams, mathematical tools for system analysis and control, testing and evaluation, economic considerations and the system life cycle.

ELE E 602 Graduate Seminar in Telecommunications and Information Processing
Spring. 2 credits. Can count as one M.Eng. course for Electrical Engineering.
This seminar will discuss material at the level of current engineering publications. Faculty sponsors will prepare a listing of appropriate subject areas and suggest certain papers for discussion. Student swill be required to lead discussions on one or two topics as required and will be graded on individual presentations, discussion participation, as well as written reports and talk summaries. Topics vary each term.

ELE E 604 Graduate Seminar in RF, Antenna, and Space Science Systems
Spring. 2 credits. Can count as one M.Eng. course for Electrical Engineering.
This seminar will discuss material at the level of current engineering publications. Faculty sponsors will prepare a listing of appropriate subject areas and suggest certain papers for discussion. Students will be required to lead discussions on one or two topics as required and will be graded on individual presentations, discussion participation, as well as written reports and talk summaries. Topics vary each term.

ELE E 606 Graduate Seminar in Semiconductor and Microelectromechanical Systems
Spring. 2 credits. Can count as one M.Eng. course for Electrical Engineering.
This seminar will discuss material at the level of current engineering publications. Faculty sponsors will prepare a listing of appropriate subject areas and suggest certain papers for discussion. Students will be required to lead discussions on one or two topics as required and will be graded on individual presentations, discussion participation, as well as written reports and talk summaries. Topics vary each term.

ELE E 608 Graduate Seminar in Computer and Digital Systems
Spring. 2 credits. Can count as one M.Eng. course for Electrical Engineering.
This seminar will discuss material at the level of current engineering publications. Faculty sponsors will prepare a listing of appropriate subject areas and suggest certain papers for discussion. Students will be required to lead discussions on one or two topics as required and will be graded on individual presentations, discussion participation, as well as written reports and talk summaries. Topics vary each term.

ELE E 610 Graduate Seminar in Medical Electronics and Analysis Systems
Spring. 2 credits. Can count as one M.Eng. course for Electrical Engineering.
This seminar will discuss material at the level of current engineering publications. Faculty sponsors will prepare a listing of appropriate subject areas and suggest certain papers for discussion. Students will be required to lead discussions on one or two topics as required and will be graded on individual presentations, discussion participation, as well as written reports and talk summaries. Topics vary each term.

ELE E 691–692 Electrical Engineering Colloquium
Fall, 691; spring, 692. 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
Fall, 693; spring, 694. 1–8 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 6-digit course ID numbers.

ELE E 695–699 Graduate Topics in Electrical Engineering
1–4 credits.
Seminar, reading course, or other special arrangement agreed on by the students and faculty members concerned. See M.Eng. office for course registration procedure.

ELE E 791–792 Thesis Research
Fall, 791; spring, 792. 1–15 credits. For students enrolled in the master's or doctoral program.

GEOLOGICAL SCIENCES

Courses

For complete course descriptions, see the Geological Sciences listing in the College of Arts and Sciences section.

GEOL 101 Introductory Geological Sciences
Fall, spring, summer. 3 credits.

GEOL 102 Evolution of the Earth and Life (BIO G 170)
Spring, summer. 3 credits.

GEOL 104 The Sea: An Introduction to Oceanography (BIO ES 154)
Spring, summer. 3 or 4 credits (4 credits with lab section).

GEOL 105 Writing on Rocks (Freshman Seminar)
Fall. 3 credits.
See Freshman Seminar handbook for description.

GEOL 106 Vertebrate Fossil Preparation
Spring. 1 credit. Prerequisites: one introductory geology course or concurrent enrollment; class size is limited.

GEOL 107 How the Earth Works
Fall. 1 credit.

GEOL 109 Dinosaurs
Fall. 1 credit.

GEOL 111 To Know the Earth and Build a Habitable Planet
Fall. 3 credits.

GEOL 122 Earthquake! (also ENGRI 122)
Fall. 3 credits.
This is a course in the Introduction to Engineering series. For course description, see ENGRI 122.

[GEOL 125 Global Environment (also ENGRI 125)
Fall. 3 credits. Not offered 1999–2000. W. M. White, L. A. Derry.
This is a course in the Introduction to Engineering series. For course description, see ENGRI 125.]

GEOL 200 Art, Archaeology, and Analysis (also ARKEO 285, ART 372, ARTH 200, ENGRI 185, and PHYS 200)
Spring. 3 credits. 3 lectures. R. Kay.
This is a course in the Introduction to Engineering series. For description, see ENGRI 185.

GEOL 201 Introduction to the Physics and Chemistry of the Earth (also ENGRD 201)
Fall. 3 credits. Prerequisites: MATH 191 and PHYS 112.
For course description, see ENGRD 201.

[GEOL 203 Natural Hazards and the Science of Complexity
Fall. 3 credits. 1 course in calculus. Not offered 1999–2000.]

GEOL 204 Ocean Sciences Laboratory
Spring. 3 credits.

GEOL 210 Introduction to Field Methods in Geological Sciences
Fall. 3 credits. Prerequisite: GEOL 101 or 201, or permission of instructor. Weekly field sessions. A weekend field trip.

GEOL 212 Caribbean Field Trip (January)
Spring. 2 credits. Enrollment limited to 15. Prerequisite: permission of instructor. Travel and subsistence expenses to be announced. L. D. Brown.

GEOL 213 Marine and Coastal Geology
Summer. 2 credits. Prerequisites: an introductory course in geology or permission of instructor.

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 302)
Spring. 4 credits. Prerequisites: MATH 112 or 192 and CHEM 207 or equivalent. For course description, see the Science of Earth Systems section in "Interdisciplinary Centers, Programs, and Studies," in the front part of the catalog.

GEOL 315 Geomorphology
Fall. 4 credits. Prerequisite: one of the following: a 3-credit GEOL or SES course, or SCAS 260, or permission of instructor.

GEOL 321 Introduction to Biogeochemistry (also SES 321, NTRES 321)
Fall. 4 credits. Prerequisites: MATH 192 and CHEM 207, or equivalent.

GEOL 326 Structural Geology
Spring. 4 credits. Prerequisite: MATH 192 and GEOL 101 or 201, or permission of instructor.

GEOL 355 Mineralogy
Fall. 4 credits. Prerequisite: GEOL 101 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, 102, or 201.

GEOL 388 Geophysics and Geotectonics
Spring. 4 credits. Prerequisites: MATH 192 and PHYS 208, 213, or equivalent.

[GEOL 411 Satellite Remote Sensing in Geosciences
Fall. 3 credits. Not offered 1999–2000.]

GEOL 417 Field Mapping in Argentina
Summer. 3 credits. Prerequisites: GEOL 210 and GEOL 326.

[GEOL 423 Petroleum Geology
Fall. 3 credits. Recommended: GEOL 326. Offered alternate years. Not offered 1999–2000.]

GEOL 434 Reflection Seismology
Spring. 4 credits. Prerequisites: MATH 192 and PHYS 208, 213, or equivalent.

GEOL 437 Geophysical Field Methods
Fall. 3 credits. Prerequisites: PHYS 213 and MATH 192 or equivalents, or permission of instructor.

GEOL 445 Geohydrology (also ABEN 471 and CEE 431)
Fall. 3 credits. Prerequisites: MATH 294 and ENGRD 202. L. Cathles.
For description, see CEE 431.

[GEOL 452 X-ray Diffraction Techniques
Spring. 3 credits. Prerequisite: GEOL 355 or permission of instructor. Offered alternate years. Not offered 1999–2000.]

[GEOL 453 Advanced Petrology
Fall. 3 credits. Prerequisite: GEOL 356. Offered alternate years. Not offered 1999–2000.]

[GEOL 454 Advanced Mineralogy
Spring. 3 credits. Prerequisite: GEOL 355 or permission of instructor. Offered alternate years. Not offered 1999–2000.]

GEOL 455 Geochemistry
Fall. 4 credits. Prerequisites: CHEM 207 and MATH 102, or equivalent. Recommended: GEOL 356. Offered alternate years.

[GEOL 458 Volcanology
Spring. 3 credits. Corequisite: GEOL 356 or equivalent. Offered alternate years. Not offered 1999–2000.]

GEOL 462 Marine Ecological Processes (also BIOES 462)
Spring. 3 credits. Limited to 75 students. Prerequisite: BIOES 261. Offered alternate years. C. D. Harvell, C. H. Greene.
For description, see BIOES 462.

GEOL 475 Special Topics in Oceanography
Spring, summer. 2–5 credits. Prerequisites: GEOL 104 or BIO ES 154 and permission of instructor.

[GEOL 476 Sedimentary Basins: Tectonics and Mechanics
Fall. 3 credits. Prerequisite: GEOL 375 or permission of instructor. Not offered 1999–2000.]

GEOL 478 Advanced Stratigraphy
Fall. 3 credits. Prerequisite: GEOL 375 or permission of instructor. Offered alternate years.

GEOL 479 Paleobiology (also BIO ES 479)
Fall. 3 credits. Prerequisites: one year of introductory biology for majors and either BIOES 274, 373, GEOL 375, 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 491–492 Undergraduate Research
Fall, spring. 1–4 credits.

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.

GEOL 502 Case Histories in Groundwater Analysis
Spring. 4 credits.

GEOL 624 Advanced Structural Geology II
Spring. 3 credits. Prerequisites: GEOL 326 and permission of instructor. Offered alternate years.

GEOL 628 Geology of Orogenic Belts
Spring. 3 credits. Prerequisite: permission of instructor.

GEOL 634 Advanced Geophysics I: Fractals and Chaos in Geology and Geophysics
Spring. 3 credits. Prerequisite: GEOL 388 or permission of instructor. Offered alternate years.

GEOL 636 Advanced Geophysics II: Quantitative Geodynamics
Spring. 3 credits. Prerequisite: GEOL 388 or permission of instructor. Offered alternate years.

GEOL 651 Analysis of Biogeochemical Systems
Spring. 3 credits. Prerequisite: MATH 293 or permission of instructor. Offered alternate years.

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 695 Computer Methods in Geological Sciences
Fall, spring. 1–3 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. Contact appropriate professor for more information.

GEOL 722 Advanced Topics in Structural Geology

GEOL 731 Plate Tectonics and Geology

GEOL 733 Fractals and Chaos—Independent Studies

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
Fall.

GEOL 771 Advanced Topics in Sedimentology and Stratigraphy

GEOL 773 Paleobiology

GEOL 775 Advanced Topics in Oceanography
Spring.

GEOL 780 Earthquake Record Reading
Fall.

GEOL 781 Geophysics, Exploration Seismology

GEOL 783 Advanced Topics in Geophysics

GEOL 789 Lithospheric Seismology (COCORP Seminar)

GEOL 793 Andes-Himalaya Seminar

GEOL 795 Low-Temperature Geochemistry

GEOL 796 Geochemistry of the Solid Earth

GEOL 797 Fluid-Rock Interactions

GEOL 799 Soil, Water, and Geology Seminar

MATERIALS SCIENCE AND ENGINEERING

Undergraduate Courses

MS&E 111 Materials by Design (also ENGRI 111)
Fall. 3 credits. E. P. Giannelis.
This is a course in the Introduction to Engineering series. For description, see ENGRI 111.

MS&E 118 Design Integration: A Portable CD Player (also ENGRI 118 and T&AM 118)
Spring. 3 credits.
This is a course in the Introduction to Engineering series. For description, see ENGRI 118.

MS&E 124 Designing Materials for the Computer
Spring. 3 credits. 3 lectures. C. K. Ober.
This is a course in the Introduction to Engineering series. For description, see ENGRI 124.

MS&E 222 Materials Chemistry
Spring. 3 credits. E. P. Giannelis.
This course is designed to show how materials chemistry has enabled modern technology. Topics will include conducting polymers, organic LEDs, self-assembling materials, contact lithography, nanophase and nanocrystalline materials, catalysis, smart gels, dendrimers, buckytubes, aerogels, chemistry of surfaces, molecular magnets, bioinspired materials, light harvesting polymers, and inorganic polymers.

MS&E 261 Introduction to Mechanical Properties of Materials (also ENGRD 261)
Fall. 3 credits. S. P. Baker.
For description, see ENGRD 261.

MS&E 265 Biological Materials and Their Synthetic Replacements
Fall. 3 credits. D. T. Grubb.
From contact lenses and false teeth to arterial implants and hip joints, a tremendous range of synthetic materials are used in contact with the body to replace or supplement natural biological materials. The course will consider a number of biological systems and describe the properties and structure of the natural materials. Requirements for candidate replacement materials will be discussed, with historical and current solutions. These involve material properties such as strength and corrosion resistance as well as toxicity and bio-compatibility. Design constraints, including methods of production, economics, regulatory approval, and legal liabilities, will also be considered.

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. 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 331 Structure of Materials (also MS&E 531)
Fall. 4 credits. S. L. Sass.
Bonding in materials, crystal structures and symmetry, defects. Crystal planes and directions, stereographic projections, texture. Techniques for structural analysis: direct and diffraction methods. X-ray and electron diffraction, optical and electron microscopy. Experimental systems for structural characterization of materials.

MS&E 332 Electrical and Magnetic Properties of Materials (also MS&E 532)
Spring. 3 credits. Prerequisite: MS&E 331 or permission of instructor. Y. Suzuki.
Introduction to electronic band structure of crystals. Electrical and magnetic properties of metals and semiconductors. Electron transport. Design of semiconductor properties by doping. Carrier statistics. Properties of junctions in semiconductor devices. Principles and design of ferromagnetic materials for transformers, permanent magnets, and magnetic memory devices. Ionic conductivity. Fundamentals of superconducting materials for high-field magnets and Josephson junctions. Introduction to dielectric and optical properties.

MS&E 333 Research Involvement I
Fall. 3 credits. Prerequisite: approval of course coordinator. Staff.
Supervised independent research project in association with faculty member and faculty research group of the department. Students design experiments, set up the necessary equipment, and evaluate the results. Creativity and synthesis are emphasized.

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 Thermodynamics of Condensed Systems (also MS&E 535)
Fall. 4 credits. Prerequisites: PHYS 214 and MATH 294. M. O. Thompson.
The three laws of thermodynamics are introduced as a basis for understanding phase equilibria, heterogeneous reactions, solutions, electrochemical processes, surfaces, and defects. Statistical mechanics is introduced and applied to the calculation of entropy and specific heat of ideal gases and solids. Examples of design and control of processes.

MS&E 336 Kinetics, Diffusion, and Phase Transformations (also MS&E 536)
Spring. 4 credits. Prerequisite: MS&E 335 or permission of instructor. R. Dieckmann.
Introduction to electrochemistry, atomic motion, and diffusion. Applications and design involving nucleation and growth of new phases in vapors, liquids, and solids; solidification, crystal growth, corrosion, 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 345 Mechanical Properties and Processing of Engineering Materials (also M&AE 212)
Spring. 4 credits. Prerequisite: ENGRD 202.
For description, see M&AE 212.

MS&E 435 Senior Thesis I & II
Fall and spring. 2-semester course. 8 credits. Staff.
Open to advanced undergraduates in lieu of the senior materials laboratory. Proposals for thesis topics should be approved by the supervising faculty member prior to beginning the senior year. Approved thesis topics will normally involve original experimental research in direct collaboration with an ongoing research program. Periodic oral and written presentations and a final written thesis are required. This course is required for graduation with honors.

MS&E 441 Microprocessing of Materials (also MS&E 541)
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. 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, resists and the principles of lithography using UV, electrons and X-rays, and wet/dry etching.

MS&E 443–444 Senior Materials Laboratory
Fall, 443; spring, 444. 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
Spring. 3 credits. Prerequisites: MS&E 331 and 336, or permission of instructor. A. L. Ruoff.
Stress, strain, and the basics of concepts in deformation and fracture for metals, polymers, and ceramics. Analysis of important mechanical properties such as plastic flow, creep, fatigue, fracture toughness, and rupture. Application of these principles to the design of improved materials and engineering structures.

MS&E 447/448 Materials Design Concepts I & II
Fall, 447; spring, 448. 2 credits each term. C. K. Ober, D. G. Ast.
Develops 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 case studies of design problems. Students give short oral and written presentations. Proposal for design-study project in the fall semester. Completion of extensive design-study project in the spring semester. Study includes prior art literature, materials selection, and some modeling, as well as discussion of broader economic, regulatory, environmental, and liability concerns that may arise.

[MS&E 449 Introduction to Ceramics
Fall. 3 credits. Prerequisite: MS&E 331 or permission of instructor. Not offered 1999–2000.
Ceramic processes and products, crystal structures, structure of glasses, point defects (point-defect chemistry and relation to nonstoichiometry), line defects, grain boundaries, diffusion in ionic materials (emphasis on the relationships between diffusion and point-defect structure), phase diagrams, phase transformations, kinetics of solid-state reactions (reactions with and between solids: heterogeneous reactions, reactions between different solids, point-defect relaxation, internal reactions), grain growth and sintering. Physico-chemical aspects are emphasized.]

MS&E 452 Properties of Solid Polymers (also MS&E 552)
Fall. 3 credits. Prerequisite: ENGRD 261. Corequisite: MS&E 335/535 or permission of instructor. U. B. Wiesner.
Synthetic and natural polymers for engineering applications. Production and characterization of long-chain molecules. Gelation and networks, rubber elasticity, elastomers and thermosetting resins. Amorphous and crystalline thermoplastics and their structure. Time- and temperature-dependent elastic properties of polymers. Molecular-weight measurement. Design of high-impact-strength polymers.

MS&E 454 Processing of Glass, Ceramic, and Glass-Ceramic Materials
Spring. 3 credits. Recommended prerequisite: MS&E 449. Offered alternate years. R. Dieckmann.
Conventional and unconventional techniques for processing glass, glass-ceramic, and ceramic materials. Case studies illustrate the design, engineering, and scientific aspects of such processes. Vapor processes for high-purity optical fibers, hot-processing of ceramic turbine blades, photosensitive materials, and powder processing and sintering of ceramics will be discussed. This course is team taught with scientists from the research and development laboratory of Corning Inc.

MS&E 455 Introduction to Composite Materials (also M&AE 455 and T&AM 455)
Spring. 4 credits.
For description, see T&AM 455.

MS&E 459 Physics of Modern Materials Analysis
Spring. 3 credits. M. O. Thompson.
The interaction of ions, electrons, and photons with solids, and the characteristics of the emergent radiation in relation to the structure and composition of materials. Aspects of atomic physics that are relevant to understanding techniques of modern materials analysis. Principles of analysis techniques such as Auger electron spectroscopy, ion scattering, and secondary ion-mass spectroscopy. Design of experiments for near-surface analysis.

MS&E 463 Principles of Electronic Packaging
Spring. 3 credits. Staff.
Design, materials, and manufacturing needs for packaging technology, from chip to board. Principles involved in key areas of materials science, and other engineering disciplines. Packaging materials to be discussed include metals, ceramics, and polymers.

MS&E 482 Plasma Processing of Electronic Materials (also ELE E 482)
Spring. 3 credits. Prerequisite: PHYS 213 and 214 or their equivalents offered on demand.
For description, see ELE E 482.

MS&E 489 Undergraduate Teaching Involvement
Fall and spring. Variable credit. MS&E faculty.
This course will give credit to students who help in the laboratory portions of ENGRI 111 or 124, ENGRD 261 or MS&E 277. The number of credits earned will be determined by the teaching load and will typically be 1 to 3 credits.

MS&E 490 Independent Study
Fall and spring. Variable credit. Individual faculty.
This course is meant for students who have already taken MS&E 333 and MS&E 334, Research Involvement, and who want to do an intense research project.

MS&E 495 Introduction to Point and Space Groups (also ELE E 495)
Fall. 4 credits. Homework only. S-U grades only. R. L. Liboff.
For description, see ELE E 495.

Graduate-Level Professional Courses

[MS&E 503 Magnetic Materials
Fall. 3 credits. Prerequisites: PHYS 213 and 214, or equivalent. Offered alternate years. Not offered 1999–2000. Y. Suzuki.
This course covers the fundamentals of magnetic phenomena and specific magnetic materials and their use in modern applications. Magnetization phenomena, the origin of magnetism in a material, magnetic domains, magnetic anisotropy will be included in the fundamentals. Specific magnetic materials and their applications include: ferromagnetism in thin films and fine particles, amorphous magnetic materials; magnetic recording, magnetic circuits.]

MS&E 505 Organic Optoelectronics
Fall. 3 credits. G. G. Malliaras.
Overview of relevant materials from small aromatic molecules to conjugated polymers. Focuses on optoelectronic properties including photophysics (absorption, emission, photogeneration, recombination), charge transport (doping, hopping, disorder, charge injection) and elements of nonlinear optics. Optoelectronics applications (such as electrophotography, light emitting diodes, lasers, photovoltaic cells, thin film transistors) will also be discussed.

MS&E 516 Thin-Film Materials Science
Fall. 3 credits. Offered alternate years. D. G. Ast.
This course is a fundamental approach to thin-film science that will cover deposition of films, growth of epitaxial layers, formation of multilayered structures such as superlattices and quantum wells, and interdiffusion and

reaction in thin films. The course will begin with the structure and thermodynamics of surfaces and ultrathin films. The conditions for epitaxial growth, such as used in semiconductor heterostructures, will be contrasted with those for amorphous or polycrystalline films. The role of thermal processing for reactive thin films involving the formation of surface oxides, metallic silicides, and aluminides will be presented.

MS&E 522 Mechanical Properties of Thin Films
Spring. 3 credits. Offered alternate years. S. P. Baker.
Mechanical properties which are unique to materials in the form of thin films (typical thicknesses 1 micrometer and less) and micrometer scale structures. Mechanics of two-dimensional structures. Stress and mechanical property measurement methods in small dimensions. Microstructural development in thin films. Elastic, plastic, and fracture response of films and constrained volumes.

MS&E 531 Structure of Materials (also MS&E 331)
Fall. 4 credits. S. L. Sass.
For description, see MS&E 331.

MS&E 532 Electrical and Magnetic Properties of Materials (also MS&E 332)
Spring. 3 credits. Prerequisite: MS&E 331/531 or permission of instructor. Y. Suzuki.
For description, see MS&E 332.

MS&E 535 Thermodynamics of Condensed Systems (also MS&E 335)
Fall. 4 credits. Prerequisites: PHYS 214 and MATH 294. M. O. Thompson.
For description, see MS&E 335.

MS&E 536 Kinetics, Diffusion, and Phase Transformations (also MS&E 336)
Spring. 3 credits. Prerequisite: MS&E 335/535 or permission of instructor. R. Dieckmann.
For description, see MS&E 336.

MS&E 541 Microprocessing of Materials (also MS&E 441)
Fall. 3 credits. D. G. Ast.
For description, see MS&E 441.

MS&E 552 Properties of Solid Polymers (also MS&E 452)
Fall. 3 credits. Prerequisite: ENGRD 261. Corequisite: MS&E 335/535 or permission of instructor. U. B. Wiesner.
For description, see MS&E 452.

MS&E 553–554 Special Project
Fall, 553; spring, 554. 6 credits each term.
Master of Engineering research project.

Graduate Core Courses

MS&E 601 Thermodynamics of Materials
Fall. 3 credits. Prerequisite: previous course in thermodynamics at level of MS&E 335. J. M. Blakely.
Basic statistical thermodynamics. Partition functions and thermodynamic state functions. Distributions. Laws of thermodynamics. Free-energy functions and conditions of equilibrium. Chemical reactions. Statistics of electrons in crystals. Heat capacity. Heterogeneous systems and phase transitions. Lattice models of 1–, 2–, 3–dimensional interacting systems. Statistical thermodynamics of alloys. Free-energy and phase diagrams. Order-disorder phenomena. Point defects in crystals. Statistical thermodynamics of interfaces.

MS&E 602 Elasticity, Plastic Flow, and Fractures
Spring. 3 credits. S. P. Baker.
Micromechanical modeling of mechanical behavior. A materials-science approach to modeling combines concepts from continuum mechanics, thermodynamics, kinetics and atomic structure. Topics include: elastic properties of crystals, deformation mechanisms from ambient temperature to very high temperatures over a wide range of strain rates, fracture in brittle materials, fracture in ductile materials, fracture at elevated temperatures, crack tip phenomena, and composite materials.

MS&E 603 Analytical Techniques for Materials Science
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.

MS&E 604 Diffusion and Phase Transformation: Kinetics in Condensed Matter
Spring. 3 credits. D. T. Grubb.
Phenomenology and microscopic aspects of diffusion in fluids, both simple and polymeric, and in metallic and ionic solids. Phase stability and transformation; nucleation and growth, spinodal decomposition and displacive transformations. Phase coarsening processes, recrystallization and grain growth. Diffusion-controlled growth, interfacial reactions, moving-boundary problems. Grain-boundary migration controlled kinetics. At the level of *Diffusion in the Condensed State,* by Kirkaldy and Young.

MS&E 655 Composite Materials (also M&AE 655 and T&AM 655)
Spring. 4 credits.
For description, see T&AM 655.

Related Course in Another Department
Introductory Solid-State Physics (PHYS 454).

Further Graduate Courses

MS&E 610 Principles of Diffraction (also A&EP 711)
Spring. 4 credits. Offered alternate years. B. Batterman.
For description, see A&EP 711.

MS&E 612 Solid-State Reactions
Fall. 3 credits. Offered alternate years. 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 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 Transmission Electron Microscopy
Spring. 3 credits. Prerequisite: MS&E 331 or equivalent level of knowledge of crystallography and diffraction. S. L. Sass.
This course covers the theory and practice of obtaining and interpreting TEM data from crystalline materials. Topics include specimen preparation, adjustment and calibration of the TEM, and image formation. Special emphasis is placed on electron diffraction (formation and analysis of spot patterns, Kikuchi patterns and convergent beam patterns), and obtaining useful images of crystal defects. Practical requirements for high-resolution imaging of crystal lattices and interfaces are also covered. Associated theoretical topics include kinematical and dynamical diffraction theories, including Bloch waves and anomalous absorption, the contrast transfer function theory of phase contrast, and image modeling and image analysis for quantitative interpretation of data. Current texts are Loretto *Electron Beam Analysis of Materials*, 2nd ed., and Riemer *Transmission Electron Microscopy, Physics of Image Formation.*

[MS&E 617 Solid State Electrochemistry
Fall. 3 credits. Prerequisite: MS&E 612 or permission of instructor. Offered alternate years. Not offered 1999–2000. 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 electrodes; galvanic cells with solid electrolytes for thermodynamic investigations; technical applications of solid electrolytes. At the level of *Electrochemistry of Solids* by H. Rickert.]

[MS&E 619 Superhard Materials
Fall. 3 credits. Prerequisite: permission of instructor. Not offered 1999–2000. A. L. Ruoff.
The superhard materials include diamond, cubic boron nitride (possibly the new C_4N_3) and borderline, B_4C. 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 Diamonds*, plus recent papers.]

MS&E 524/624 Synthesis of Polymeric Materials
Spring. 3 credits. Offered alternate years. Prerequisite: MS&E 452 or permission of instructor.
Preparation of synthetic polymers by step- and chain-growth polymerization: condensation; free radical, anionic, and cationic mechanisms; ring opening and coordination routes. Statistical and kinetic aspects of homopolymer and copolymer formation. Stereochemistry of polymers and spectroscopic methods for polymer analysis. Molecular aspects of polymer design for properties such as conductivity, elasticity, thermal stability, and engineering properties. Special topics will include liquid crystalline polymers, photoresists, and supermolecular chemistry. At the level of *Principles of Polymerization*, by Odian.

MS&E 626 Advanced Inorganic Chemistry III: Solid-State Chemistry (also CHEM 607)
Spring. 4 credits. Prerequisite: CHEM 605 or permission of instructor. F. DiSalvo.
For description, see CHEM 607.

MS&E 671 Synthetic Polymer Chemistry (also CHEME 675 and CHEM 671)
Spring. 4 credits. Prerequisites: CHEM 359–360 or equivalent or permission of instructor.
For description, see CHEM 671.

MS&E 703 Surfaces and Interfaces in Materials
Spring. 3 credits. Offered alternate years. J. M. Blakely.
This course deals with special topics in the field of surface and interface science. Some knowledge of basic statistical thermodynamics, crystallography, elementary quantum mechanics and theory of rate processes will be assumed. The following are the main topics: statistical thermodynamics of interfaces, morphological stability, atomic structure, energetics and structure determination, electronic structure of interfaces, charge and potential distributions, surface states, adsorption and segregation, atomic transport and growth processes at surfaces, oxidation and other surface reactions.

Specialty Courses

MS&E 779 Special Studies in Materials Sciences
Fall, spring. 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
Fall, 800; spring, 801. 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&AE 101 Naval Ship Systems
For description, see NAV S 202.

M&AE 102 Drawing and Engineering Design (also ENGRG 102)
Fall, spring. 1 credit. Half-term course offered twice each semester. Enrollment limited to thirty-two students each half term. Recommended for students without previous mechanical drawing experience. S-U grades optional.
For description, see ENGRG 102.

M&AE 117 Introduction to Mechanical Engineering (also ENGRI 117)
Fall or spring, to be determined. 3 credits.
This is a course in the Introduction to Engineering series. For description, see ENGRI 117.

M&AE 127 Introduction to Entrepreneurship and Engineering Enterprise (also ENGRI 127)
Spring. 3 credits. Enrollment open to engineering students; others with permission of instructor.
This is a course in the Introduction to Engineering series which provides a solid introduction to the entrepreneurial process to students in engineering. For description, see ENGRI 127.

M&AE 212 Mechanical Properties and Processing of Engineering Materials (also MS&E 345)
Spring. 4 credits. Prerequisite: ENGRD 202.
Introduction to the broad range of mechanical behavior of materials and their processing; atomic bonding and crystalline structures, point and line defects, plastic deformation ofcrystals and polycrystals; hardening behavior and basic elements of plasticity; equilibrium microstructural development and time-dependent phase transformations; bulk deformation processes; the ideal work and slab analysis methods; failure of materials; materials selection.

M&AE 221 Thermodynamics (also ENGRD 221)
Fall, spring, may be offered summer. 3 credits. Prerequisites: MATH 192 and PHYS 112.
For description, see ENGRD 221.

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 also. 4 credits. Prerequisites: ENGRD 202 and 203 and coregistration in 221, or permission of instructor.
Physical properties of fluids, hydrostatics, conservation laws using control volume analysis and using differential analysis, Bernoulli's equation, potential flows, simple viscous flows (solved with Navier-Stokes equations), dimensional analysis, pipe flows, boundary layers, introduction to compressible flow.

M&AE 324 Heat Transfer
Spring. May also be offered in Engineering Cooperative Program. 3 credits. Prerequisite: M&AE 323 or permission of instructor.
Topics include 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; and radiative transfer between surfaces.

M&AE 325 Mechanical Design and Analysis
Fall. Usually offered in Engineering Cooperative Program also. 4 credits. Prerequisites: ENGRD 202, ENGRD 203, M&AE 212 and M&AE 225. 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: MATH 294, ENGRD 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 technical writing requirement.
Laboratory exercises in methods, techniques, and instrumentation used in fluid mechanics and the thermal sciences. 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 Seminar on Engineering Design
Fall. 2 credits. Prerequisite: completion of six semesters in mechanical engineering or equivalent. S-U grades only.
This course is offered to illustrate the design 'process' in action. It consists of seminars by industrial and academic practioners of design. Case studies are presented in weekly invited lectures from a wide range of disciplines, including thermo-fluid processes, manufacturing, energy, mechanical design, aerospace, and biological sciences. The invited lectures are supplemented by one or more design 'projects' in the semester, such as a competition to design an all-balsa indoor hand or catapult-launched glider for maximum duration.

M&AE 591 Applied Systems Engineering (also CEE 504, ELE E 595, OR&IE 512)
Fall. 3 credits. Permission of instructor.
Fundamental ideas of systems engineering, and their application to design and development of various types of engineered systems. Defining system requirements, creating effective project teams, mathematical tools for system analysis and control, testing and evaluation, economic considerations and the system life cycle.

Mechanical 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 412 Smash and Crash: Mechanics of Large Deformations
Fall. 4 credits. Prerequisites: M&AE 212, T&AM 202. Fulfills field design requirement.
Severe loading is a defining feature of both materials processing and crash worthiness. Materials intentionally are stressed beyond their elastic limits, resulting in deformations that are not reversible. In materials processing, the desire is to change the shape to manufacture components; in crash worthiness, it is to absorb the vehicle's energy. In this course the fundamentals of plasticity are covered: yielding, flow laws, work hardening. Various solution methods, including bound theorems, are presented. The fundamentals are applied to localization, primary and secondary forming operations, and plastic buckling. Laboratory experiments deal with these topics and conclude with the individual design, construction, and testing of a crash cage.

M&AE 415 Global Position System Theory and Design (also ELE E 415)
Fall. 4 credits. Prerequisites: ELE E 301 and ELE E 303 or permission of instructor.
For description, see ELE E 415.

M&AE 417 Introduction to Robotics: Dynamics, Control, Design
Spring. 3 credits.
Introductory course in the analysis and control of mechanical manipulators. Topics include spatial descriptions and transformations, manipulator kinematics and inverse kinematics, differential relationships and static forces, manipulator dynamics, trajectory generation, sensors and actuators, trajectory control, and compliant motion control. Several experiments with a five axis manipulator arm as well as simulation and design using MATLAB and multibody codes will be used.

M&AE 455 Introduction to Composite Materials (also MS&E 455 and T&AM 455)
Spring. 4 credits.
For description, see T&AM 455.

M&AE 461 Entrepreneurship for Engineers (also ENGRG 461)
Fall. 3 credits. Enrollment open to upper class engineers; others with permission of instructor.
This course will examine issues and skills necessary to identify, evaluate, and start new business ventures. Topics include competition, strategy, writing a business plan, intellectual property, technology forecasting, product design and development, sources of capital, and manufacturing. Cases and guest lecturers will provide material for analysis and class discussion.

M&AE 467 Advanced Mechanical Analysis and Design
Fall. 3 or 4* credits. Evening examinations. Prerequisite: M&AE 325 and M&AE 326 or permission of instructor. *Fulfills M&AE design elective if taken for 4 credits.
Further application of the principles of mechanics and materials to problems of analysis and design of mechanical components and systems. Diverse examples from aerospace, automotive, and biomechanical fields, with emphasis on current machinery applications. Students have access to general-purpose software tools (such as MATLAB) as well as specialized computational codes (such as ANSYS) for analysis of stress and deformation.

[M&AE 469 Stress Analysis for Mechanical and Aerospace Design
Fall. 3 credits. Prerequisites: T&AM 202 and M&AE 325 or permission of instructor. Evening examinations. Not offered 1999–2000.
Study of advanced topics in the analysis of stress and deformation of elastic bodies, with applications to analysis and design of mechanical and aerospace systems and components. Review of mechanics fundamentals and their application to classical problems. Introduction to modern computational methods (such as the finite element method) for analysis of stress and deformation.]

M&AE 478 Feedback Control Systems (also ELE E 471)
Fall. 4 credits. Prerequisites: ELE E 301, or M&AE 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 root-locus and frequency response methods. Includes laboratory that examines modeling and control of representative dynamic processes. (Lectures shared with CHEME 472.)

M&AE 479 Modeling and Simulation of Mechanical and Aerospace Systems (also M&AE 579)
Spring. 3 or 4* credits. Prerequisite: senior engineering standing or permission of instructor. Evening examinations. Term project. *Fulfills M&AE design elective if taken for 4 credits.
Representation of discrete and distributed dynamic systems by state-variable models. Time- and frequency-domain simulation via general-purpose languages (such as MATLAB) and special-purpose simulation software (such as Simulink). Introduction to finite element modeling of distributed systems via educational and commercial software (such as MacTran and ANSYS). Selected mechanical and aerospace applications.

M&AE 486 Automotive Engineering Design
Spring. 4 credits. Prerequisite: senior standing. Fulfills field design requirement.
For description, see M&AE 386.

M&AE 514 Design for Manufacture and Assembly
Spring. 3 or 4 credits; (4 credit option includes a lab or a design option for M&AE seniors). Prerequisites: ENGRG 102 and M&AE 212 or 412 a introductory probability and statistics, or permission of instructor.
Nominal DFMA (Design for Manufacture & Assembly) and variational DFMA are covered in two parallel streams. The nominal stream is based on readings in a popular text that surveys the characteristics of manufacturing and assembly processes that influence the design of parts and products. The second stream, covered through lectures and diverse reading, addresses dimensional variability and its control through parametric and geometric tolerances, dimensional metrology, and aspects of statistical quality and process control.

M&AE 565 Biomechanical Systems—Analysis and Design
Fall. 3 or 4 credits. Prerequisites: T&AM/ENGRD 203 and senior standing, graduate standing, or permission of instructor.
Selected topics from the study of the human body as a mechanical system. Emphasis on the modeling, analysis, and design of biomechanical systems frequently encountered in orthopaedic engineering and rehabilitation engineering.

M&AE 571 Applied Dynamics
Fall. 3 credits. Prerequisites: graduate standing, seniors with T&AM/ENGRD 203, M&AE 326 or permission of instructor. 2 lectures.
Introduction to multibody dynamics; dynamics of rigid bodies; Newton-Euler methods, Lagrangian dynamics, principle of virtual power (Kane-Jourdain methods); applications to robotics, space dynamics of satellites, electro mechanical systems.

M&AE 579 Modeling and Simulation of Mechanical and Aerospace Systems
Spring. 4 credits. Prerequisite: graduate standing or permission of instructor. Evening examinations. Term project.
For description, see M&AE 479.

M&AE 612 Materials Processing: Theory and Applications
Fall. 4 credits. Prerequisite: graduate standing, or permission of instructor.
Basic principles governing the inelastic behavior of solids. 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 semisolid state.

[M&AE 613 Computational Methods In Materials Processing
Spring. 4 credits. Prerequisite: M&AE 612 or permission of instructor. Not offered 1999–2000.
Thermodynamic framework for inelastic constitutive models, temperature and rate dependence, phenomenology of plastic deformation. 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 with an elasto-plastic 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 615 Experiments in Materials Processing
Fall. 4 credits. Prerequisite: M&AE 680 (finite elements) or permission of instructor.
This course will focus on experiments and simulations related to the mechanical properties of materials and materials processing. A general introduction to sensors and instrumentation for engineering measurements will also be included. Testing for mechanical properties/model parameter characterization and simple boundary value problems: linear elasticity, inelastic deformation, fatigue, and fracture, including rate and temperature effects. Process simulation experiments including forging, extrusion, rolling, and ironing may also be conducted. In addition, an emphasis will be placed on the experiment/simulation interface. Students will perform analyses including finite element modeling to correlate and predict materials behaviors observed in the experiments. These analyses include linear elasticity behavior, state variable plasticity modeling and fracture mechanics.

M&AE 655 Composite Materials (also MS&E 655 and T&AM 655)
Spring. 4 credits.
For description, see T&AM 655.

M&AE 664 Mechanics of Bone
Spring. 3 credits. Prequisites: graduate standing or permission of instructor.
This course will focus on current methods and results in skeletal research, focusing on bone. Topics include skeletal anatomy and physiology, experimental and analytical methods for determination of skeletal behavior, mechanical behavior of bone tissue, and skeletal functional adaptation to mechanics.

[M&AE 670 Finite Element Analysis for Mechanical and Aerospace Design
Spring. 4 credits. Prerequisite: graduate standing, or permission of instructor. Evening examinations. Term project. Not offered 1999–2000.
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 consideration of inherent capabilities and limitations of large-scale, general-purpose structural mechanics programs (such as ANSYS). Introduction to computational aspects through study of small, special-purpose programs and application of available general-purpose programs.]

M&AE 676 Model-Based Estimation
Fall. 3 credits. Prerequisites: linear algebra, differential equations, and MATLAB programming. Open to M.S./Ph.D.; others by permission of the instructor.
This course covers a variety of ways in which models and experimental data can be used to estimate model quantities that are not directly measured. The two main estimation methods that are presented are a) least-squares estimation for general problems and b) Kalman filtering for dynamic systems problems. Techniques for linear models are taught as are techniques for nonlinear models. Both theory and application are presented, but the emphasis is on the latter. The course includes a final programming project.

M&AE 677 Advanced Topics in Systems and Control
Spring. 4 credits. Prerequisite: M&AE 478 (ELE E 471), ELE E 521, graduate standing, or permission of instructor.
Modern topics in model based control pertaining to multi-input, multi-output systems. Emphasis on design techniques which result in closed loop systems that are insensitive to modeling errors. Topics include H-infinity and H-2 optimization, explicit models of uncertainty, gain scheduling, and the analysis of uncertain systems. Real-time control laboratory will include applications such as flight control and control of flexible space structures.

M&AE 680 Finite Element Analysis (also CEE 772 and T&AM 666)
Spring. 3 credits. Prerequisites: T&AM 663 or equivalent.
Conceptual, theoretical, and practical bases for finite element analysis in engineering, with emphasis on structural, mechanical, fluid, and thermal problems. Focuses on the FEM as a method for numerically solving partial differential equations. Topics include: strong and weak problem forms; weighted-residual and variational formulations; formulation of elliptic, parabolic, hyperbolic, and eigenvalue problems; convergence and error estimation; and isoparametric elements. Applications selected from such topics as nonlinear analysis, materials processing, and fracture mechanics.

Energy, Fluids, and Aerospace Engineering

M&AE 305 Introduction to Aeronautics
Fall. 3 credits. Prerequisite: T&AM/ENGRD 203; limited to upperclass engineers, others with permission of instructor.
Introduction to aerodynamic design of aircraft. Principles of incompressible and compressible aerodynamics, boundary layers, and wing theory. Description and performance of reciprocating and jet propulsion engines; propeller theory. Design analyses focus on transonic passenger airplanes and small supersonic jets.

M&AE 306 Spacecraft Engineering
Spring. 3 credits. Upperclass engineering students.
Introduction to spacecraft design from launch, through orbital operation, to reentry. Topics covered include space missions, space environment, orbital mechanics, rocket theory, and reentry. Emphasis on satellites orbiting the Earth. Several guest lectures on current problems and trends in spacecraft operation and development.

M&AE 400 Components and Systems: Engineering in a Social Context (also S&TS 400)
Spring. 3 credits. Prerequisites: upperclass standing, two years of college physics. Serves as an approved elective but not as a field elective in mechanical engineering. Offered alternate years.
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), supersonic transport, and the automobile and its effect on the environment, we investigate interactions between the scientific, technical, political, economic, and social forces that are involved in the development of engineering systems.

M&AE 401 Components and Systems: Engineering in a Social Context
Spring. 4 credits. Prerequisites: senior standing, two years of college physics. Fulfills field design requirement. Offered alternate years.
For description, see M&AE 400.

M&AE 423 Intermediate Fluid Dynamics
Spring. 3 credits. Prerequisite: M&AE 323.
This course builds on the foundation of M&AE 323. Emphasis will be both on the calculation of real flows (both engineering and environmental) and fundamental principles. Topics covered will include some exact solutions to the Navier-Stokes equations, boundary layers, wakes and jets, separation, convection, stratified and rotating flows, fluid instabilities, turbulence and chaos.

M&AE 449 Combustion Engines
Spring. 3 credits. Prerequisites: ENGRD 221 and M&AE 323.
Introduction to combustion engines, with emphasis on the application of thermodynamic and fluid-dynamic principles affecting their performance. Chemical equilibrium and kinetics, ideal-cycle analyses, deviations from ideal processes, engine breathing, combustion knock. Formation and control of undesirable exhaust emissions.

M&AE 458 Introduction to Nuclear Science and Engineering (also A&EP 403, ELE E 403 and NS&E 403)
Fall. 3 credits. Prerequisites: PHYS 214 and MATH 294.
For description, see NS&E 403.

M&AE 459 Introduction to Controlled Fusion: Principles and Technology (also A&EP 484, ELE E 484 and NS&E 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. Offered on demand.
For description, see NS&E 484.

M&AE 506 Aerospace Propulsion Systems
Spring. 3 credits. Prerequisite: M&AE 323 or permission of instructor. Offered alternate years.
Application of thermodynamic and fluid-mechanic principles to design and performance of aerospace systems. Jet propulsion principles, including rockets. Electric propulsion. Future possibilities for improved performance.

[M&AE 507 Dynamics of Flight Vehicles
Spring. 3 credits. Prerequisites: M&AE 305 and M&AE 323 or permission of instructor. Offered alternate years. Not offered 1999–2000.
Introduction to stability and control of atmospheric-flight vehicles. Review of aerodynamic forces and methods for analysis of linear systems. Static stability and control. Small disturbance equations of unsteady motion. Dynamic stability of longitudinal and lateral-directional motions; transient response. At the level of *Dynamics of Flight: Stability and Control* by Etkin.]

M&AE 543 Combustion Processes
Fall. 3 credits. Prerequisite: graduate standing or permission of instructor.
An introduction to combustion and flame processes, with emphasis on fundamental fluid dynamics, heat and mass transport, and reaction-kinetic processes that govern combustion rates. Thermochemistry, kinetics, vessel explosions, laminar and turbulent premixed and diffusion flames, droplet combustion, and combustion of solids.

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, including 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; sound waves, viscous flows, boundary layers, and potential flows.

[M&AE 602 Fluid Dynamics at High Reynolds Numbers
Spring. 4 credits. Prerequisite: M&AE 601. Not offered 1999–2000.
Navier-Stokes and Euler equations, integral formulas for fluid forces and moments on immersed bodies in compressible and incompressible viscous flows. Vorticity dynamics in compressible 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 603 Compressible Gas Dynamics
Fall. 4 credits. Graduate standing or permission of instructor. Not offered 1999–2000.
Fundamentals of compressible gas dynamics are described using thermodynamics and fluid properties, as well as isentropic flow theory; normal shock waves including Rankine-Hugoniot relations; duct flows including effects of area, friction, and heat interaction; oblique shock waves and Prandtl-Meyer expansion fans; applications include high-speed aerodynamics, combustor design, and jets used for materials processing.]

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: postulates of quantum mechanics, internal structure, rigid rotator, harmonic oscillator, one-electron atom. Statistical mechanics: partition functions, relation to thermodynamics, calculations of thermodynamic properties. Chemical rate processes.

[M&AE 636 Elements of Computational Aerodynamics
Spring. 4 credits. Prerequisites: graduate standing and a graduate-level course in fluid mechanics. Not offered 1999–2000.
Topics relevant to numerical solution of problems in aerodynamics and fluid mechanics. Analysis and application of computational techniques appropriate for solution of inviscid or high Reynolds number fluid flow problems. Course has common lectures with M&AE 736, but is more applications oriented and uses commercial software for all computational exercises.]

M&AE 648 Seminar on Combustion
Fall. 2 or 4 credits. Prerequiste: M&AE 543 or permission of instructor.
S. B. Pope.
Discussion of contemporary problems in combustion research, with emphasis on applications of modern experimental and analytical techniques. Typical problems include formation and removal of pollutants in combustion systems, combustion of alternative fuels, coal combustion and combusion in turbulent flow. Topic for Fall 1999: turbulent nonpremixed combustion.

M&AE 651 Advanced Heat Transfer
Spring. 4 credits. Prerequisite: graduate standing or permission of instructor.
Advanced treatment of conductive and convective heat transfer. Basic equations reasoned in detail. Integral and differential formulations. Exact and approximate solutions. Forced convection. Natural convection. Laminar and turbulent flows. Effects of viscous dissipation and mass transfer.

[M&AE 654 Radiation Heat Transfer
2–4 credits. Prerequisite: graduate standing or permission of instructor. Not offered 1999–2000.
An independent readings course. Coverage of surface- and gas-radiation properties, including reflection, emission, absorption, and scattering. Deductions from the first and second laws of thermodynamics. The radiative-transfer equation; surface-surface, surface-volume, and volume-volume exchange. Simplifying approximations. Modern methods for exchange calculations and transport analysis including integral, computer-graphics-assisted, and Monte Carlo approaches. Assigned readings from *Radiative Heat Transfer,* by Modest. Discussion sessions. Assigned problems and papers.]

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, and the closure problem. Reynolds-stress equation: effects of dissipation, anisotropy, deformation. Transported scalars. Probability density functions (pdf's): transport equations, relationship to second-order closures, stochastic modeling, and the Langevin equation. The course emphasizes comparison of theory with experiment. Large-eddy simulations: filtered and residual motions, Smagorinsky and dynamic models.

M&AE 733 Stability of Fluid Flow
Fall, on demand. 4 credits. S-U grades only. Prerequisite: graduate standing or permission of instructor.
Basic stability and bifurcation theory in fluid systems. "Open" flow systems: inviscid Kelvin-Helmholtz, Rayleigh-Taylor instability, and capillary instability of liquid jets. Stability of parallel shear flows and of concentrated vortex flows. Spatial development of linearly unstable motion: "absolute" and "convective" instability. Thermal, double-diffusive, and related instabilities. Post-bifurcation behavior: the Ginzburg-Landau (Stewartson-Stuart) and Davey-Hocking-Stewartson amplitude equations. Phase dynamics and pattern formation. Stability of periodic motion: Floquet theory. Secondary instabilities; Eckhaus instability, Busse "balloons." Energy stability theory. Effects of symmetry. Taylor-Couette instability.

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 Theory of Computational Aerodynamics
Spring. 4 credits. Prerequisites: graduate standing, an advanced course in continuum mechanics or fluid mechanics, and some FORTRAN programming experience. Not offered 1999–2000.
Numerical methods to solve inviscid and high-Reynolds-number fluid-dynamics problems, including finite-difference, finite-volume, and surface-singularity methods. Accuracy, convergence, and stability; treatment of boundary conditions and grid generation. Focus on hyperbolic (unsteady flow with shock waves) and mixed hyperbolic-elliptic (steady transonic flow) problems. Assignments require programming a digital computer.]

M&AE 737 Computational Fluid Mechanics and Heat Transfer
Fall. 4 credits. Prerequisites: graduate standing; an advanced course in continuum mechanics, heat transfer, or fluid mechanics; and some FORTRAN, C, or C++ programming experience.
Numerical methods are developed for the elliptic and parabolic partial differential equations that arise in fluid flow and heat transfer when convection and diffusion are present. Finite-difference, finite-volume, and some spectral methods are considered, together with issues of accuracy, stability, convergence, and conservation. Current methods are reviewed. Emphasis is on steady

and unsteady essentially incompressible flows. Assigned problems are solved on a digital computer.

Special Offerings

M&AE 490 Special Investigations in Mechanical and Aerospace Engineering
Fall, spring. Credit to be arranged. Limited to undergraduate students. Prerequisite: permission of instructor.
Intended for an individual student or a small group of students who want to pursue a particular analytical or experimental investigation outside of regular courses or for informal instruction supplementing that given in regular courses.

M&AE 491 Design Projects in Mechanical and Aerospace Engineering
Fall, spring. 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 (also ELE E 587 and NS&E 545)
Fall. 1 credit.
For description, see ELE E 587.

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.
Introduction to topics of current research interest in aerospace engineering by Aerospace faculty and invited speakers. Individual design projects supervised by separate faculty members after introductory sessions.

M&AE 594 Manufacturing Seminar (also OR&IE 893–894)
Fall, spring. 1 credit.
For description, see OR&IE 893–894.

M&AE 690 Special Investigations in Mechanical and Aerospace Engineering
Fall, spring. Credit to be arranged. Limited to graduate students.

M&AE 695 Special Topics in Mechanical and Aerospace Engineering
Fall, spring. Credit to be arranged. Graduate standing and permission of instructor.
Special lectures by faculty members on topics of current research.

M&AE 791 Mechanical and Aerospace Research Conference
Fall, spring. 1 credit each term. S-U grades only. For graduate students involved in research projects.
Presentations on research in progress by faculty and students.

M&AE 799 Mechanical and Aerospace Engineering Colloquium
Fall, spring. 1 credit each term. Credit limited to graduate students. All students and staff invited to attend.
Lectures by visiting scientists and Cornell faculty and staff members on research topics of current interest in mechanical and aerospace science, especially in connection with new research.

M&AE 890 Research in Mechanical and Aerospace Engineering
Credit to be arranged. Prerequisite: candidacy for M.S. degree in mechanical or aerospace engineering or approval of director.
Independent research in an area of mechanical and aerospace engineering under the guidance of a member of the faculty.

M&AE 990 Research in Mechanical and Aerospace Engineering
Credit to be arranged. Prerequisite: candidacy for Ph.D. degree in mechanical or aerospace engineering or approval of director.
Independent research in an area of mechanical and aerospace engineering under the guidance of a member of the faculty.

NUCLEAR SCIENCE AND ENGINEERING

NS&E 121 Fission, Fusion, and Radiation (also A&EP 121 and ENGRI 121)
Spring. 3 credits. S-U grades optional for students outside the College of Engineering. K. B. Cady.
This is a course in the Introduction to Engineering series. For description, see ENGRI 121.

NS&E 403 Introduction to Nuclear Science and Engineering (also A&EP 403, ELE E 403, and M&AE 458)
Fall. 3 credits. Prerequisites: PHYS 214 and MATH 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. K. B. Cady.
Introduction to the fundamentals of nuclear reactors. Topics include an overview of the field of nuclear engineering; nuclear structure, radioactivity, and reactions; interaction of radiation and matter; and neutron moderation, neutron diffusion, the steady-state chain reaction, and reactor kinetics. At the level of *Introduction to Nuclear Engineering*, by Lamarsh.

NS&E 484 Introduction to Controlled Fusion: Principles and Technology (also A&EP 484, ELE E 484, and M&AE 459)
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. Offered on demand. D. A. Hammer.
Introduction to the physical principles and various engineering aspects underlying power generation by controlled fusion. Topics include: (1) fuels and conditions required for fusion power, and basic fusion-reactor concepts; (2) fundamental aspects of plasma physics relevant to fusion plasmas, and basic engineering problems for a fusion reactor; and (3) an engineering analysis of proposed magnetic and/or intertial confinement fusion-reactor designs.

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. V.O. Kostroun.
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 nonnuclear 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 521 Radiation Effects in Materials
Fall. 3 credits. Prerequisite: introductory course in nuclear science and materials science. K. Unlü.
Radiation effects in fission and fusion reactors. Displacement of atoms by neutrons, electrons and ions, radiation induced defects, diffusion of point defects in the crystalline lattice, void swelling, and other radiation induced changes in mechanical properties of alloys. Radiation effects in fission and fusion reactor materials. Nuclear reactor fuels. At the level of *Fundamental Aspects of Nuclear Reactor Fuel Elements*, by D. R. Olander.

NS&E 545 Energy Seminar (also ELE E 587 and M&AE 545)
Fall. 1 credit. D. A. Hammer.
For description, see ELE E 587.

NS&E 551 Nuclear Measurements in Research
Spring. 3 credits. Prerequisite: PHYS 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 fields in which nuclear methods are used. Open to qualified undergraduates. K. Unlü.
Lectures on interaction of radiation with matter, radiation protection, and nuclear instruments. Experiments on radiation detection 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 methods used in non-nuclear fields. At the level of *Radiochemistry and Nuclear Methods of Analysis*, by Ehmann and Vance.

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 612 Nuclear Reactor Theory
Fall. 4 credits. Prerequisites: a year of advanced calculus and some nuclear physics. K. B. Cady.
Physical theory of fission reactors; fission and neutron interactions with matter; theory of neutron diffusion; slowing down and

thermalization; calculations of criticality and neutron-flux distribution in nuclear reactors; reactor kinetics. At the level of *Nuclear Reactor Theory*, by Lamarsh.

NS&E 633 Nuclear Reactor Engineering (also A&EP 633)
Fall. 4 credits. K. B. Cady.
For description, see A&EP 633.

OPERATIONS RESEARCH AND INDUSTRIAL ENGINEERING

OR&IE 115 Engineering Applications of Operations Research (also ENGRI 115)
Fall, spring. 3 credits. Enrollment not open to OR&IE upper-class majors.
This is a course in the Introduction to Engineering series. For description see ENGRI 115.

OR&IE 270 Basic Engineering Probability and Statistics (also ENGRD 270)
Fall, spring, summer. 3 credits. Pre- or co-requisite: MATH 293.
For description see ENGRD 270.

OR&IE 310 Industrial Systems Analysis
Spring. 4 credits. Prerequisite: ENGRD 270, or permission of instructor.
Design of production facilities, including engineering economy, materials handling process design, and facility layout. Operations analysis, including process scheduling, process evaluation, procedural analysis, project management, methods analysis and design, work measurement, inventory control, job evaluation, and quality engineering and control.

OR&IE 320 Optimization I
Fall. 4 credits. Prerequisite: MATH 221 or 294.
Formulation of linear programming problems and solutions by the simplex method. Related topics such as sensitivity analysis, duality, and network programming. Applications include such models as resource allocation and production planning. Introduction to interior-point methods for linear programming.

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.

OR&IE 350 Financial and Managerial Accounting
Fall. 4 credits.
Principles of accounting, financial reports, financial-transactions analysis; financial-statement analysis, budgeting, job-order and process-cost systems, standard costing and variance analysis, economic analysis of short-term decisions.

OR&IE 360 Engineering Probability and Statistics II
Fall. 4 credits. Prerequisite: ENGRD 270 or equivalent.
This second course in probability and statistics provides a rigorous foundation in theory 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. Specific topics include random variables, probability distributions, density functions, expectation and variance, multidimensional random variables, and important distributions including normal, Poisson, exponential, hypothesis testing, 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 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 414 Using Simulation Models for Engineering Design
Spring. 4 credits. Prerequisites: an undergraduate course in probability and statistics through regression analysis, computer programming skills with a working knowledge of or willingness to learn Java, C++, or C. Corequisites: graduate or senior level course in discrete event simulation. Not offered 1999–2000.
This course examines ways for engineers to exercise simulation models efficiently to gain information. The lectures will survey general techniques that are useful in most engineering and manufacturing disciplines; some specialized techniques will also be presented such as Infinitesimal Perturbation Analysis Gradient Estimation, Frequency Domain Screening, Multivariate Adaptive Regression Splines and Wavelets. Students will become familiar with a broad range of modeling strategies.]

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 431 Discrete Models
Fall. 4 credits. Prerequisites: OR&IE 320 and COM S 211, or permission of instructor. Not offered 1999–2000.
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. Not offered 1999–2000.
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 434 Optimization Modeling
Fall. 3 credits. Prerequisites: a grade of at least B- in OR&IE 321/521.
The emphasis is on modeling complicated decision problems as linear programs, integer programs, or highly-structured non-linear programs. Besides modeling, students are required to assimilate articles from the professional literature and to master relevant software.

OR&IE 435 Introduction to Game Theory
Spring. 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 436 A Mathematical Examination of Fair Representation
Spring. 3 credits. Prerequisites: MATH 222 or 294 or permission of instructor. Not offered 1999–2000.
In this course we will study the mathematical aspects of the political problem of fair apportionment. The most recognizable form (in the U.S.) of apportionment is the determination of the number of seats in the U.S. House of Representatives awarded to each state. The constitution indicates that the apportionment should reflect the relative populations, but it does not prescribe a specific method. At first blush it appears that there is a straightforward approach that must lead to a fair, or fairest apportionment, for any fixed house size and known populations. However, indivisibility of seats leads us to interesting mathematical questions and a long, rich and fractious political history involving many famous figures. The basic ideas extend beyond apportionment of legislatures (in both federal systems and proportional representation systems) to some other realms where indivisible resources are to be allocated among competing constituencies.]

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
Fall. 4 credits. Prerequisite: OR&IE 361 or equivalent.
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 473 Empirical Research Methods In Financial Engineering
Fall. 3 credits. Prerequisites: OR&IE 270, 360 and 361 or their equivalents.
This course represents an advanced study of empirical research methods in financial economics. We focus on the empirical techniques used most often in the analysis of financial markets and how they are applied to actual market data.

OR&IE 476 Applied Linear Statistical Models
Spring; weeks 1–7. 2 credits. Prerequisite: OR&IE/ENGRD 270.
Multiple linear regression, diagnostics, model selection, inference, one and two factor analysis of variance. Theory and applications both treated. Use of MINITAB stressed.

OR&IE 480 Information Technology
Fall. 4 credits. Pre- or corequisites: COM S/ENGRD 211, plus either OR&IE 310 or OR&IE 350.
Information technology is the means by which computer science, operations research and industrial engineering are brought to serve the operational and strategic needs of enterprises. The course takes the perspective of an analyst who accesses existing computer data to analyze a problem or opportunity, uses computer tools to manage the data, and integrates a computer application into the solution. This perspective introduces OR&IE and other students to the ways in which information technology is currently being used throughout enterprises and how these uses are changing with the explosive growth of the internet. The course will use lectures (including guest lectures by practitioners), cases, and laboratory exercises intended to make the general concepts concrete.

OR&IE 481 Delivering OR Solutions with Information Technology
Spring; weeks 8–14. 2 credits. Prerequisites: OR&IE 480.
Study of ways in which information technology is used to deliver operations research methodology in real applications, including decision support systems, embedded operations research techniques, packaged software, web-based techniques, collaborative software, and expert systems. Several real applications will be investigated.

OR&IE 490 Teaching in OR&IE
Fall, spring. Credit to be arranged.
Prerequisite: permission of instructor.
This course involves working as a TA in an OR&IE course. The course instructor will assign credits (the guideline is 1 credit per 4 hours/week of work with a limit of 3 credits).

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. Opportunities in the course may be discussed with the Associate Director.

OR&IE 512 Applied Systems Engineering (also CEE 504, ELE E 595, M&AE 591)
Fall. 3 credits. Permission of instructor.
Fundamental ideas of systems engineering and their application to design and development of various types of engineering systems. Defining systems requirements, creating effective project teams, mathematical tools for system analysis and control, testing and evaluation, economic considerations and system life cycle.

OR&IE 515 Design of Manufacturing Systems
Fall. 4 credits. Prerequisite: permission of instructor. Limited to graduate students in Engineering and the Business School.
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 an unstructured problem that resembles a real-world situation. 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 518 Supply Chain Management
Spring; weeks 1–8. 2 credits. Prerequisites: one of OR&IE 310, OR&IE 416, OR&IE 525 or OR&IE 562.
A supply chain is the scope of activities that convert raw materials (i.e., wheat) to finished products delivered to the end consumer (i.e., a box of cereal at the local P&C), usually spanning several corporations. Supply chain management focuses on the flow of products, information and money through the supply chain. An overview of issues, opportunities, tools and approaches. Emphasis on business processes, system dynamics, control, design, re-engineering. Relationship between the supply chain and the company's strategic position relative to its clients and its competition. Dimensions of inter-corporate relationships with partners, including decision-making, incentives, and risk.

OR&IE 520 Operations Research I: Optimization I
For description, see OR&IE 320.

OR&IE 521 Optimization II
For description, see OR&IE 321.

OR&IE 522 Operations Research I: Topics in Linear Optimization
Fall. 1 credit. Pre- or corequisite: OR&IE 520. Students who have already taken OR&IE 321 or 521 should not enroll. Limited to M.Eng. students in OR&IE.
An extension of OR&IE 520 that deals with applications and methodologies of dynamic programming, integer programming, and large-scale linear programming.

OR&IE 523 Operations Research II: Introduction to Stochastic Processes I
For description, see OR&IE 361.

OR&IE 524 Design of Manufacturing Systems II
Spring; weeks 8–14. 2 credits. Prerequisites: OR&IE 562, OR&IE 416; or by permission of instructor.
This project course focuses on the design and analysis of a global corporation's operations. Working in teams, students will examine issues pertaining to a prototype company on the following topics: information system design, marketing, strategy, location of facilities, organization design, manufacturing capacity, planning logistics, production planning, scheduling, inventory control and financial analysis. Meetings between project teams and faculty will be substituted for some lectures or laboratories. Analytical methods appropriate for conducting analysis will be discussed in lectures.

[OR&IE 525 Production Planning and Scheduling Theory and Practice
Fall. 4 credits. Corequisite: OR&IE 320, OR&IE 360. Not offered 1999–2000.
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 552 Revenue Management
Spring; weeks 8–14. 2 credits. Prerequisites: thorough knowledge of OR&IE 360, familiarity and appreciation of time series and regression methods, and graduate standing. OR&IE 320/321 helpful but not required. Others by permission of instructor.
Revenue Management (RM) concepts, models used in practice, and possible extensions; forecasting techniques, including time series methods, booking curves, and customer preference models; demand uncensoring; overbooking, optimization with emphasis on stochastic models of demand; benefit measurement; computational and technological issues; examples from the airline and other industries.

OR&IE 560 Engineering Probability and Statistics II
For description, see OR&IE 360.

[OR&IE 561 Queuing Theory and Its Applications
Spring. 3 credits. Prerequisite: OR&IE 361 or permission of instructor. Not offered 1999–2000.
Basic queueing models; delay and loss systems; finite source, finite capacity, balking, reneging; systems in series and in parallel; FCFS versus LCFS; busy period problems; output; design and control problems; priority systems; queueing networks; the product formula; time sharing; server vacations; applications to equipment maintenance, computer operations and flexible manufacturing systems.]

OR&IE 562 Inventory Management
Fall. 3 credits. Prerequisite: OR&IE 321, 361, or permission of instructor.
The first portion of this course is devoted to the analysis of several deterministic and probabilistic models for the control of single and multiple items at one of many locations. The second portion of this course is presented in an experiential learning format. The focus is on analyzing and designing an integrated production and distribution system for a global company. Applications are stressed throughout.

OR&IE 563 Applied Time-Series Analysis
Fall. 3 credits. Prerequisites: OR&IE 361 and OR&IE 270, or permission of instructor.

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 Stochastic Processes II
Fall. 4 credits. Prerequisite: OR&IE 361 or equivalent. Lectures concurrent with OR&IE 462.
For description, see OR&IE 462.

OR&IE 565 Applied Financial Engineering
Spring. 4 credits. Limited to M.Eng. students.
This course has two components: a sequence of lectures and a project. The course will be co-listed with the Johnson School and will be co-taught by one faculty member from each school. The lectures will be given by the faculty for the course and by invited speakers from the financial industry. The project will satisfy the M.Eng. project requirement.

[OR&IE 575 Experimental Design
Spring; weeks 8–14 (alternates with 576). 2 credits. Prerequisite: OR&IE 476. Not offered 1999–2000. Next offered 2000–01.
Randomization, blocking, sample size determination, factorial designs, 2^p full and fractional factorials, response surfaces, Latin squares, split plots, Taguchi designs. Engineering applications. Computing in MINITAB or SAS.]

OR&IE 576 Regression
Spring; weeks 8–14 (alternates with 575). 2 credits. Prerequisite: OR&IE 476.
Nonlinear regression, advanced diagnostics for multiple linear regression, collinearity, ridge regression, logistic regression, nonparametric estimation including spline and kernel methods, regression with correlated errors. Computing in MINITAB or SAS.

OR&IE 577 Quality Control
Fall. 3 credits. Prerequisites: OR&IE/ENGRD 270.
Concepts and methods for process and acceptance control. Control charts for variables and attributes. Process capability analysis. Acceptance sampling. Continuous sampling plans. Life tests. Use of experimental design and Taguchi methods for off-line control.

OR&IE 581 Simulation Modeling
Fall; weeks 1–7. 2 credits. Prerequisites: programming experience and OR&IE 360 or permission of instructor. OR&IE 360 may be taken concurrently.
Models and digital computer programs to simulate the behavior of complex stochastic systems in time. Modeling time and randomness, simulation languages, generation of stochastic inputs (scalers and processes),

OR&IE 582 Simulation Analysis
Fall; weeks 8–14. 2 credits. Prerequisites: programming experience and OR&IE 360 or permission of instructor. OR&IE 360 may be taken concurrently.
Probabilistic and statistical methods for design of computer simulation experiments and analysis of their outputs. Initialization issues, analysis of simulation outputs, variance reduction methods, optimization through simulation.

OR&IE 599 Project
Fall, spring. 5 credits. For M.Eng. students.
Identification, analysis, design, and evaluation of feasible solutions to some applied problem in the OR&IE field. A formal report and oral defense of the approach and solution are required.

[OR&IE 625 Scheduling Theory
Spring. 3 credits. Not offered 1999–2000.
Scheduling and sequencing problems, including single-machine problems, parallel-machine scheduling, and shop scheduling. The emphasis is on the design and analysis of polynomial time optimization and approximation algorithms and on related complexity issues.]

OR&IE 630 Mathematical Programming I
Fall. 4 credits. Prerequisites: advanced calculus and elementary linear algebra.
A rigorous treatment of the theory and computational techniques of linear programming and its extensions, including formulation, duality theory, algorithms; sensitivity analysis; network flow problems and algorithms; theory of polyhedral convex sets, systems of linear equations and inequalities, Farkas' Lemma; exploiting special structure in the simplex method, and computational implementation.

[OR&IE 632 Nonlinear Programming
Fall. 3 credits. Prerequisite: OR&IE 630. Not offered 1999–2000.
Necessary and sufficient conditions for unconstrained and constrained optima. Topics include the duality theory, computational methods for unconstrained problems (e.g., quasi-Newton algorithms), linearly constrained problems (e.g., active set methods), and nonlinearly constrained problems (e.g., successive quadratic programming, penalty and barrier methods).]

[OR&IE 633 Graph Theory and Network Flows
Spring. 3 credits. Prerequisite: permission of instructor. Not offered 1999–2000.
Directed and undirected graphs. Bipartite graphs. Hamilton cycles and Euler tours. Connectedness, matching, and coloring. Flows in capacity-constrained networks. Maximum flow and minimum cost flow problems.]

OR&IE 635 Interior-Point Methods for Mathematical Programming
Spring. 3 credits. Prerequisites: MATH 411 and OR&IE 630, or permission of instructor.
Interior-point methods for linear, quadratic, and semidefinite programming and, more generally, for convex programming. Discussion of the basic ingredients—barrier functions, central paths, and potential functions—that go into the construction of polynomial-time algorithms, and various ways of combining them. Emphasis on recent mathematical theory and the most modern viewpoints.

OR&IE 636 Integer Programming
Fall. 3 credits. Prerequisite: OR&IE 630.
Discrete optimization. Linear programming in which the variables must assume integral values. Theory, algorithms, and applications. Cutting-plane and enumerative methods, with additional topics drawn from recent research in this area.

OR&IE 637 Semidefinite Programming
Spring; weeks 8–14. 2 credits. Pre- or corequisite: OR&IE 635.
Linear optimization over the cone of positive semidefinite symmetric matrices; applications to control theory, eigenvalue optimization, and strong relaxations of combinatorial optimization problems; duality; computational methods, particularly interior-point algorithms.

[OR&IE 639 Polyhedral Convexity
Spring. 3 credits. Prerequisite: basic knowledge of linear algebra. Not offered 1999–2000.
A comprehensive introduction to the geometry and combinatorics of polyhedral convex sets. Also, linear inequalities, supporting and separating hyperplanes; polarity; convex hulls, facets, and vertices; face lattices; convex cones and polytopes; minkowski sums; gale transforms; simplicial and polyhedral subdivision; applications to linear programming, combinatorial optimization, and computational geometry.]

OR&IE 650 Applied Stochastic Processes
Fall. 4 credits. Prerequisite: a one-semester calculus-based probability course.
An introduction to stochastic processes that presents the basic theory together with a variety of applications. Topics include Markov processes, renewal theory, random walks, branching processes, Brownian motion, stationary processes, martingales, and point processes.

OR&IE 651 Probability
Spring. 4 credits. Prerequisite: real analysis at the level of MATH 413 and a previous one-semester course in calculus-based probability.
Sample spaces, events, sigma fields, probability measures, set induction, independence, random variables, expectation, review of important distributions and transformation techniques, convergence concepts, laws of large numbers and asymptotic normality, conditioning.

[OR&IE 662 Advanced Stochastic Processes
Spring. 3 credits. Prerequisite: OR&IE 651 or equivalent. Not offered 1999–2000.
Brownian motion, martingales, Markov processes, and topics selected from: diffusions, stationary processes, point processes, weak convergence for stochastic processes and applications to diffusion approximations, Lévy processes, regenerative phenomena, random walks, and stochastic integrals.]

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 680 Simulation
Spring. 4 credits. Prerequisite: permission of instructor.
An advanced version of OR&IE 581 and 582, intended for Ph.D.-level students.

OR&IE 728–729 Selected Topics in Applied Operations Research
Fall, spring. Credit to be arranged.
Current research topics dealing with applications of operations research.

OR&IE 738–739 Selected Topics in Mathematical Programming
Fall, spring. Credit to be arranged.
Current research topics in mathematical programming.

OR&IE 768–769 Selected Topics in Applied Probability
Fall, spring. Credit to be arranged.
Topics are chosen from current literature and research areas of the staff.

OR&IE 778–779 Selected Topics in Applied Statistics
Fall, spring. Credits to be arranged.
Topics chosen from current literature and research of the staff.

OR&IE 790 Special Investigations
Fall, spring. Credit to be arranged.
For individuals or small groups. Study of special topics or problems.

OR&IE 799 Thesis Research
Fall, spring. Credit to be arranged.
For individuals doing thesis research for master's or doctoral degrees.

OR&IE 891 Operations Research Graduate Colloquium
Fall, spring. 1 credit.
A weekly 1-1/2 hour meeting devoted to presentations by distinguished visitors, by faculty members, and by advanced graduate students on topics of current research in the field of operations research.

OR&IE 893–894 Applied OR&IE Colloquium (also M&AE 594)
893, fall; 894, spring. 1 credit each term.
A weekly meeting for Master of Engineering students. Discussion of various topics on manufacturing with faculty members and outside speakers.

THEORETICAL AND APPLIED MECHANICS

Basics in Engineering Mathematics and Mechanics

T&AM 118 Design Integration: A Portable CD Player (also ENGRI 118 and MS&E 118)
Spring. 3 credits.
This is a course in the Introduction to Engineering series. For description, see ENGRI 118.

T&AM 202 Mechanics of Solids (also ENGRD 202)
Fall, spring. 3 credits Prerequisite: PHYS 112, coregistration in MATH 293 or permission of instructor.
For description, see ENGRD 202.

T&AM 203 Dynamics (also ENGRD 203)
Fall, spring. 3 credits. Prerequisite: T&AM 202, coregistration in MATH 294, or permission of instructor.
For description, see ENGRD 203.

Engineering Mathematics

T&AM 191 Calculus for Engineers (also MATH 193)
Fall. 4 credits. Prerequisite: 3 years of high school mathematics, including trigonometry.
For description, see MATH 191.

T&AM 192 Calculus for Engineers (also MATH 192)
Fall, spring, or summer. 4 credits. Prerequisite: MATH/T&AM 191/193.
For description, see MATH 192.

T&AM 193 Calculus for Engineers (also MATH 193)
Fall. 4 credits. Prerequisite: 3 years of high school mathematics, including trigonometry.
For description, see MATH 193.

T&AM 293 Engineering Mathematics (also MATH 293)
Fall, spring. 4 credits. Prerequisite: MATH/T&AM 192 plus a knowledge of computer programming equivalent to that taught in COM S 100.
For description, see MATH 293.

T&AM 294 Engineering Mathematics (also MATH 294)
Fall, spring. 4 credits. Prerequisite: MATH/T&AM 293.
For description, see MATH 294.

T&AM 310 Advanced Engineering Analysis I
Fall, spring. 3 credits. Prerequisite: MATH/T&AM 294 or equivalent.
Initial value, boundary value, and eigenvalue problems in linear ordinary differential equations. Special functions, linear partial differential equations. Introduction to probability and statistics. Use of computers to solve problems.

T&AM 311 Advanced Engineering Analysis II
Spring. 3 credits. Prerequisite: MATH/T&AM 294 or equivalent (T&AM 311 can be taken without T&AM 310).
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. Examples are drawn from fluid mechanics, heat transfer, electromagnetics, and elasticity.

T&AM 610 Methods of Applied Mathematics I
Fall. 3 credits. Intended for beginning graduate students in engineering and science. An intensive course, requiring more time than is normally available to undergraduates (see T&AM 310–311) but open to exceptional undergraduates with permission of instructor.
Emphasis is on applications. Linear algebra, calculus of several variables, vector analysis, series, ordinary differential equations, complex variables.

T&AM 611 Methods of Applied Mathematics II
Spring. 3 credits. Prerequisite: T&AM 610 or equivalent.
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 and 611 or equivalent.
Integral transform, methods, Wiener-Hopf technique, solutions of integral equations and partial differential 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 610 and 611 or equivalent.
Topics include asymptotic behavior of solutions of linear and nonlinear ODE (e.g., the WKB boundry layer 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 exercises at the option of the instructor.

Continuum Mechanics

T&AM 455 Introduction to Composite Materials (also M&AE 455 and MS&E 455)
Spring. 4 credits.
Introduction to composite materials; varieties and properties of fiber reinforcements and matrix materials; micromechanics of stiffness and stress transfer in discontinuous fiber/matrix arrays; orthotropic elasticity as applied to parallel fibers in a matrix and lamina; theory of stiffness (tension, bending, torsion) and failure of laminates and composite plates including computer software for design; manufacturing methods and applications for composities. There is a group component design and manufacturing paper required, and a group laboratory on laminated component fabrication.

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. 5–15 credits.
M. Eng. (Mechanics) project related to the mechanics of advanced composites and structures.

T&AM 655 Composite Materials (also M&AE 655 and MS&E 655)
Spring. 4 credits.
Taught jointly with T&AM 455 using same lecture material, but also includes more advanced material and homeworks through additional lectures. Additional material includes: shear-lag models of stress transfer around arrays of fiber breaks including viscoelastic effects, statistical theories of composite strength and failure; stress distributions around holes and cuts in composite laminates; compressive strength of composites. Laboratory on effects of holes and notches in composites.

T&AM 663 Solid Mechanics I
Fall. 4 credits.
Rigorous introduction to solid mechanics emphasizing linear elasticity: tensors; deformations, rotations and strains; balance principles; stress; small-strain theory; linear elasticity, anisotropic and isotropic; basic theorems of elastostatics; boundary-value problems, e.g. plates, St. Venant's solutions.

T&AM 664 Solid Mechanics II
Spring. 4 credits. Prerequisites: MATH 610 and T&AM 663, or equivalent.
Preparation for advanced courses in solid mechanics. Singular solutions in linear elasticity; plane stress, plane strain, anti-plane shear, airy stress functions; linear viscoelasticity; cracks and dislocations; classical plasticity; thermoelasticity; three-dimensional elasticity.

T&AM 666 Finite Element Analysis (also M&AE 680 and T&AM 666)
Spring. 3 credits. Prerequisites: T&AM 663 or equivalent. P. Dawson.
For description, see M&AE 680.

T&AM 751 Continuum Mechanics and Thermodynamics
Fall. 3 credits. Prerequisites: T&AM 610 and 611; and 663 and 664 or equivalents.
Kinematics; conservation laws; the entropy inequality; constitutive relations: frame indifference, material symmetry; finite elasticity, rate-dependent materials, and materials with internal state variables.

T&AM 752 Nonlinear Elasticity
Spring. 3 credits. Prerequisites: T&AM 610, 611, and 751 or equivalents. Offered alternate years.
Review of governing equations. Linearization and stability; constitutive inequalities; exact solution of special problems; nonlinear string and rod theories; phase transformations and crystal defects.

T&AM 753 Fracture
Fall. 3 credits. Prerequisites: T&AM 610 or 611; and 663 and 664 or equivalents. Offered alternate years.
Fundamentals of linear elastic fracture mechanics: K, small-scale yielding, solutions of elastic crack problems, energy concepts, J-integral. Nonlinear, rate-independent, small-deformation, fracture mechanics: plastic fracture, J-integral, small-scale yielding, fields for stationary and growing cracks. Failure mechanisms of polymers, ceramics, composites, and metals: void growth, load transfer between fibers, crazing. Fracture testing. Fatigue fracture. Computation of stress intensity factors. Plate theory and fracture.

T&AM 757 Inelasticity
Spring. 3 credits. Prerequisites: T&AM 610 and 611; and 663 and 664 or equivalents. Offered alternate years.
Plasticity: dislocation slip systems; early experimental observations; general principles; limit analysis; solution of boundary-value problems, plastic waves, one- and three-dimensional. Visco-elasticity: general principles, solution of boundary-value problems.

[T&AM 759 Boundary Element Methods
Fall. 4 credits. Prerequisites: T&AM 610 and 611; and 633 and 644 or equivalents. Offered alternate years. Not offered 1999–2000.
Introduction to boundary element methods. Solutions for potential theory, linear elasticity, diffusion, material and/or geometric nonlinearities. Modern developments: hypersingular integrals, the boundary contour methods, sensitivity analysis.]

Dynamics and Space Mechanics

T&AM 570 Intermediate Dynamics
Fall. 3 credits.
Newtonian mechanics; motion in rotating coordinate systems. Introduction to analytical mechanics; virtual work, Langrangian mechanics. Hamilton's principle. Small vibration and stability theory. Newtonian-Eulerian mechanics of rigid bodies. Gyroscopes.

T&AM 578 Nonlinear Dynamics and Chaos
Spring. 3 credits. Prerequisite: Mathematics/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 1999–2000.
Review of Lagrangian mechanics, Kane's equations; 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; Melnikov's method.]

[T&AM 672 Celestial Mechanics (also ASTRO 579)
Fall. 3 credits. Offered alternate years. Not offered 1999–2000.
Description of orbits; 2-body, 3-body, and n-body problems; Hill curves, libration points and their stability; capture problems. Osculating orbital elements, perturbation equations; effects of gravitational potentials, atmospheric drag, and solar radiation forces on satellite orbits; secular perturbations, resonances, mechanics of planetary rings.]

T&AM 673 Mechanics of the Solar System (also ASTRO 571)
Spring. 3 credits. Prerequisite: an advanced undergraduate course in dynamics. Offered alternate years.
Gravitational potentials, planetary gravity fields. Free and forced rotations. Chandler wobble, polar wander, damping of nutation. Equilibrium tidal theory, tidal heating. Orbital evolution of natural satellites, resonances, spin-orbit coupling, Cassini states. Long-term variations in planetary orbits. Dust dynamics. Dynamics of ring systems. Physics of interiors, seismic waves, free oscillations. Illustrative examples are drawn from contemporary research.

T&AM 675 Nonlinear Vibrations
Fall. 3 credits. Prerequisite: T&AM 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.

T&AM 776 Applied Dynamical Systems (also MATH 717)
For description, see MATH 717.

Special Courses, Projects, and Thesis Research

T&AM 491–492 Project in Engineering Science
Fall, 491; spring, 492. 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.

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Christine Ranney, associate dean

Terry D. Plater, 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.

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 minimum Test of English as a Foreign Language (TOEFL) score of 550 on the paper-based test or 213 on the computer-based test (higher for some fields);
2) studied for two or more years in, or received a degree from, a college or university in a country where both the language of instruction and 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 fall admission for most fields in the Graduate School should be received by early January. Many fields, however, have different deadlines. Consult the Graduate School's application booklet for the closing date for each field.

Inquiries regarding admission should be addressed to the graduate field office or to the Graduate School Admissions Office, Cornell University, Caldwell Hall, Ithaca, New York 14853–2602.

Inquiries regarding facilities for advanced study and research in a given field, special requirements for such study and research, and opportunities for fellowships and teaching and research assistantships should be addressed to the particular graduate field of interest.

More detailed information is contained in the application for admission to the Graduate School and in the *Graduate School Catalog*. Both may be viewed on the World Wide Web at <http://www.gradschool.cornell.edu/>. An interactive application is available on the Web and application forms may be downloaded and printed from the Web. Both the application and the *Catalog* may be received through the mail by contacting either the individual graduate field office or the Graduate School, Caldwell Hall, Cornell University, Ithaca, New York 14853-2602. (The application is mailed world-wide; the *Catalog* is mailed to addresses with the U.S.)

Note: Programs leading to the degrees of Doctor of Law (J.D.), Master of Laws (LL.M.), 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.

SCHOOL OF HOTEL ADMINISTRATION

ADMINISTRATION

David A. Dittman, dean

A. Neal Geller, associate dean for academic affairs

Judi Brownell, Richard J. and Monene P. Bradley director for graduate studies

Timothy Hinkin, director of undergraduate studies

Donald C. Bishop, associate dean of students and enrollment management

David W. Butler, associate dean for executive education

Robert N. D'Entremont, director of external relations

Margaret Haley Ferguson, director of financial services

James E. Hisle, managing director of the Statler Hotel and J. Willard Marriott Executive Education Center

Cheryl S. Farrell, director of admissions and student services

Yariela Kerr-Donovan, director of minority programs and lecturer

Katherine S. Margolis, director of academic information resources and training

Shari Avery, director of information technologies

Philippus Miller III, director of alumni affairs

Preston Clark, director of instructional support and visiting lecturer

Millie Reed, director of career services

Glenn Withiam, director of publications

Fred Conner, senior editor of the *Cornell Hotel and Restaurant Administration Quarterly*

Mark Adams, director of communications

DEGREE PROGRAMS

	Degree
Hotel and Restaurant Administration	
	B.S.
	M.M.H.
	M.S.
	Ph.D.

FACILITIES

Statler Hall. Statler Hall is a unique building designed expressly to meet the needs of the faculty and students of the School of Hotel Administration. The 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's Nestlé Library has the largest single collection of hospitality-related materials in the United States. The collection contains approximately 23,000 books, 1,000 videotapes, numerous ephemera and memorabilia (such as photographs, menus, and rare books), and more than 800 journal, 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 language 121 and 122 (8 credits) or the equivalent, and attain a minimum grade of at least C- in each (C or above for transfer credit from other institutions); or 4) pass 123 or the equivalent;
4) completion of two units of practice credit prior to the last two terms 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 72 of the 120 credits needed for graduation, the hotel electives account for 12 credits, and 18 credits are allotted for distributive electives. The remaining 18 credits may be earned in courses chosen from the offerings of any college of the university, provided that the customary requirements for admission to such courses are met.

Students in the School of Hotel Administration who plan to attend summer school at Cornell or 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 18-credit group of free electives. No credit toward the degree is allowed for "0"-level courses, such as Educ 005.

Transfer Credit Policy

Transfer students are required to complete all degree requirements with at least seventy-five (75) credits at Cornell University, of which a minimum of sixty (60) must be in courses offered by the Hotel School, and nine (9) must be in distributive electives taken outside the Hotel School. Thus, a maximum of forty-

five (45) hours in transfer credit may be allowed from other accredited colleges or universities, as follows:

Core	18
Hotel Electives	0
Distributive Electives	9
Free Electives	18
	45

In the core, transfer credit may be allowed against basic courses only (for example, HA 121, HA 136, Economics). Others generally are waived, and an upper-level course in the area substituted. For instance, if HA 243 were waived, another marketing course would be required in its place. The communication courses (HA 165 and HA 365) are tailored specifically to the School of Hotel Administration, and, thus, communication courses taken elsewhere generally are not accepted against core courses.

Hotel elective courses may not transfer.

Distributive electives ensure that Hotel students are exposed to other courses at Cornell, and, thus, only nine (9) credits may transfer. The remaining nine (9) must be taken at Cornell but may be distributed in any combination of humanities, social sciences, or natural sciences provided at least three (3) credits are taken (at Cornell or transferred from elsewhere) in each area. A maximum of six credits, but no more than four per semester, of distributive electives may be taken on an S/U basis. For more information on the distribution requirement, see the handout available in the student services office, room 178 Statler Hall.

Eighteen (18) credits in free electives may transfer.

Concentration

While completing the hotel elective courses, undergraduates in the school may select a concentration.

When students select a field of concentration, they should consult the coordinator of instruction in that area during the sophomore year to plan the sequence of courses that will best fit their program.

Upon completion, the concentration will be noted on the transcript, provided a cumulative g.p.a. of 3.0 in the concentration was attained.

Foreign Languages

Mastery of a foreign language is particularly desirable for students who are planning careers in the hospitality industry and, hence, the second language requirement for graduation. Further information on foreign language courses at Cornell, and placement in language courses, may be found in this book in the College of Arts and Sciences program description under the Modern Languages, Literature, and Linguistics section and also under the section Advanced Placement for Freshmen.

Independent Study

Students may conduct independent study projects in any academic area of the school under the direction of a resident faculty member. Credit is arranged on an individual basis. To enroll in an independent study project, students must obtain written permission from the school before the add deadline. See H Adm 499 or 699 for more details.

Practice-Credit Requirement

As part of degree requirements, undergraduates enrolled in the School of Hotel Administration must fulfill the practice-credit requirement and submit verification thereof prior to registering for the last two semesters. 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 free elective credits and 1 practice credit. While on the internship, tuition is reduced and students receive a salary from the sponsoring organization. Positions are available in the U.S. and internationally. Sponsors include, but are not limited to, 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. More information about the management intern program also is available in the Career Services Office, 255 Statler Hall.

Study Abroad

All students planning to study abroad apply through Cornell Abroad; please see the Cornell Abroad program description in the introductory section of Course of Study.

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 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 may 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. A maximum of 4 credits each term may be taken on a "satisfactory-unsatisfactory" (S-U) basis. Students should be aware that a satisfactory grade equals "C-" or above and an unsatisfactory grade equals "D+" or lower.

Students whose term averages are at least 3.3 and who took at least 12 credits of letter grades with no unsatisfactory or incomplete grades are honored by being placed on the Dean's List.

Course Requirements for Graduation

Required courses	*Credits*
Management Operation: Hotel Administration 105, 401	6
Human-Resources Management: Hotel Administration 115, 211	6
Financial Management: Hotel Administration 121, 221, 222, 321	12
Food and Beverage Management: Hotel Administration 136, 236, 335	12
Marketing and Tourism: Hotel Administration 243, elective	6
Property Asset Management: Hotel Administration 255, 355	6
Communication: Hotel Administration 165, 365	6
Operations Management and Information Technology: Hotel Administration 174, 371, 475	9
Law: Hotel Administration 387	3
Economics: Micro and Macro	6
Specifically required credits	72
Hotel Electives	12
Distributive electives	18
Free electives	18
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:

Required courses	*Credits*
H Adm 105, Introduction to Lodging	3
H Adm 115, Organizational Behavior and Interpersonal Skills	3
H Adm 121, Financial Accounting	3
H Adm 136, Introduction to Food Service Operations	4
H Adm 165, Managerial Communication I	3
H Adm 174, Microcomputing	3
H Adm 191, Microeconomics for the Service Industries	3
Macroeconomics	3
Electives	6
	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
Electives	12
	31

Junior Year

Required courses	*Credits*
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 II	3
H Adm 371, Hospitality Quantitative Analysis	3
H Adm 387, Business and Hospitality Law	3
Electives	12
	31

Senior Year

Required courses	*Credits*
H Adm 401, Strategic Management	3
H Adm 475, Information Technology in the Hospitality Industry	3
Marketing Elective	3
Electives	18
	27

GRADUATE CURRICULUM

The school's programs for advanced degrees include those of Master of Management in Hospitality, Master of Science, and Doctor of Philosophy. For further information on graduate programs, consult the school's graduate catalog (available in room 172 Statler Hall); contact the school's graduate services office at 255–7245, or see the university's *Announcement* from the Graduate School.

Required Program for Professional Master's Students

Required courses	*Credit*
H Adm 701, Competitive Strategies 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 Mini-Courses	0
H Adm 771, Quantitative Methods	3
H Adm 772, Information Technology for Hospitality Managers	3
H Adm 791, Creating and Managing for Service Excellence	3
H Adm 793, Industry Mentorship Program	0
H Adm 794, Management Development Component I, II, and III	0

Balance of courses are electives.

Total credits required for the Master of Management in Hospitality 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 OPERATION COURSES

H ADM 100 Principles of Management
Fall and spring. 3 credits. Limited to non–hotel school students. Elective. R. Chase.
An introductory survey course in management with orientation to the hospitality industry. The course is organized around the traditional management functions of planning, organizing, commanding, coordinating and controlling.

H ADM 102 Distinguished Management Lectures
Fall. 1 credit. 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 104 Elements of Business for Non-Business Majors
Spring. 1 credit. Limited to non-hotel students. P. Rainsford.
Provides hands-on skills and knowledge about how to start or run a small business for students whose professional careers may require them to operate their own business. The course will be especially appropriate for students interested in professional careers such as architecture, design, writing, art, engineering, law, and other service businesses. Utilizes a computer-based management simulation game and will require students to work in management teams of six to start and operate a hotel. Each management team's hotel will be in competition with other hotels in the stimulation. The course is introductory level and no previous business experience or computer knowledge is required. Students will be required to attend all sessions and complete a paper that will be due a week after the conclusion of the course. Hotel students may not enroll.

H ADM 105 Introduction to Lodging
Fall and spring. 3 credits. Limited to hotel school and sponsored internal transfer division students. Required. R. McCarthy.
Designed to provide students with a comprehensive, fundamental understanding of how hotels are managed from the rooms perspective. Through practical hands-on experiences, students will be exposed to operational line-level positions in the rooms division including housekeeping, reservations, front desk, PBX, and bellstand. Lectures will begin with an overview of the lodging industry and will focus on the managerial aspects of the rooms division. Topics include revenue management, forecasting, budgeting, measuring performance, transient versus group displacement, pricing and inventory management, service quality, ethics, and technology. Students will apply what they have learned in class while operating their own virtual 250-room hotel using a CHESS computer simulation. Guest lecturers will provide students with insight on various career opportunities in the operations or rooms-related areas.

H ADM 303 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. The deadline to drop is the mid-point of the course.

H ADM 304 Rooms Division Strategic Management
Fall. 2 credits. Second seven weeks of the semester. Limited to juniors, seniors and graduate students. Elective. R. Chase.
Designed for students to study and explore the strategies used by hotel companies competing within multiple market areas. The course will build upon the student's awareness of operations, marketing, law and finance. The course content parallels presentations made to many hotel companies and their senior management staffs. Assignments will involve readings about service marketing strategies. Participation, analysis and communication with in the Cornell Hotel Administration Strategic Exercise will compose a term project. Ownership meetings and emphasis on renewal or extension of management contracts with the strategic exercise will be a focus of the course.

H ADM 306 Franchising in the Hospitality Industry
Fall. 3 credits. Not open to freshmen. Elective. M. Noden.
This course looks at relationships between franchisor and franchisee, advantages and disadvantages of franchising, structure and services offered by franchisors. Case studies of leading lodging and restaurant companies currently offering franchises will be discussed. Guest speakers from the franchising industry.

H ADM 401 Strategic Management
Fall and spring. 3 credits. Limited to 45 juniors and seniors per lecture. Prerequisites: H Adm 105, 115, 211, and 321, or equivalents. Required. T. Cullen, C. Enz.
This is a top management, "big picture" course. It is not limited to a single functional area such as marketing, human resources, finance, food and beverage, design, or so forth. The problems and issues of strategy require a total enterprise perspective and the skill of judging how all the relevant factors affect the business organization. Introduces a number of models, methods, and techniques that can be used to identify strategic issues, generate future-oriented action plans to address those issues, and implement change. An important goal is to emphasize the need to review a firm's strengths and weaknesses as the basis for formulating the firm's strategy for exploiting environmental opportunities and coping with environmental threats. Because of the group nature of the course, the absolute drop deadlines are September 3 in the fall and January 29 in the spring.

H ADM 402 Hospitality Management Seminar
Fall. 1 credit. Limited to 30 seniors and graduate students by permission. Students will be expected to register for H Adm 102. Elective. 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 403 Resort Management
Fall. Students may enroll in first seven weeks, second seven weeks, or both. 2 credits. Limited to seniors and graduate students, others by permission of instructor. Mandatory attendance in all class periods. Elective. M. Noden.
First Seven Weeks: A lecture course in the development, operations and management of the resort property. Resorts of various types, seasons, and economic levels are considered. Emphasis is on the financing and environmental considerations of the resort development cycle. Regulatory issues are examined, and relationships with host communities and governmental bodies are explored. Special consideration is given to the promotion of business, the provision of facilities, services and guest entertainment. Contract and non-contract relationships with the travel industry are reviewed.

Second Seven Weeks: A lecture course in the development, financing and management of secondary-residential hotel condominiums. Contemporary state statutory requirements, S.E.C. regulations and prospectus rules are reviewed for application in the managerial portfolio. Federal land use controls are examined and explained. Individual financing of units, and management contracts are fully reviewed, and students will be exposed to typical management contract requirements and protocols. Rental pooling, and its effects upon management and owners will be fully explored. Applications of the condominium concept, including such by-products as time sharing, will be examined from a managerial perspective.

H ADM 404 Entrepreneurship and Small Business Management
Fall and spring. 3 credits. Limited to 20 juniors, seniors, and graduate students. Prerequisite: H Adm 321 or equivalent. Elective. Faculty.
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 student teams to serve as consultants to real businesses that have asked for help from the Small Business Administration. **Because of the group project nature of the course, the absolute drop deadline for all students is the last day of the first week of classes.**

H ADM 405 Quality Planning in 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.
Focuses on the analysis of work processes and examines organizations from three perspectives: the customer, the employee, and management. Provides students with a systematic approach to identifying, prioritizing, and improving key job functions and work processes utilizing the tools of quality management. Readings, case analysis.

H ADM 407 Seminar In Hotel Operations
Spring. 3 credits. Limited to 30 seniors. Estimated cost of field trip, $200. Elective. R. McCarthy.
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 Introduction to Casino Operations
Fall. 2 credits. Limited to 45 juniors, seniors and graduate students. Estimated cost of field trip, $150. Elective. R. McCarthy.
Introduction to the multi-billion dollar gaming industry, including a historical overview of gaming and examination of legal, social, and economic issues within the industry. Reviews various games played in casinos, current trends, and the most popular casino destinations in the world. Special attention is devoted to the growth of casinos in cruise ships, Indian reservations, and on river boats in the U.S.

[H ADM 409 Airline Management
Spring. 3 credits. Prerequisites: H Adm 115 and 211. Elective. Offered every other year—1999, 2001, etc. Not offered spring 2000. M. Noden.
Focuses on domestic and international airline industries and explores both pre- and post-regulatory climates. Emphasis is on dynamic organizational change in response to fluctuating economic and legal conditions. Topics include airline organization, comparative corporate strategies, marketing and distribution networks, operations and service management, union relations, finance, government regulation, and air transport. Case studies and guest lecturers will be used. Also, using the computer-driven simulation exercise called AIRLINE, student teams will operate a small regional carrier.]

H ADM 603 Managing Across Cultural Boundaries
Fall and spring. 3 credits. Limited to 15 seniors and graduate students. Prerequisites: H Adm 121, 165, 321, 401 or graduate student status. Elective. T. Cullen.
Contributes to the development of knowledge and skills needed to manage effectively in other cultures. Objectives are to develop awareness of the pervasive and hidden influence of culture on behavior, particularly with respect to management and management practices; to develop familiarity with the types of situations and issues that often confront managers working in foreign countries; and to develop an appreciation of the impact on personal behavior of living and working in another culture. Readings, case studies.

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.
Focuses on manager and member behavior in organizations. Ideas and models about persons, interpersonal relationships, small groups, and organizations will provide the basis for understanding the dynamics of effective organizational behavior. Learning will occur primarily through readings, case discussions, and self-reflective teamwork.

H ADM 801 Seminar In Hospitality and Service Inquiry
Fall. 3 credits. Elective. C. Lundberg.
This seminar introduces academic graduate students to the major alternative ways of conceptualizing and designing research, and acquiring, interpreting, and disseminating findings. The implications and consequences of one's choices and tradeoffs among the alternative philosophical, ideological, and pragmatic perspectives and approaches to inquiry will be emphasized.

HUMAN RESOURCES MANAGEMENT COURSES

H ADM 115 Organizational Behavior and Interpersonal Skills
Fall and spring. 3 credits. Required. F. Berger, T. Simons.
Focuses on managing people in the workplace. Students develop theoretic 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 and spring. 3 credits. Limited to 100 non–hotel school students, no freshmen. Elective. Faculty.
Examines the role of human resources management, starting with an introduction to the personnel function and an analysis of the social, legal, international, and competitive factors. Examines recruitment, selection, training, motivation, development, compensation, performance appraisal, and labor relations. Class discussion and case analysis are emphasized.

H ADM 211 Human Resources Management
Fall and spring. 3 credits. Limited to 60 hotel school students per lecture, no freshmen or graduate students. Prerequisite: H Adm 105 and 115 (co-registration in 115 allowed). Required. B. Chung, 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/situations they will face as future hospitality managers. Integrates information and knowledge acquired in previous courses. Students will understand the relationship between compensation and benefit activities and job design, motivation, and reward structures. Upon completion, students will a) understand the interrelationship of HRM activities, as well as the relationship between HRM 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. M. Lankau.
Training is one of the primary tools used for coping with a continuously changing environment. It also is 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 411 Negotiations in the Hospitality Industry
Spring. 3 credits. Limited to 30 juniors, seniors, and graduate students, with preference given to hotel school seniors and second-year graduate students. Prerequisites: H Adm 115, 702, or equivalents. Elective. T. Simons.
Negotiation skills are crucial to business success. This course provides hands-on experience in negotiation in the hospitality field. Writing, role-playing exercises, and discussions are used to develop students' negotiation skills. Students will improve their comfort level with negotiating as well as develop their own personal style. Students will also learn how to adjust their negotiating style to respond appropriately to different personalities and negotiation tactics.

H ADM 412 Managing Organizational Change
Spring. 3 credits. Prerequisite: H Adm 211 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 415 Managerial Leadership in the 1990s
Spring. 1 credit. Weekend course. Dates TBA. Elective. Required notebook $25. K. Blanchard.
Students become participant observers in their own lives by 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. The absolute deadline for adding or dropping the course is 12:00 noon on the first day of class.**

H ADM 416 Special Studies in the Management of Human Resources: Service Cultures
Spring. 2 credits. Limited to juniors, seniors, and graduate students. Prerequisite: H Adm 211 or equivalent. Elective. Faculty.
First Seven Weeks—Service Cultures. This course will assist students in understanding the creation and maintenance of effective service-driven operations. Emphasis will be placed on the diagnosis and design of human resource initiatives aimed at creating effective service cultures and improving organizational performance. Topics covered include the management of emotions, monitoring and measuring the corporate culture for service, and the linkage of human resource practices to service vision, organizational design, and strategic objectives. Students will develop and conduct a culture audit in a business. The seminar format is intended to encourage class discussion, case analysis, and field experience.

Second Seven Weeks – Service Organization Design. Since the earliest organizations, questions of how to best organize activities and resources have challenged managers. Traditional structures, e.g., those organized by functions, products, territories, seem to work less effectively as time goes on. The contemporary management challenge is to design and use more responsive, and flexible organizations—especially in the service sector. It is important to understand the effects of different organizational designs and systems on behavior and efficiency. This course will therefore carefully explore the components, processes, and issues associated with known and probable design options. We will operate as a seminar with several application classes.

H Adm 418 Innovation and Dynamic Management
Spring. 3 credits. Limited to juniors and seniors. Elective. C. Enz.
Investigates the ways in which businesses and managers can build profitable organizations through a process of rethinking, re-evaluating, and discarding existing practices. Knowing self through reflection, knowing how organizations function, and knowing how to change them to enable others and build a community are the focus of this course. Students will examine the process of innovation and the psychology of followers. The class will serve as a model of a learning organization as students develop their skill set as change agents and organizational leaders.

H ADM 611 Negotiations in the Hospitality Industry
Spring. 2 credits. Second seven weeks of the semester. Limited to 30 graduate students. Prerequisite: H Adm 702 or equivalent. Elective. T. Simons.
Negotiation skills are crucial to business success. This course provides hands-on experience in negotiation in the hospitality field. Writing, role-playing exercises, and discussions are used to develop students negotiation skills. Students will improve their comfort level with negotiating as well as develop their own personal style. Students will also learn how to adjust their negotiating style to respond appropriately to different personalities and negotiation tactics.

H ADM 614 Leadership and Small Group Processes
Fall. 3 credits. Limited to 30 hotel school seniors and graduate students. Elective. Faculty.
Theoretical and practical 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 711 Human Resources Management
Spring. 3 credits. Professional master's requirement. B. Tracey.
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. Faculty.
A survey of basic principles of financial management, investment management, and financial analysis. Designed for the student who desires a general understanding of financial decision making.

H ADM 121 Financial Accounting
Fall and 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 123 Financial Accounting Principles
Fall and spring. 3 credits. Limited to non–hotel school students. Elective. L. Hensley.
An in-depth introduction to the principles of financial accounting, involving transaction analysis, flow of accounting data to the financial statements, and careful consideration of accounting for revenues, expenses, assets, liabilities, and owner's equity.

H ADM 125 Finance
Fall and spring. 3 credits. Limited to non–hotel school students. Elective. L. Canina.
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, security valuation models, cost of capital, capital budgeting, capital structure, dividend policy, and creative finance.

H ADM 221 Managerial Accounting
Fall. 3 credits. Prerequisites: H Adm 121 and 174, or equivalents. Required. G. Potter.
Focuses on the use of accounting information for management decision making and control. Topics include product costing, management control systems and performance measurement. There will be one common exam at the end of the semester.

H ADM 222 Finance
Spring. 3 credits. Prerequisite: H Adm 121, 221, or equivalents. Required. S. Carvell.
Provides students with accounting cash flow information for financial planning, capital structure decisions, 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. S. Carvell.
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 Principles of Investment Management
Fall. Limited to non-hotel school students. Hotel school students or those with a background in economics, quantitative analysis, and computers are advised to enroll in H Adm 424. Elective. A. Arbel.
An introductory course covering institutional and analytical aspects of security analysis and investment portfolio management including valuation models and practical strategies for stocks, bonds, and mutual fund selection and trading. Computer-assisted analysis, including students' participation in an investment game, is discussed and applied in a realistic manner.

H ADM 323 Hospitality Real-Estate Finance
Spring. 3 credits. Limited to juniors and seniors. Prerequisite: H Adm 321, or equivalent. Elective. J. deRoos.
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 by hospitality industry real estate practitioners.

H ADM 324 International Financial Management
Fall and spring. 3 credits. Prerequisites: H Adm 121, 221, 222, or equivalents, and macroeconomics. Elective. D. Ferguson.
Focuses on the international aspects of financial management important to 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 30 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 421 Internal Control in Hospitality Operations
Spring. 3 credits. Limited to 30 students. Prerequisite: H Adm 321, 722, or equivalents. Elective. Faculty.
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. T. Nohel.
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 424 Security Analysis and Portfolio Management
Fall. 3 credits. Limited to juniors, seniors, and graduate students. Prerequisites: macro and micro economics, introductory course in statistics and/or quantitative analysis, and knowledge of computers beyond word processing. Elective. A. Arbel.
An in-depth analysis of financial instruments, investments and portfolio management including fixed income, equity securities, advanced valuation models, risk-return analysis, screening techniques, asset allocation, and active portfolio management and trading. Recent developments in investments research are covered, and large financial databases are used for practical applications of the concepts and techniques presented.

H ADM 621 Hospitality Real Estate Finance
Spring. 3 credits. Limited to graduate students. Prerequisite: H Adm 722, or equivalent. Elective. 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 622 Capital Investment Analysis
Spring. 3 credits. Prerequisite(s): a course in principles of corporate finance (for graduate students, HA 721 Financial Economics or its equivalent; for undergraduate students, HA 222 and permission). Elective. S. Carvell.
This course is about how financial managers must make capital investment decisions in order to maximize shareholder wealth. This requires an in-depth understanding of both the investing and financing decision-making process. To understand the former, students learn about the capital budgeting process and acquire specific skills enabling them to evaluate capital projects; e.g., net present value, discounted cash flow and risk analysis. For the latter, students learn how equity and debt securities are priced in a dynamic capital market and how the firm's capital cost and structure are linked with shareholder wealth maximization. Cases are used to illustrate theory, and industry guest speakers conduct occasional seminars.

H ADM 624 Analysis and Interpretation of Financial Statements
Spring. 3 credits. Limited to 30 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 maximization 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. G. Potter.
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 Introduction to Food Service Operations
Fall and spring. 4 credits. Limited to hotel school students. Required. G. Norkus, A. Susskind.
An introduction to the principles of food and beverage management, beginning with an overview of the food service industry at large. Attention is focused on major industry segments, business practices, and trends. Detailed consideration is given to the components of the food service system: marketing, menu planning, logistical support, production, service, controls, and quality assurance. Product and systems differentiation in various industry segments are emphasized.

H ADM 230 Introduction to Culinary Arts
Fall and spring. 2 credits. Limited to non–hotel school students. Priority given to seniors and graduate students. S–U grades only. Attendance at first class is mandatory. Absolute drop deadline for fall is September 7; spring drop deadline is January 28. Elective. D. D'Aprix, S. Gould.
Studies of food groups, their respective methods of preparation, cooking, presentation, and holding. Designed for non-hotel students who are interested in learning the professional approach to food preparation and service with hands-on practice. Food product identification, preparation and service methods, and professional language of food and cooking.

H ADM 236 Culinary Theory and Practice
Fall and spring. 4 credits. Prerequisite: H Adm 136. Attendance at first class is mandatory. Required. T. O'Connor, R. White, faculty.
Designed to introduce the student to food and beverage operations through three major components: fundamental food composition and properties, food products and preparation, and food safety and sanitation. Students will prepare recipes, menus, and production schedules and will develop the ability to recognize properly prepared foods by preparing, tasting, and evaluating foods. They also will develop an awareness of potential production problems and how to troubleshoot them.

H ADM 330 Seminar in Chain-Restaurant Operations
Fall. 3 credits. Prerequisite: H Adm 136 and 236, or permission of instructor. Elective. Faculty.
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 Creating Distributor Partnerships
Spring. 3 credits. Limited to 20 juniors, seniors, and graduate students; others by permission of instructor. Elective. E. Merberg, G. Norkus.
Provides an overview of the food service distribution industry: past, present, and future. Specific disciplines of food service distribution include marketing and sales, operations, routing, credit management practices, and financial management of the distribution center. Focus also on the newly emerging role of the "distributor consultant." Concept of developing business partnerships between food service operators and food service distributors is stressed.

H ADM 332 Reviewing the Restaurant: The Consumer's View of the Dining Experience
Spring. 3 credits. Field trip $200. Limited to 20 students. Prerequisites: H Adm 165 and 335, or permission of the instructor. Elective. G. Pezzotti.
Trains the student to perform a comprehensive analysis of the restaurant dining experience. The role of the restaurant critic/reviewer will be discussed in depth. The student will examine and enhance his or her critical writing skills, as the course will require each student to complete approximately ten restaurant reviews.

H ADM 333 Current Issues in Food Safety and Sanitation
Spring. Variable to 3 credits. Three-credit registration limited to 12 students. Elective. Faculty.
A study of current issues in food safety and sanitation procedures and regulations that affect managerial decisions in food service and hospitality operations. Topics include risk assessment and hazard analysis; legal responsibilities related to food, food handlers, equipment and facilities; food-borne illness and other public-health concerns; and certification and training. Preparation for NIFI/NRA certification and the Food Protection (ETS) certification exam (optional) is offered.

H ADM 334 Wine and Food Pairing Principles and Promotion
Fall. 2 credits. Limited to 20 seniors and graduate students. Prerequisite: H Adm 430 or permission of instructor. Elective. G. Pezzotti.
Focuses on the pairing and marketing of wine and food. Students develop an understanding of regional and varietal wine styles; how foods' flavors can change a wine's flavor, and the promotion of wine and food. Topics include wine and food pairing principles, cuisines and their flavor components, food trends in restaurants and in the home, special event planning, and wine list development. Students design and present wine and food tastings to industry guests.

H ADM 335 Restaurant Management
Fall and spring. 4 credits. Limited to 30 hotel school students per lab; others by permission of instructor. Prerequisites: H Adm 136 and 236. Approximate cost of utensils and manual, $75. Once enrolled, students may not drop the course without permission of instructor. Required. D. D'Aprix, B. Halloran, B. Lang, M. McCarthy, J. Ridley.
A restaurant-management course in which each student participates as a manager of a full-service restaurant operation. Topics related to the general management of restaurants and industry trends, including defining a service philosophy, improving profit margins, securing adequate supplies, identifying target markets, and planning for organization growth. The laboratory is based on a hands-on managerial component, from which students become familiar with the various requirements for success of each of the line positions in a restaurant.

H ADM 338 Seminar in Culture and Cuisines
Fall. 3 credits. Limited to 20 students. Prerequisites: H Adm 165 and 236, or permission of instructor. Elective. R. Spies.
Explores various cuisines in terms of history, lifestyle, and foods peculiar to a culture. Through readings, research, and meal preparation, students explore various cuisines in depth. The goal of the course is to develop an awareness of several international cuisines, enabling students to make comparisons among the foodways of different cultures. Students prepare research reports and oral presentations, and design menus and orchestrate their preparation.

H ADM 339 Wine: A Cultural and Historical Perspective
Fall and spring. 2 credits. Limited to 200 students. Elective. A. Nash.
Designed to provide students with a cultural and historical perspective on wine and its place in society. Topics include history, people, culture, production of wine in specific wine-producing regions of the world, wine and health issues, wine and food pairing, cooking with wine, and retail wine buying strategies. Regions covered will change each semester so students may take the course more than once.

H ADM 430 Introduction to Wines
Fall and spring. 2 credits. Wine glass kit and course fee, $25.00. Limited to hotel school juniors, seniors, and graduate students, and seniors and graduate students in all other colleges. **Hotel students encouraged to enroll in the fall.** All students, except those in the hotel school, must be 21 years old by the first day of university classes (August 26, 1999 and January 24, 2000). S-U grades only. Elective. S. Mutkoski, A. Nash.

An introduction to the major wine-producing regions of the world and what the consumer needs to know to purchase wines, spirits, and beers at retail outlets and in a restaurant setting. Topics include flavor components in wine, pairing wine and food, responsible drinking, selecting quality and value wines, and wine etiquette. Samples from a variety of countries, regions, and vineyards are evaluated.

(Preregistered students who do not attend the first class and fail to notify the course secretary in 274 Statler of their absence before the first class are automatically dropped from the course. The student must then follow the normal drop procedure in his or her school. **Because of the high demand for this course and because a product is consumed, the absolute drop deadline for all students is September 10 in the fall and February 4, 2000 in the spring.)**

H ADM 431 Seminar in Independent Restaurant Operations Management

Fall and spring. 3 credits. Five field trips, $300. Limited to 20 students. Prerequisite: written permission of instructor. Elective. G. Pezzotti.

Designed for students who have a strong interest in food and beverage operations and who may be considering a career as an entrepreneur. Students visit and analyze various independently owned restaurant operations. Analysis covers the restaurant's concept (market), organization, ownership, management, physical structure, staff, front- and back-of-the-house operations, and fiscal integrity. Readings relevant to current topics in the restaurant industry are required. Classes alternate weekly between field trips and seminar/case presentations.

H ADM 432 Contemporary Healthy Foods

Fall. 3 credits. Field trip, $50. Limited to 20 seniors and graduate students, or by permission of instructor. Elective. J. Ridley, M. Tabacchi.

Builds a greater awareness and understanding among nutrition and food service professionals of the origins and manifestations of today's health-conscious and educated food service patron. Topics include the marriage of nutrition and the cuisine demanded by today's consumer, fresh produce, lean meats, and lack of fabricated diet foods. Menu design includes creativity and nutrient density of foods. Major emphasis is on preparation, marketing, merchandising and selling of healthy menus in Statler's outlets.

H ADM 433 Contract Food Service Management

Spring. 3 credits. Field trips, $25–50. 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, controls, systems design, equipment, and government/legal regulations. Readings, small investigative projects, presentations, discussions, and local site visits.

[H ADM 434 Desserts Merchandising

Spring. 3 credits. Limited to 25 students. Prerequisite: H Adm 236, 230, or permission of the instructor. Elective. Not offered spring 2000. Faculty.

A hands-on course providing exposure to a variety of breads, pastries, cakes, and other desserts. Students develop large-scale production skills, become familiar with bakeshop utensils, and advertise and sell their products.]

H ADM 435 Selection, Procurement, and Supply Management

Fall and spring. 3 credits. Prerequisites: H Adm 136 and 236, or 731. Elective. R. Spies.

Expands upon the concepts of purchasing and supply management that were developed in H ADM 136 and 731. Designed to expose the student to two specific areas: the management of the procurement system and the major commodity groups that are germane to the operation of a hotel or foodservice operation. Lectures include discussions on the comparison of the purchasing function in the hospitality industry to other industries, distribution systems, legal and ethical implications in buyer-seller relationships, procurement options, buying strategy development, price protection programs, and other contemporary issues. Students work with the major entree food groups: meats, seafood, and poultry, with emphasis placed on identification, quality and condition, market form, yield tests, and cost analyses.

H ADM 436 Beverage Management

Fall and spring. 2 credits. Limited to 20 hotel school juniors, seniors, and graduate students. Prerequisite: H Adm 430 (co-registration is not allowed). Elective. S. Mutkoski, A. Nash.

Designed for students who intend to pursue food and beverage as a career. Deals specifically with the management of beverage operations. Lectures develop skills in and awareness of dram shop liability; staff training and responsible customer service; beverage pricing; food and wine pairings; wine list development; purchasing, storage, and service; wine regions; cost controls and loss prevention; and creative beverage merchandising. Guest lecturers.

H ADM 437 Specialty Food and Beverage Operations: Guest Chefs

Spring. 3 credits. Limited to 20 students. Prerequisite: H Adm 335 or 731. Elective. B. Lang, B. Halloran, H. Winslow.

Designed for students with a strong food and beverage orientation, especially students considering careers in the hotel food and beverage environment, or those who anticipate interacting with current culinary trends. Working in groups, students market, organize, plan, produce, serve, and prepare the financial analysis and accounting relative to four guest chef specialty production nights for the Cornell community, utilizing the Statler Hotel facility. Final project.

H ADM 438 Catering Management

Spring. 2 credits. Field trip, $150. Limited to 20 students. Prerequisite: H Adm 236 or permission of instructor. Elective. R. Spies.

Examines on- and off-premise catering for business and social functions, as well as sports events and office catering. Topics include the organizational structure of catering operations; legal aspects of catering businesses; menu design for special functions and its operational implications; marketing from a caterer's perspective; function planning and management; staff recruitment, training, and supervision; and post-event analysis. Site visits and analyses of actual catering operations.

H ADM 538 Health and Fitness in the Resort Hotel and Spa Industry

Fall. 3 credits. Limited to juniors, seniors, and graduate students. Two field trips, $75–100. Prerequisite: previous courses in food and beverage management and marketing. Elective. M. Tabacchi.

Emphasizes the management aspects of spas, health clubs, and spa resorts. Topics include feasibility of success and marketing research necessary to establish new spas, design of menus, mental and physical fitness programs, stress management, spa medical treatments, complementary medical treatments and other spa programs. Other topics include required personnel, safety, legal and ethical issues, integration of nutritious menu items and their marketing and merchandising. Guest speakers.

H ADM 539 Airline Food Service Management

Spring. 3 credits. Field trip, $75–100. Prerequisites/Corequisites: H Adm 136, 236, or permission of the instructor. Elective. M. Tabacchi.

Focuses on the challenge of preparing and distributing 20,000–30,000 meals per day to 20–30 different airline carriers and rethermalizing, serving, and clearing those meals at 30,000 feet in confined space and short periods of time. Examines strategies, planning, and forecasting by airline, airline catering, and sales executives, as well as the effect of the economy and the airline's competition upon the type of meals served.

H ADM 631 Case Studies in Multi-unit Restaurant Management

Fall. 3 credits. Limited to 20 graduate students, seniors by permission. Elective. Faculty.

Case studies of multi-unit restaurant organizations will focus on topics such as: new venture planning, rapid growth and organizational change, market identification, service delivery and design, consumer demand, corporate culture, production planning and operations management, strategic planning and implementation, tactics and market responses, international expansion, breakpoints and breakthrough thinking. Each class period will be spent in student-organized discourse and exchange based upon their assigned written case analysis. Grading will be on individual case presentations, class participation and written case assignments.

H ADM 633 Food Service Operations Management

Fall. 3 credits. Limited to 20 seniors and graduate students. Elective. T. O'Connor, A. Susskind.

Applies fundamental concepts of marketing, financial analysis, food service production and management, and human resource principles that were addressed in previous courses. Combines theory and practice in all levels of a food service operation: basic knowledge, technical skills, and analytical skills. Manages by planning, implementing, critiquing, and analyzing a food service operation. Designs and implements a training program for an opening staff and employees who will be rotating through different positions. Develops budgets, both projected and actual, for different food service operations. Employs a feasibility model for a particular food service concept and operation.

H ADM 731 Graduate Food and Beverage Management
Spring. 3 credits. Professional master's requirement. T. Kelly.
Focuses on the technical, managerial, and human resource skills needed to be successful in food service management. Topics include market analysis, concept development, menu planning, operations management, marketing, and current and future issues affecting the food service industry.

MARKETING AND TOURISM

H ADM 243 Marketing Management for the Hospitality Industry
Fall and spring. 3 credits. Limited to 80 hotel school students per lecture, not open to freshmen. Required. J. Siguaw.
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 343 Marketing Research
Fall and spring. 3 credits. Limited to 32 students. Prerequisites: H Adm 243 or equivalent and an introductory course in statistics/quantitative methods, or permission of instructor. Elective. J. Austin.
Introduces students to the basic techniques and practices used to collect, analyze and disseminate data for decision making in hospitality marketing. The goal is to help future managers develop a level of research competency that will enable them to interact intelligently with marketing research providers when requesting information, assessing proposed research projects, as well as evaluating and using information from completed research.

H ADM 344 Tourism I
Fall. 3 credits. Not open to freshmen. Elective. M. Noden.
An introductory course in the study of tourism. The origins and evolution of contemporary tourism are examined. Students are familiarized with the various supply components of the tourism industrial base and their integration on an international scale. The effects of mass-volume tourist demand on destination development are explored through the use of selected limited case studies. Guest lectures highlight the economic operations and effects of tourism in both the public and private sectors.

H ADM 345 Hospitality Sales
Fall. 3 credits. Limited to 24 students. Prerequsite: H Adm 243, 741, or equivalent. Elective. J. Siguaw.
An in-depth study of the promotional tool of personal selling, with an emphasis on identifying and meeting the needs of the customer. Course material encourages the use of intuition, judgment, logic, problem-solving methodology and other tools as part of an overall sales mix. Class sessions involve lectures, role playing, videos, presentations, and guest lectures.

H ADM 346 Marketing Planning for Hotels
Spring. 3 credits. Prerequisite: H Adm 243, 741, or equivalent. Elective. L. Renaghan.
Key variables in property level management and their proper application in developing a marketing plan, e.g., marketing intelligence, demand analysis, supply and competitor analysis, segment analysis, resource allocation, sales strategies and measurement of results. Upon completion of the course, the student should be able to design, develop, and implement a comprehensive, action-oriented marketing plan for a lodging property.

H ADM 347 Consumer Behavior
Fall and spring. 3 credits. Limited to 45 juniors and seniors. Prerequisite: an introductory principles of marketing or marketing management course. Elective. M. Lynn.
Introduces students to various causal processes underlying consumer behavior and their implications for hospitality marketing. Consumers responses to marketing communications and offerings depend on the consumers' perceptions, motivations, personalities, attitudes, group memberships, families, and cultures. Knowing how these factors influence consumers' reactions to marketing efforts will allow students to better anticipate and control those reactions.

H ADM 442 Strategic Marketing
Fall. 3 credits. Limited to seniors. Prerequisite: a previous marketing course. Elective. C. Dev.
This course 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, case studies, and development of a strategic marketing report.

H ADM 444 Tourism II
Spring. 3 credits. Limited to juniors, seniors, and graduate students. Prerequisites: 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 discussions 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. 3 credits. Limited to 40 undergraduate students. Prerequisite: a previous marketing course or permission of instructor. Elective. L. Renaghan.
Students preparing for management positions will develop an understanding of services marketing principles applicable to the hospitality industry. Topics include marketing strategies of service firms, new marketing approaches, and the reformulation of traditional marketing principles from consumers and industrial goods marketing. Case studies, guest speakers.

H ADM 447 Channels of Distribution in Tourism
Spring. 3 credits. Prerequisite: H Adm 243. Elective. M. Noden.
Examines the major elements of the structure, arrangement, management, and control of the channels of distribution in the tourism industries. Topics include emerging trends in electronic distribution, organizational structures of distributive consortia, and their effectiveness in service distribution. Significant readings, guest lectures.

H ADM 448 Marketing Communications
Spring. 3 credits. Limited to seniors. Prerequisite: a previous marketing course. Elective. C. Dev.
Provides students with a managerial understanding of the effective use of a variety of marketing communication media, including advertising, sales promotion, public relations, etc. Hospitality industry emphasized.

[H ADM 449 International Marketing
Fall and spring. 3 credits. Limited to 25 students. Prerequisites: Micro and macroeconomics. Elective. Not offered fall 1999. Faculty.
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
Fall. 3 credits. Limited to 20 seniors and graduate students. Prerequisite: a principles of marketing or marketing management course and an introductory course in quantitative methods for management. Elective. Not offered fall 1999. Faculty.
Introduces students to advanced data analysis and modelling methods used for decision making in hospitality marketing.]

H ADM 642 Strategic Marketing
Fall. 3 credits. Limited to graduate students. Prerequisite: a previous marketing course and permission of instructor. Elective. C. Dev.
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
Spring. 3 credits. Limited to 20 graduate students. Prerequisites: introductory principles of marketing or marketing management and an introductory course in quantitative methods for management. Elective. J. Austin.
Introduces students to the basic techniques and practices used to collect and analyze data for decision making in hospitality marketing. The goal is to help future managers develop a level of research competency that will enable them to interact intelligently with marketing research providers when requesting information, assessing proposed research projects, as well as evaluating and using information from completed research.

H ADM 644 Food and Beverage Marketing Strategy
Spring. 3 credits. Limited to graduate students, seniors by permission. Prerequisite: prior three-credit marketing course. Elective. T. Kelly.
Focuses on how to apply marketing, sales, and merchandising techniques to the commercial food and beverage industry. Addresses developing a market segmentation based on understanding the needs and wants of potential target markets, translating needs and wants into a 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
Spring. 3 credits. Limited to graduate students. Prerequisite: previous marketing course, or permission of instructor. Elective. L. Renaghan.
Helps students preparing for ownership or management positions develop an understanding of services marketing principles applicable across the entire service sector. Marketing strategies of service firms from various service industries will be evaluated. New marketing approaches uniquely applicable to services are considered as well as the reformulation of traditional marketing principles from consumers and industrial goods marketing. Case studies, guest speakers.

[H ADM 646 Marketing Planning For Hotels
Fall. 3 credits. Limited to graduate students. Prerequisite: H Adm 243, 741, or equivalent. Elective. Not offered fall 1999.
For description, see 346. This course includes the H Adm 346 lectures plus a theoretical paper.]

H ADM 647 Consumer Behavior
Fall and spring. 3 credits. Limited to 25 graduate students. Prerequisite: introductory marketing principles or marketing management course. Elective. M. Lynn.
For description, see H ADM 347.

H ADM 741 Marketing Management
Spring. 3 credits. Professional master's requirement. J. Austin.
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. R. Penner.
An introduction and management overview of the problems and opportunities inherent in the development and planning of hospitality facilities. Topics include the project development sequence; conceptual and space planning; architectural design 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 lease and management contracts, accounting and finance, staffing, and building operations. Case studies and a term project focus on the dynamics of operating real estate assets.

H ADM 351 Hospitality Facilities Design
Fall. 4 credits. Prerequisite: H Adm 255 or 751 or permission of instructor. Elective. R. Penner.
A lecture-studio course dealing with property development, planning, and design by focusing on the interpretation 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
Spring. 3 credits. Field trip, $200; drawing supplies, $75. Limited to 12 students. Prerequisite: H Adm 351. Elective. R. Penner.
A project course concerned with hotel planning, interior design, and renovation. Students establish the operator's criteria for the renovation of hotel guestrooms and public areas, prepare budgets, and develop preliminary conceptual designs leading to a substantial graphic presentation. Drawing ability is essential.

H ADM 353 Food Service Facilities Design
Spring. 3 credits. Limited to 18 students. Prerequisites: H Adm 351 and 335 (co-registration is allowed) or food service experience is recommended. Elective. M. Redlin.
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. Curtis.
The operation of microcomputer-based computer-aided design (CAD) systems. Using AutoCAD on the IBM PC, the course presents an organized and logical sequence of commands, mode settings, drawing aids, and other characteristics of CAD. Students will learn the program in the school's computer center and will develop a complete graphic presentation. 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. M. Redlin, 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. A. Klausner.
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. J. Corgel.
Approaches real estate from four perspectives: legal, economic, financial, and business. Understanding these perspectives will enable students to make better investment and financing decisions, to use real estate resources wisely, to understand public-policy issues, and to be prepared for additional courses in real estate investment, finance, and development.

H ADM 454 Advanced Computer Aided Design
Spring. 3 credits. Limited to 18 students. Required. S. Curtis.
Computer aided design has grown beyond its traditional use as a tool to draw contract documents. This course will give students an understanding of the more advanced capabilities of AutoCAD, including raster image support, OLE, 3D surface and solid modeling and photorealistic rendering. The availability and capabilities of "third party" plug-ins to AutoCAD will also be explored. There will be weekly projects as well as a final project.

H ADM 455 Special Topics in Properties Management-Sustainable Development and Ecotourism
Fall. 3 credits. Optional field trip, $425 plus travel costs. Limited to juniors, seniors and graduate students. Elective. D. Stipanuk.
A multi-disciplinary investigation of issues surrounding ecotourism and sustainable development. Topics include the concept of sustainable development as applied to the tourism industry, environmental issues affecting the sustainability of tourism

developments, as well as linkages between ecotourism and sustainable development, planning, development, and management of ecotourism projects. We will also explore methods used to reduce the environmental impacts of traditional tourism projects. Optional field trip over winter break.

H ADM 456 Hospitality Facilities Management
Spring. 3 credits. Prerequisite: H Adm 355, 751, or permission of the instructor. Elective. D. Stipanuk.
A managerial approach to hospitality facilities addressing issues of owning and operating, cost management, facilities services and delivery systems management, governmental regulatory compliance, and emerging issues. Emphasis on environmental issues such as indoor air quality, waste management, and energy conservation. Extensive use of the World Wide Web.

H ADM 457 Advanced Development and Construction
Fall. 3 credits. Overnight field trip, $175. Limited to juniors with permission, seniors and graduate students. Elective. D. Stipanuk.
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, managing other professionals, and analysis of alternative materials and methods. Guest speakers, case studies, and group project.

H ADM 458 Hospitality Real Estate
Spring. 3 credits. 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 for 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, and the approaches to valuation and contemporary hospitality valuation issues.

H ADM 459 International Development
Spring. 3 credits. Limited to 25 seniors and graduate students. Elective. J. Clark.
A seminar course covering the strategic development of international hospitality projects. Topics will include corporate expansion strategies; the international development process; viewpoints of public and private stakeholders; and such development challenges as technology, infrastructure, environmental concerns, and public policy issues. Senior corporate guest lecturers will present and discuss new projects in such locations as Hawaii, Mexico, western and eastern Europe, Southeast Asia, and Latin America and contrast these opportunities with development in the U.S.

H ADM 651 Principles of Real Estate
Fall. 3 credits. Limited to graduate students. Elective. J. Corgel.
This survey course approaches real estate from four perspectives: investment, market, mortgage finance, and legal. Understanding these perspectives will enable students to make better investment and financing decisions, to use real estate resources wisely, to understand public policy issues, and to be prepared for additional courses in real estate investment, finance, and development. This course includes much of the material in H ADM 450 plus special topic sessions that feature guest speakers from the industry, faculty from other colleges, and case studies.

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. A wide array of financing options is considered including convertible, participating, and accrual mortgages. All types of residential and non-residential real estate are analyzed; however, special emphasis is placed on the analysis of hospitality properties.

H ADM 751 Properties Development and Planning
Spring. 3 credits. Professional master's requirement. Faculty.
Provides an overview of project development, hotel planning, and the construction process, including the role of the development team, feasibility, functional planning and design, interpretation of architectural drawings, architectural and engineering criteria, construction management, contracts, and scheduling. Student teams will prepare the program documentation for a new hotel or one undergoing major rehabilitation in conjunction with other professional master's core courses.

COMMUNICATION COURSES

H ADM 165 Managerial Communication I
Fall and spring. 3 credits. Each lecture limited to 16 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. This course must be taken within the first two semesters, including any ITD semesters. Required. S. Jones, faculty.
An introduction to the role and importance of effective communication in managerial work, especially in the hospitality industry. Development of abilities in analytical thinking and clear written expression. The process of planning, preparing, and executing professional communications with an emphasis on written documents. Students write a series of business documents and give several oral presentations.

H ADM 266 Intermediate French: Le Francais de l'Hotellerie et du Tourisme
Spring. 3 credits. Limited to 15 students. Prerequisite: French 123 or permission of instructor. Elective. A. Grandjean-Levy.
Offers continuing study of the French language with specific emphasis on the hospitality industry. Material presented considers cultural, geographic, economic, historical, political, and social contexts within which the business functions. The course is conducted in French, emphasizing a conversational approach. Specialized situations and vocabulary are used in building general competence in practical usage. Students with special interest in the hospitality industry will be given priority for admission.

H ADM 364 Advanced Business Writing
Fall and spring. 3 credits. Limited to juniors, seniors, or graduate students, or written permission of instructor. Prerequisite for undergraduates: H Adm 165 (for hotel school students) or completion of student's freshman writing requirement. Elective. Faculty.
Focuses on the written communication that requires special persuasiveness and control of tone. Writing assignments will give students a chance to apply the theories of communication, semantics, and human relations covered in the course. The kinds of communications that will be analyzed, evaluated, and written include persuasive messages to subordinates and superiors in an organization; sales letters and other promotion materials; and negative messages such as refusals, rejections, and responses to complaints. A major topic is the planning and executing of a job-hunting campaign, for which students prepare résumés, letters of application, and follow-up messages adapted to their individual needs.

H ADM 365 Managerial Communication II
Fall and spring. 3 credits. Limited to 22 juniors and seniors per lecture. Note: Students required to take this course generally may not drop it; however, students may be allowed to drop before the first class meets if the area has a wait list and the vacancy can be filled. Students may drop between the first and second class if they 1) check first with the course chair, and 2) can find a replacement for their place in the course. Students may not drop after the second class unless they petition and present a case of extenuating circumstances. It is expected these cases would be rare. Prerequisites: Hotel undergraduates must have completed H Adm 165 and H Adm 115. Required. N. Dahl, faculty.
A broad study of communication in a management context. Emphasizes the significant role of communication in developing work relationships that enable managers to achieve their goals. It presents the theories and principles of communication that underlie effective performance. Students increase their individual communication abilities by applying these concepts in a variety of managerial contexts, including interacting one-to-one, working in groups, and formally developing and presenting ideas to larger audiences.

H ADM 462 Communication and the Multicultural Organization
Fall. 3 credits. Elective. Faculty.
Influence of culture, perception, and gender on communication in multicultural organiza-

tions, 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 365 for hotel school undergraduates, or permission of instructor. Elective. Faculty.
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. Studies 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. Faculty.
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 mangerial contexts.

H ADM 761 Communication Mini-Courses
Fall. Variable credits. Limited to MMH students. Elective. D. Jameson, faculty.
Note: These are two separate seven-week courses. Students may enroll in Lecture 1 or Lecture 2 or both. Lecture 1—Business Writing (first 7.5 weeks); Lecture 2—Presentational Speaking (second 7.5 weeks).

These mini-courses assist students enrolled in the Master of Management in Hospitality Program in developing their communication skills, improving their communication assignments in other core courses, and meeting the program's required writing and speaking.

OPERATIONS MANAGEMENT, INFORMATION TECHNOLOGY COURSES

H ADM 170 Keyboarding for Windows
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 and spring. 3 credits. Limited to hotel school freshmen and transfers. Limited to 30 students per lecture. Required. R. Alvarez, P. Clark, M. McCarthy, R. Moore, M. Talbert.
This course is designed to aid students in building functional computer literacy. Students will develop their skills in five generic areas: text, graphics, spreadsheet, presentation, and listing processing. This portion of the class is taught in the Binenkorb computer lab, where students work with Microsoft Office and the Internet. In addition, students learn introductory statistical concepts, including descriptive statistics, correlation, and regression analysis. Course material is presented through a combination of lectures and labs.

H ADM 274 Microcomputing
Spring. 3 credits. Limited to 30 non-hotel students per lecture. B. David.
An introduction to microcomputing to develop functional computer fluency. Students will develop their skills in five generic areas: text, graphics, spreadsheet, presentation, and file processing. The course is entirely lab-oriented and students work in both Mac/OS and Windows. Software used is Word, Excel, Powerpoint, Filemaker. Students will use the Internet.

H ADM 371 Hospitality Quantitative Analysis
Fall and spring. 3 credits. Required. G. Thompson.
Introduces statistical and operations research methods appropriate for the hospitality industry. The overriding goal is to provide students with the skills and understanding necessary for decision making using quantitative data. Students will use computer spreadsheet software extensively for the "number crunching" analysis.

H ADM 474 Corporate Information Systems Management
Spring. 3 credits. Limited to juniors, seniors, and graduate students. Elective. R. Alvarez.
Explores ten key issues in information technology management through use of case studies of companies who have relevant experience with the issues. A basic understanding of information technology, organizational behavior, and general management is advised.

H ADM 475 Information Technology in the Hospitality Industry
Spring. 3 credits. Limited to 30 students in each section. Prerequisites: all other required core courses, except for students concentrating in information technology. Required. R. Moore.
A three-tiered course, with each tier lasting five weeks. Tier 1 covers information technology management issues. Prior to taking Tier II, students will be required to pass a proficiency test of microcomputer skills taught in H ADM 174. Students will update their skills and learn more advanced features, with emphasis on database and model building skills. In Tier III, students select one of a series of modules, such as hotel systems, food service systems, management of information technology systems, or electronic commerce.

H ADM 674 Service Operations Management
Fall and spring. 3 credits. Limited to 25 graduate students. Prerequisite: H Adm 175, 371, 771 or equivalent. Elective. G. Thompson.
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 services management.

H ADM 675 Yield Management
Fall and spring. 3 credits. Limited to 30 students. Prerequisites: H Adm 175, 771, or equivalent. Elective. S. Kimes.
Students learn how to effectively apply the principles of yield management. Focuses on the integration of yield management techniques with information technology, internal management issues, and external marketing concerns. Topics include yield management techniques, forecasting, overbooking, group decisions, and management and marketing issues.

H ADM 676 Restaurant Revenue Management
Spring. 2 credits. First seven weeks. Letter grade only. Limited to 30 graduate students, or by permission of the instructor. Prerequisite: H Adm 771 and 741. Elective. S. Kimes.
Revenue management is a method for profitably managing capacity. The objective of this course is to help students learn how to apply the principles of revenue management to restaurants. The course focuses on methods of managing duration and price with the intent of maximizing revenue per available seat-hour. Topics to be covered include forecasting, overbooking, reservations systems, information technology, process design, pricing, and management and marketing issues.

H ADM 771 Graduate Quantitative Methods
Fall. 3 credits. Professional master's requirement. S. Kimes.
Covers statistical and operations research techniques which can be applied to the hospitality industry. Topics include descriptive statistics, probability, sampling, correlation and regression, forecasting and yield management.

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.

LAW COURSES

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. P. Wagner.
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. D. Sherwyn.
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 485 Employment Discrimination Law for Managers
Spring. 3 credits. Limited to juniors, seniors, and graduate students. Elective. D. Sherwyn.
Provides students with an understanding of anti-discrimination statutes and a framework for establishing the proper policies and procedures for complying with the law, avoiding liability, and maintaining positive employment relations.

H ADM 487 Real Estate Law
Fall and spring. 3 credits. Recommended: completion of H Adm 387 preferred. Elective. A. Klausner.
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. Faculty.
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 Industry
Fall and spring. 3 credits. Limited to 60 hotel school students per lecture, others by permission of instructor. Required. M. Conlin, J. Wissink.
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 partnership in addressing the crisis of homelessness. Through lectures, readings, discussions, research, volunteerism, and a field placement practicum, students will explore the economic, social, and political issues of our country's 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, 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 approximately three hours per week during the semester.

H ADM 491 Hotel Ezra Cornell
Fall and spring. Variable credit (maximum, 4). Prerequisite: written permission. Elective. Y. Kerr-Donovan.
Elected board members of Hotel Ezra Cornell receive credit for academic coursework, and the development, organization, and management of the April "Hotel-for-a-Weekend." Students who are considering a board position may pre-enroll for the course and should speak with the instructor for additional information about board positions and required coursework. Elections will take place in April after Hotel Ezra Cornell Weekend, at which time the HA 491 course enrollment will be finalized. Further information is available in the Student Services Office, 178B Statler Hall.

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 objective statement, four management reports, journals, debriefing, and oral presentation. Elective. R. Chase.

H ADM 495 Development and Management of Wellness in Business Organizations
Spring. 3 credits. Limited to juniors, seniors, and graduate students. Field trip, $25–50. Elective. M. Tabacchi.
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. Faculty.
Students are afforded an opportunity to pursue independent study projects under the direction of a resident 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
Spring. 3 credits. Limited to 15 seniors and graduate students. Elective. J. Clark.
A seminar approach will be used to discuss readings and case studies selected to illustrate current challenges and future trends such as globalization, consolidation, etc., in the hospitality industry. The view will be futuristic and primarily from that of a multi-unit/corporate perspective. An in-depth analysis of a few specific companies will be included using case studies and guest lecturers when appropriate. Student teams will research new topics and make presentations and final reports.

H ADM 699 Graduate Independent Research
Fall and spring. Credit to be arranged. Elective. Faculty.
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 Creating and Managing for Service Excellence
Fall. 3 credits. Professional master's requirement. L. Renaghan.
Covers the complex management practices and concepts necessary to deliver consistent value in the hospitality industry (determining customer expectations; integrating marketing into operations; managing customer satisfaction; and measuring and controlling costs). Cases, lectures, discussion and industry experts will be used, with emphasis on translating the strategic understanding of value into management practice.

H ADM 793 Industry Mentorship Program
Spring. No credits. S-U grades only. Professional master's requirement. M. Redlin.
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 Management Development
Year-long course. No credits. S-U grades only. Professional master's requirement. D. Jameson.
Students must register for the first three semesters, and they will get a grade at the end of each semester. Second semester students must keep the times listed above open for team project meetings. All students in the Master of Management in Hospitality Program must enroll for HA 794. This requirement includes participation in the MMH Assessment Center, program benchmarking, and other activities related to students' communication development and assessment.

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

Alvarez, Roy, M.Ed., Auburn U. Lecturer
Arbel, Avner, Ph.D., New York U. Prof.
Austin, Jon R., Ph.D., U. of Wisconsin-Madison. Asst. Prof.
Berger, Florence, Ph.D., Cornell U. Prof.
Brownell, Judith, Ph.D., Syracuse U. Prof., and Richard J. and Monene Bradley Director of Graduate Studies
Bryson, Susan, M.A., U. of Chicago. Lecturer
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.
Chung, Beth G., Ph.D., U. of Maryland. Asst. Prof.
Clark, John J., Jr., Ph.D., Cornell U. Prof.
Corgel, John B., Ph.D., U. of Georgia. Prof.
Cullen, Thomas, Ph.D., Cornell U. Assoc. Prof.
Curtis, Steven, B.L.A., Syracuse U. Lecturer
Dahl, Nicholas, M.A., Oregon State U. Lecturer
David, Betty B., Lecturer
deRoos, Jan A., Ph.D., Cornell U. Asst. Prof.
Dev, Chekitan S., Ph.D., Virginia Polytechnic. Assoc. Prof.
Dittman, David A., Ph.D., Ohio State U. Dean and E. M. Statler, Professor.
Enz, Cathy A., Ph.D., Ohio State U. Prof. and Lewis G. Schaeneman, Jr. Professor of Innovation and Dynamic Management
Ferguson, Dennis H., Ph.D., Cornell U. Assoc. Prof.
Geller, A. Neal, Ph.D., Syracuse U. Prof. and Associate Dean for Academic Affairs
Gould, Shelly, B.S., Cornell U. Teaching Support Specialist
Hinkin, Timothy, Ph.D., U. of Florida. Assoc. Prof. and Director of Undergraduate Studies
Jameson, Daphne A., Ph.D., U. of Illinois. Assoc. Prof.
Jones, Scott L., M.A., Purdue U. Lecturer
Kelly, Thomas J., M.S., Cornell U. Assoc. Prof.
Kerr-Donovan, Yariela, M.M.H., Cornell U. Lecturer
Kim, H. Young, Ph.D., Oklahoma State U. Lecturer
Kimes, Sheryl E., Ph.D., U. of Texas. Assoc. Prof.
Lang, Barbara, B.S., Cornell U. Lecturer
Lankau, Melenie, Ph.D., U. of Miama. Asst. Prof.
Lundberg, Craig C., Ph.D., Cornell U. Blanchard Professor of Human-Resources Management
Lynn, Wm. Michael, Ph.D., Ohio State U. Assoc. Prof.
McCarthy, Reneta, B.S., Cornell U. Lecturer
Moore, Richard G., M.B.A., Cornell U. Assoc. Prof.
Mutkoski, Stephen A., Ph.D., Cornell U. Banfi Vintners Professor of Wine Education and Management
Nash, Abby, B.A., Cornell U. Lecturer
Nohel, Tom, Ph.D., U. of Minnesota. Assoc. Prof.
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. Senior Lecturer
Potter, Gordon S., Ph.D., U. of Wisconsin-Madison. Assoc. Prof.
Rainsford, Peter, Ph.D., Cornell U. Assoc. Prof. and J. Thomas Clark Prof. of Entrepreneurship and Personal Enterprise
Redlin, Michael H., Ph.D., Cornell U. Prof.
Renaghan, Leo M., Ph.D., Pennsylvania State U. Assoc. Prof.
Ridley, Jane S., B.A., SUNY at Binghamton. Teaching Support Specialist
Roberts, Elizabeth, Ph.D., Purdue U. Asst. Prof.
Sherwyn, David, J.D., Cornell U. Asst. Prof.
Siguaw, Judy, D.B.A., Louisiana Technical U. Assoc. Prof.
Simons, Tony L., Ph.D., Northwestern U. Asst. Prof.
Snow, Craig, Ph.D., Purdue U. Senior Lecturer
Spies, Rupert, Studienassessor, Senior Lecturer
Steinacher, Richard, Ph.D., Florida State U. Senior Lecturer
Stevens, Betsy, Ph.D., Wayne State U. Asst. Prof.
Stipanuk, David M., M.S., U. of Wisconsin. Assoc. Prof.
Susskind, Alex, Ph.D., Michigan State U. Asst. Prof.
Tabacchi, Mary H., Ph.D., Purdue U. Assoc. Prof.
Thompson, Gary M., Ph.D., Florida State 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.
James, Robert, M.B.A., Pace U. Visiting Lecturer
Merberg, Elliot, B.S., New York U. Visiting Lecturer
Sciarabba, Andrew, B.B.A., St. John Fisher College. Adjunct Assoc. Prof.
Shankar, Gowri, Ph.D., Syracuse U. Visiting Assoc. Prof.
Yesawich, Peter C., Ph.D., Cornell U. Visiting Assoc. Prof.

COLLEGE OF HUMAN ECOLOGY

ADMINISTRATION

Patsy M. Brannon, dean

D. Merrill Ewert; director of Cornell Cooperative Extension

Jennifer Gerner, associate dean

Charles McClintock, associate dean

S. Kay Obendorf, associate dean

Brenda Bricker, director, undergraduate affairs

Darryl Scott, director, admissions

Duncan Bell, college registrar

FACILITIES

The College of Human Ecology anticipates and responds to human needs in the areas of nutrition and health, economic and social well-being, environmental design and technology; as well as human development through education, basic and applied research, and the extension of knowledge. The college is distinctively characterized by the quality of its research in the natural and social sciences and the design arts, a global perspective in academic programs, a preventive approach to contemporary societal problems, multidisciplinary departments and programs, development of leadership in students and citizens, and a commitment to diverse populations. Faculty and students examine individuals in relation to their family, neighborhood, workplace, and community, seeking a balance between theory and practice that will improve the quality of everyday life.

The college is housed in Martha Van Rensselaer Hall. The Division of Nutritional Sciences, an intercollege division supported jointly by the College of Human Ecology and the College of Agriculture and Life Sciences, has space in Savage and Kinzelberg Halls and in Martha Van Rensselaer Hall.

The buildings include administrative and faculty offices, classrooms, auditoriums, galleries and lecture halls; wet chemistry and biochemistry laboratories for nutrition, food science, and textile science; experimental food laboratories; design studios and computer-aided design laboratories; woodworking shops; experimental observation rooms with one-way vision screens and sound-recording equipment; human factors and infant research facilities; educational television studios; and an audio/visual classroom for distance learning. Also included are learning resource centers for career planning, field and international study, a historical costume collection, a human metabolic research unit, a animal research facility, cold rooms, a constant temperature and humidity laboratory, and an early childhood research and care program.

Specialized equipment for teaching and research includes biochemical and chemical instruments for spectroscopy, chromatography, radioisotope analysis, electrophoresis, microscopy, and ultracentrifugation; physical testing equipment; and cameras, videotape, and sound recording equipment.

DEGREE PROGRAMS

	Degree
Biology and Society	B.S.
Design and Environmental Analysis	B.S.
Human Development and Family Studies	B.S.
Human Biology, Health and Society	B.S.
Nutritional Sciences	B.S.
Policy Analysis and Management	B.S.
Textiles and Apparel	B.S.
Individual Curriculum	B.S.

UNDERGRADUATE AFFAIRS

Brenda Bricker, director

Duncan Bell, college registrar

Persons interested in undergraduate study in human ecology should contact the admissions office, 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.

Counselors in the Office of Admission, Student, and Career Services (172 MVR) can help perspective students understand college programs and requirements, as well as College and University resources and services. They provide a broad range of career services and personal support for all matriculated undergraduates. The college registrar (145 MVR) assists undergraduates with questions on academic credit and graduation requirements.

The Students

The College of Human Ecology undergraduate enrollment is 1,369 with 55 percent in the upper division. Roughly 360 students graduate each year; last year 255 freshmen and 188 transfer students matriculated. Nearly one hundred faculty members serve as advisers to undergraduates.

The college's undergraduate admissions committee selects applicants who are academically well prepared and appear most likely to profit from the college's various curricula. Admission is selective. Approximately 73 percent of the student body comes from New York State, with the remainder coming from other parts of the United States and abroad. In 1998 27 percent were identified as members of minority groups. Approximately 209 graduate students have members of the college's faculty chairing their special committees. The college awarded 59 master's degrees and 29 doctorates last year.

ACADEMIC PROGRAMS

Majors

Selection of a major begins with identifying 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 director of career services and other counselors in the Office of Admission, Student, and Career Services (172 Martha Van Rensselaer Hall) and resources in the Career Development Center (159 MVR) can help students through 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. A student may satisfy the requirements of more than one major option. (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:

Design and Environmental Analysis (DEA): Interior design, facility planning and management, human factors and ergonomics.

Human Biology, Health and Society (HBHS): A major sponsored by Division of Nutritional Sciences, HBHS combines the biological sciences with courses that explore human health issues from the perspectives of both the biological and behavioral science. More information about this program can be found in a separate section of the catalog that describes the division's programs.

Human Development (HD): 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.

Nutritional Sciences (NS): This division supervises this major and HBHS (above). (With careful planning, students may also meet the minimum academic requirements of The American Dietetic Association.) The division administers an honors program for selected students.

Policy Analysis and Managment (PAM): The department offers a major in policy analysis and management.

Textiles and Apparel (TXA): Apparel design, apparel-textile management, fiber science.

Interdepartmental Major in Biology and Society (ID-BS).

Individual Curriculum: It is possible to develop an individual program of study if none of the above programs fit particular educational and career objectives.

Changing Majors

Because any student's interests and goals may change as new options emerge, the college provides ways for students to change their majors. 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 Admission, Student, and Career Services, 172 Martha Van Rensselaer Hall) or from the Office of the Registrar (145 MVR) 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 education of mature students, defined as those twenty-four years old or older at first matriculation, the college has adopted certain procedures specifically for that group. Counselors in the Office of Admission, Student, and Career Services (172 MVR) 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 also are permitted to extend their residency beyond the normal eight terms.

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 person is classified as a special student may be counted toward the requirements of the bachelor's degree. Those interested in becoming special students should make appointments to discuss admission procedures in the Office of Admission (170 MVR).

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.

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, including frequent social and organizational changes, 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 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 material samples for student use.

Options

The department offers undergraduate education in three professional areas: interior design, facility planning and management, and human factors and ergonomics. The interior design option is accredited by the Foundation for Interior Design Education Research (FIDER). The Facilty Planning and Management Program at Cornell is an "IFMA Recognized Program." This means that it meets the standards for recognition of programs established by the International Facility Management Association.

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 on knowledge of buildings and their associated systems, furnishings and interior products, human-environment relations, and design principles. Some students combine this program with another option.

Careers are available in interior design and space planning, interior architecture, facility planning, interior product design, and housing. This program also serves as an excellent preparation for graduate study in interior design, facility management, architecture, and product design.

Option II: Facility Planning and Management

This option is designed to prepare students for professional careers in facility management. The program focuses on the planning, design, and management of facilities for large, complex organizations such as corporations, health-care institutions, research and development laboratories, and universities. Facility planning and management is a basic management function that coordinates and integrates information and expertise from areas such as planning and design, real estate and business administration with human factors, ergonomics, environmental psychology, telecommunications, and building operations for the purpose of developing and managing facilities that support individual and organizational effectiveness.

Excellent career opportunities exist in the facility management divisions of private companies, institutions, the health-care industry, and with private consulting firms offering facility management services. The program is also a good preparation for graduate study in business, planning, or one of the design disciplines and for advanced study in facility planning and management.

Option III: Human Factors and Ergonomics

Human factors and ergonomics 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. This knowledge is then used to help architects, planners, interior designers and product designers and facility managers to plan, design, and manage safe and effective environments. The effect of human capabilities or characteristics such as family structure, life-style, social class, and stage in life cycle on environmental needs and requirements is also a focus of the program. Career opportunities are available in design firms and in urban planning and other public agencies as well as in the facility management and product design division of private companies. Human factors and ergonomics is good preparation for graduate study leading to a Ph.D. degree in the social sciences and a career in academic or other research-oriented settings in either the public or private sector. It can also serve as the basis for graduate study in an environmental planning or design discipline such as architecture, facility planning and management, interior design, landscape architecture, or city and regional planning. Electives in the social sciences and in research methods and statistics are encouraged.

Academic Advising

All DEA majors are matched with a faculty adviser during their first semester by the director of undergraduate studies, Paul Eshelman, in E304 Martha Van Rensselaer Hall.

Consultation with faculty advisers about future goals, departmental requirements, sequences of courses, and electives inside or outside the college 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 they meet graduation requirements for their major and 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 BIOLOGY, HEALTH, AND SOCIETY

The Human Biology, Health, and Society (HBHS) Program permits you to combine your interests in the biological sciences while exploring human health issues from the perspectives of both the biological and behavioral sciences. HBHS majors select the issues they want to explore in depth from Human Ecology courses that address health and the broad range of factors that influence human well-being. Examples of issues you can explore include: biology and behavior; metabolism, genetics, and health; biology, growth, and development; and food and health policy and health promotion. Most students in this program will proceed to programs of advanced study to pursue careers related to health. This new major is offered by faculty in the Division of Nutritional Sciences. More information about this program can be found in a separate section of the catalog that describes the division's programs.

HUMAN DEVELOPMENT

Human Development majors explore the psychological, social, cultural, and biological development of people from conception to old age, focusing on the processes and mechanisms of growth and change over the life course. A wide range of issues are included in the study of human development, including biological, cognitive, and emotional development; the role of family, neighborhood, workplace, and culture in development; and the influence that developing humans have on their environment. The Human Development major provides an excellent foundation for many careers, such as medicine (particularly family medicine, pediatrics, and psychiatry), clinical psychology and other mental health professions, law, business (especially human resources), child and family advocacy, and education (from preschool to high school teaching to school administration). The major prepares students for academic careers as professors in human development, psychology, or sociology departments. Learning about human development also helps students understand more clearly their own development and the development of those around them.

The faculty of the Department of Human Development comes from several disciplines, including developmental and clinical psychology, sociology, and history. The diversity of faculty expertise results in a wide-ranging view of human development. The research of the department's faculty is extensive. It includes basic research on issues such as the neurobiology of personality, the role of childhood attachments in the development of adult romantic relationships, the acquisition of language in infants, and the effects of environmental toxins on children's cognitive development. It also includes applied research useful for the creation of public policy, such as studies of the causes and consequences of child maltreatment and studies of the effectiveness of reading programs for Headstart preschoolers, apprenticeship programs for high school students, and support programs for older adults moving into retirement communities.

Curriculum

Human Development is the most flexible major in the College of Human Ecology. While all students learn the fundamentals of human development, each student can focus on one or more areas of particular interest. The flexibility of the major also allows students ample opportunity to meet the requirements for admission to many professional schools, including medical, dental, law, and business schools.

Requirements specified by the College of Human Ecology make up part of each student's curriculum, and include classes in the social and natural sciences, humanities, writing, and communication. In addition, there are requirements for the Human Development major. Students in this major can choose up to 14 elective courses from the broad range of offerings across the Cornell campus.

Special Opportunities

Beyond formal coursework, students have many other opportunities that involve ongoing individual work with Cornell faculty or other professionals. Academic credit can be earned through all of them. These opportunities include

Field Placements. Human Development majors can arrange internships with Urban Semester in New York City, Cornell-in-Washington, and Cornell Abroad programs and in local agencies. These have included hospitals, psychiatric hospitals, juvenile detention centers, retirement homes, and the department's on-campus Early Childhood Program. Students have also participated in projects with the Tompkins County Office of Aging, the Tompkins County Youth Bureau, and the Law Guardian's Office of Tompkins County.

Faculty Research. Many students work as research assistants on faculty projects. Students use research techniques ranging from laboratory procedures to family observations to large surveys. They assist in study design, data collection, and data analysis. Participation in faculty research provides the type of experience that many graduate and professional schools expect from their top applicants. Recent projects have included the study of parent-infant interactions, the transition of high school students to the world of work, and the study of recent trends in the composition of American families.

Independent Research. Under faculty supervision, some advanced students complete an honors thesis in an area of personal interest by designing a study and collecting and analyzing data. Recent thesis topics have included marital quality in Asian and interracial couples, development in families that adopt school-age children, and connections between speed of visual processing in infants and later scores on intelligence tests.

Undergraduate Teaching Assistant. Advanced students can serve as undergraduate teaching assistants. This requires close work with the professor teaching the course as well as with students taking the course.

Teaching Certification. A cooperative program with SUNY Cortland allows students interested in elementary education to graduate with a Cornell bachelor of science degree and then apply for New York State teaching certification, which is honored in most other states.

NUTRITIONAL SCIENCES

A major of Nutritional Sciences (NS) focuses on the complex interrelationships of food patterns, nutritional status, and health. This field draws upon chemistry, biology, and the social sciences to understand questions such as: How are nutrients used by the body? What factors influence human food choice? What nutrients and dietary patterns are recommended to promote growth, maintain health, or reduce the risk of chronic disease? Students in this program may also fulfill the courses required for professional membership in the American Dietetic Association, which will enable them to be employed as nutrition counselors, clinical nutritionists, sports nutritionists, or administrators of food and nutrition services. Students also may prepare for medical school and other types of advanced degree programs through this major. The requirements for this program are outlined in the section of this catalog that describes the division's programs.

POLICY ANALYSIS AND MANAGEMENT

The Policy Analysis and Management (PAM) major produces graduates skilled in policy analysis, program planning, and evaluation and possessing management skills applicable in the public, nonprofit, and private sectors. In addition, the Policy Analysis and Management graduate will have concentrated knowledge in one of three areas: family/social welfare, health, and consumer policy. Graduates are well-qualified for a wide variety of public, nonprofit, and private sector employment emphasizing either program analysis and evaluation or management. The major also attracts large numbers of pre-law students, pre-MBA students, and students intending to pursue graduate education in public affairs and policy analysis programs. The potential exists to pursue a five-year program resulting in a BS and a Master of Health Administration.

The PAM major combines theoretical underpinnings from economics, sociology, psychology, and government to critique and analyze our society's values, laws, policies, and programs. It also gives students the knowledge to build management skills for use in public, nonprofit, and for-profit settings. Ideas of social justice, equity, and efficiency will be studied concurrently with strategic planning, human resources, supervision, and organizational development. Research methods, statistics, and planning and evaluation concepts will be learned and used to direct and aid in program planning, policy analysis, program evaluation, and management.

In addition to learning basic policy analysis and management skills, the student will be expected to apply these skills to a particular concentration—social welfare/family, health, or consumer policy. Social welfare/family policy and management includes a panoply of governmental and private sector income maintenance, social, and human service delivery programs and policies that range from child adoption and child neglect and abuse policies and antipoverty programs to policies and programs that impinge on or regulate marriage, divorce, and fertility. Health programs and policies include such politically sensitive programs and issues as health care access, Medicare, Medicaid, long-term care, health maintenance organizations, public health issues, and substance abuse policies. Consumer programs and policies include the regulation and laws governing advertising, product safety, food and drug safety, nutrition policies, the regulation of credit, insurance, telecommunications, mortgage, housing issues, and public utility markets and also deal with issues such as the invasion of privacy, internet security, and children's TV. A specific focus in the consumer concentration is the role of marketing and its relationship to consumer well-being and consumer behavior.

In addition to college requirements, all PAM majors are expected to take core courses: Introduction to Management, Introduction to Policy Analysis, Research Methods, Multivariate Statistics, Intermediate Microeconomics, and Public Finance. Students will also be expected to develop a concentration of three courses in either social welfare/family, health, or consumer policy. These concentrations may emphasize either policy analysis or management skills. Finally, PAM majors will have the opportunity to participate in departmentally approved experiential learning. Please check with the undergraduate advising coordinator, Professor Alan Mathios, for further details.

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 director of undergraduate studies, Anita Racine (316 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 working with their advisers early 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 their major and 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 the 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.

Options

Students may select options in apparel design, apparel-textile management, or fiber science. The curriculum is based on manipulation of form, color, and the physical characteristics and structures of fabric to solve functional and aesthetic apparel problems; the application of economic and marketing principles to consumer and industry problems in the textile-apparel sector; and the study of chemical, physical, and engineering properties of fibrous structures and polymers. Depending on previous course work, transfer students may need one or two extra semesters to fulfill the requirements of the major.

Option I: Apparel Design

The study of apparel design includes both functional and aesthetic considerations in the design of body coverings. The program emphasizes a problem-solving approach that enables the student to bring a background in apparel, textiles, and human factors to the design process.

Option II: Apparel-Textile Management

Apparel and textile management combines the fields of apparel and textiles with those of economics, business management, and organizational policy. Students combine theory with case studies to find solutions to everyday problems. Course work is drawn from many interrelated disciplines, including textiles, apparel, economics, business management, and communication, as well as practical field experiences. This provides students with the experience of working with professionals from a wide variety of disciplines. Students often combine this option with either Option I (Apparel Design) or III (Fiber Science).

Option III: Fiber Science

Applications for textile structures include advanced engineering composites, protective clothing for industrial and military environments, and biomedical materials, as well as the more traditional applications found in apparel and home furnishings. The fiber science option provides a strong base in mathematics and the physical sciences combined with supporting courses in engineering, consumer economics, and the social sciences.

Career Opportunities

Graduates of programs in the Department of Textiles and Apparel have found challenging employment within the textile and apparel sector, in independent and government-sponsored research, and in community organizations. Recent graduates are working in the fields of design, management, new product development, engineering, communications, and marketing. In addition, the program prepares students for graduate or professional study in fiber and polymer science, textile marketing, apparel design, textiles, or business and management.

INTERDEPARTMENTAL MAJOR IN BIOLOGY AND SOCIETY

Biology and society is a multidisciplinary program for students with special interests in such problems as genetic engineering, environmental quality, food and population, the right to medical care, and the relation between biology, society, and ethics and/or public policy, as well as for students who plan postgraduate study in management, health, medicine, law, or other related fields.

Because the biology and society major is multidisciplinary, students must attain a basic understanding of each of the several disciplines it comprises, by including introductory courses in the fields of biochemistry, chemistry, mathematics, genetics, ecology, ethics, and history. In addition, majors are required to take core courses in biology and society, a set of electives, and a special senior seminar.

Course work in the College of Human Ecology must be taken in two of the following three concentrations: human development and the environment, health, or social policy and human services. The other basic requirements of the college must also be met. Programs incorporating those required courses are designed in consultation with a faculty adviser to accommodate each student's individual goals and interests. For further information on the major, including courses of related interest, specific course requirements,

and application procedures, see the Human Ecology Student Guide, available in the Office of Admission, Student, and Career Services, 172 Martha Van Rensselaer Hall. Academic advising is coordinated by the director of undergraduate studies, Nancy Breen, 288 Martha Van Rensselaer Hall.

INDIVIDUAL CURRICULUM

A student who has educational and professional objectives that cannot be met satisfactorily within the framework of existing majors in the College of Human Ecology may petition to develop an individual curriculum. To be approved, the curriculum must be within the focus of the college and be interdisciplinary in design, include at least 40 credits in human ecology courses, and not exceed the normal number of credits allowed in the endowed divisions. A student develops an individual curriculum in consultation with faculty advisers from at least two subject-matter fields and the program coordinator, Patti Papapietro, Office of Admission, Student and Career Services (172 MVR).

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, the individual curriculum coordinator will provide direction in formally developing a program of study. Although the coordinator must approve the course enrollment schedule during course enrollment each term, it is a student's responsibility to follow the curriculum as planned or to have any necessary revision approved in writing by his or her adviser and the program coordinator before 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

Approximately 15 percent of the class of 1999 in Human Ecology studied abroad. 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 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.

Students should begin planning for their study abroad experience in their freshman or sophomore years. Opportunities for study abroad are available for human ecology students in several ways: through Cornell Abroad, through other U.S. college-sponsored programs abroad, and through direct enrollment in a foreign university. In all cases, students remain registered at Cornell during their 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 Admission, Student and Career Services, 172 Martha Van Rensselaer Hall. The study abroad adviser is Paul Fisher, 172 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 and management, 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 director of undergraduate studies. They can also visit the Career Development Center in N-159 MVR and explore established opportunities listed on the Web site, find informational materials, or meet with a career counselor to develop their own unique placements. New initiatives are encouraged. For further information, contact Kris Deluca-Beach, director of career services, 155 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 must enroll concurrently in the three courses, HE 470, HE 480, and HE 490. Students learn 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 be agents of change.

Several majors in the college require internships or encourage field study. Check with the director of undergraduate study of each major for more information. The Career Development Center in 159 MVR and counselors in the Office of Admission, Student, and Career Services in 172 MVR can help you find internships and provide more information on department opportunities and enrolling in Cornell in New York City.

Multicultural Practice

Fall and spring semesters: HE 470

Students immerse themselves in internship activities three days each week. During small group seminars, students reflect on their internship experiences, focusing on multicultural issues, professional practice, and organizational culture.

Multicultural Issues in Urban Affairs

Fall and spring semesters: HE 480

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. Readings focus on inner-city children and youth under a variety of multicultural-influenced conditions and contexts. Costs include travel to and from sites by public transportation at about $3.00–6.00 each week.

Communities in Multicultural Practice

Fall and spring semesters: HE 490

This course provides students with an understanding of community building processes and enables them to interact with children, youth, and their families in school settings. For a full day once each week, students work in inner city schools with teachers, staff, and children, providing community service. Student learning is focused on how to increase children's learning capacities and expand their horizons by teaching them to envision success. Students focus on the assets that inner city children bring to their school environment and learn how to mentor them. They help teach skills, knowledge, values, behaviors, and perspectives that school children must develop in order to enter the working world. Costs include public transportation costs to and from the various sites, about $3.00-6.00 each week.

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 with children of the Banana Kelly community. In carrying out community service, students

participate 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. In the 1998 intersession seven students mentored 15 ninth graders from Banana Kelly High School.

A photography exhibit was produced and circulated. In 1998, Cornell students and children produced three-dimentional models of their imagined community in future years and a book of essays and photographs.

Fieldwork in Diversity and Professional Practice

Summer session: HE 406

Over the course of an eight-week summer session, students will participate in a literacy project in Williamsburg, Brooklyn.

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 Donna Dempster-McClain, Gerontology Coordinator, Bronfenbrenner Center, G21 Martha Van Rensselaer Hall.

Double-Registration Programs

Johnson Graduate School of Management

A limited number of highly qualified students from the Cornell undergraduate divisions, including human ecology, may be accepted by the Johnson Graduate School of Management after their 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 their 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 Medicine. Interested students should contact the Health Careers Program office in 103 Barnes Hall.

Other Off-Campus Programs

New York State Assembly Internships

A limited number of session internships with the New York State Assembly are available in the spring semester. Intern applicants 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 Admission, Student, and Career Services, 172 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, 145 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, 145 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 director of undergraduate studies. The director of undergraduate studies 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 director of undergraduate studies to discuss such a change. Faculty advisers, and counselors in the Office of Admission, Student, and Career Services (172 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 provide the adviser key number 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. Directors of undergraduate studies 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 and referral to department resource faculty.

Completing Graduation Requirements

A summary of record is kept for each student in the Office of the Registrar, 146 Martha Van Rensselaer Hall. At the beginning of fall term each continuing student receives a copy showing which major and degree requirements have already been met. It is important to check this summary and to bring any questions to the attention of the faculty advisor and the staff members in the Office of Admission, Student, and Career Services. A student may complete the requirements of more than one major.

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 faculty advisers are available to discuss which courses may interest students and best round out their educations.

Students should consult the index 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."

REQUIREMENTS FOR THE DEGREE OF BACHELOR OF SCIENCE

General

Students applying as undergraduates who do not have the required academic unit in biology, chemistry, or physics are required to show evidence of having met this deficiency before matriculation in the college.

Freshmen and sophomores are required to enroll in at least one human ecology course per semester.

To graduate, students need to

1) meet college credit and distribution requirements,
2) complete requirements for a major,
3) achieve a cumulative average of 1.7 (C–) or better,
4) complete two terms of physical education

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.

Category I General Distribution

A. *Natural Sciences* (6) selected from Biological Sciences 101–103, 102–104, 105–106, 109–110; Chemistry 206, 207–208; and Physics 101–102, 112, 201 or 202, 207–208.

B. *Social Sciences* (6)

C. *Humanities* (3) Language credit cannot be used in this area (See: IV).

D. *Written Communictions* (6) Must be Freshman Writing Seminars. At least one seminar must be in the humanities.

E. *Quantitative and Analytical*

1. Math competency equivalent to EDUC 115 (precalculus)
   a. AP of 3 or higher on AB test
   b. AP of 2 on BC test
   c. Math assessment test score equivalent to EDUC 115
   d. Pass a math course equivalent to or higher than EDUC 115
2. Statistics, advanced math, logic (3)

F. *Additional credits* (12)

Category II Requirements in HUMEC—the major (number of credits vary by major)

HUMEC Credits Outside the Major 9

May not include any HE 00 courses, HE 100, HE 101 or any 403 course. A maximum of three credits of special studies (400, 401, and 402), or of any internship credit may be used. A maximum of five credits of either HE 470 or HE 480, PAM 392 or HE 490 can be used.

Category III Other courses to complete 120 credits overall, exclusive of physical education.

Elective credits can be earned in Human Ecology or elsewhere. Students who earn more than 21 credits in endowed colleges during fall or spring terms will be billed for the excess credits at the endowed rate of tuition. Billable endowed credit includes endowed courses taken in Category II.

Category IV Physical Education 2

TOTAL credits (exclusive of PE) 120

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.

Category I.D. Students who score 4 or 5 on the College Board AP English Exam are awarded 3 credits in English. Students who score 5 on the College Board AP Exam are exempt from one freshman writing seminar in addition to the 3 English credits awarded.

Category III. *There is no limit to the number of credits that may be taken in the state divisions of Cornell,* and therefore students may choose to take additional state credits and graduate with more than 120 credits.

Credits in the endowed divisions in this section may not exceed 21. Any course taken in an endowed division for which a grade of F or U is received will be counted *as part of* the 21 endowed credits allowed.

Elective credits earned in Cornell's endowed divisions during summer session, in absentia credits, and transfer credits are not counted in the limited 21 endowed credits permitted because they were paid for at endowed tuition rates.

Not more than 21 credits in Categories II and III 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.

Category I.D. Transfer students should have taken at least 6 credits in English composition or in courses requiring substantial writing and offering instruction in writing equivalent to that offered in the freshman writing seminar program at Cornell. Students who have not fulfilled this requirement before transferring must fulfill it after matriculation.

Category III. 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.

Category IV. 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 Office of Physical Education in Teagle Hall.

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 Admission, Student, and Career Services, 172 Martha Van Rensselaer Hall or in Room 145, the Office of the Registrar.

PROCEDURES

Course Enrollment and Registration

Students are expected to make course requests for their next semester during a specified time in the current semester. Those dates are advertised publicly and available on the University Registrar's web site. CoursEnroll takes place electronically, using software available through Just the Facts. During this time, each student must meet with his or her faculty adviser to discuss academic plans and to obtain the advising code required for finalizing course requests.

Incoming students will receive tentative schedules upon their arrival to campus, and will meet with faculty advisers during the orientation period.

All students may adjust their schedules and grading options during the first three weeks of each semester.

Permission of Instructor

Certain courses may be taken only with the permission of the instructor as indicated in *Cornell University: Courses of Study.* Undergraduates must obtain permission of the instructor for any graduate course. Students must request the instructor's permission during the CoursEnroll period by placing their name on a list maintained by the departmental advising assistant.

Students interested in taking a course in the Department of Art in the College of Architecture, Art, and Planning are required to register with the departmental secretary (100 Olive

Tjadan Hall) before enrolling in the course. Seniors who want to take an elective course in the Johnson Graduate School of Management are required to obtain permission of the instructor on a course authorization form that the student then files with that school's registrar in Sage Hall.

Special Studies Courses

Each department in the College of Human Ecology (DEA, HD, DNS, PAM, and TXA) offers special studies courses that provide opportunities for students to do independent work not available in regular courses. One of those courses, designated 300, Special Studies for Undergraduates, is intended primarily for students who have transferred from another institution and need to make up certain course work.

The other special studies courses are 400, Directed Readings; 401, Empirical Research; and 402, Supervised Fieldwork. Those courses are normally taken by upperclass students, and work is supervised on an individual basis by a faculty member in the department in which the course is offered. It is important for students to use the appropriate course number (300,400,401, or 402) for a special project.

A student who wants to take special studies courses talks with the faculty member under whose supervision the study would be done and then prepares a work plan. If the faculty member agrees to supervise the study, the student completes a multicopy special studies form, a multicopy description of the study to be pursued. The student obtains the signatures of the instructor and the department chair as well as the student's department adviser before submitting it to the Human Ecology Registrar's Office. The student also must complete a course enrollment form in the Office of the Registrar (145 MVR). Special studies forms and instructions are available in the departmental offices.

To register for a special studies course, a student obtains a special studies form from the departmental office where they plan to take the course. The student discusses the proposed course 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 special studies form and obtains signatures from the instructor, department chair, and faculty adviser before submitting the form to the Office of the College Registrar (145 MVR). The student must also submit a course registration form (add/drop form) to the Office of the College Registrar. Special studies forms are available in 145 MVR or in departmental offices. Add/drop forms are only available in 145 MVR.

Semester credits for special studies courses are determined by the number of contact hours the student has with the supervising faculty member (or a person designated by the faculty member). Special studies courses can be taken as directed readings (400), empirical research (401), and supervised fieldwork (402). Refer to the Human Ecology section of Courses of Study for descriptions of the courses. To earn one credit, a student must have the equivalent of three hours of contact time per week with the faculty member or designated person for 15 weeks (a total of 45 contact hours). For additional credit, multiply the number of credits to be earned by 45 to determine the number of contact hours needed for the course.

A student can only use 12 credits of 400, 401, or 402 courses towards graduation and only 5 of these 12 credits can be used to satisfy the 9-credit-outside-the-major requirement. In addition, a student can only take one 403 course towards graduation requirements.

To register in a special studies course taught in a department outside the college, follow the procedures established by 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.*

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. *Classes cannot be dropped after the seventh week of classes without petitioning and by substantiating extenuating circumstances.* Permission to drop late is rarely granted. Do avoid the need to drop courses by taking on a reasonable workload and using the drop period to make changes in your program.

Except for those with mature student status, students must carry at least 12 credits (exclusive of physical education). In special cases, a student may petition to carry between 8 and 12 credits. Forms for petitioning and advice on how to proceed are available from the Office of Admission, Student, and Career Services, 172 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 or counselors for more information.)

Students of mature status may carry 6 to 11 credits without petitioning and may have their tuition prorated. However, before the beginning of each term, mature students planning to take a light course load should submit a proration of tuition form to the Human Ecology Registrar's Office .

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*. Students' 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 complete course enrollment during the course enrollment period usually must wait until the beginning of the next 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 145 MVR as soon as possible. The college registrar can explain available options and course enrollment procedures under such circumstances.

Important: Students can review their course schedule via computer using Just the Facts. Students are responsible for checking their course schedule for accuracy of course numbers, credit hours, grade option 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.**

At the beginning of the fall semester, each continuing student receives a copy of his or her **summary of record** from the Human Ecology Registrar's Office. This summary shows completed degree requirements. Students are responsible for assuring that their academic program meets degree requirements. Students may direct questions about their academic programs to their faculty adviser or to a counselor in the Office of Admission, Student, and Career Services. They resolve any questions about degree requirements with the appropriate staff person in the Human Ecology Registrar's Office.

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, the Bursar's Office will change a late fee.

Students who fail to register by the third week of the term will be withdrawn from the university. Should withdrawn students wish to return, they must reapply through the admissions committee.

Course Enrollment Changes

Deadlines

- During the first three weeks of the term, courses may be added or dropped, or the grade option can be changed.
- 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 submitting a petition after the seventh week requesting permission to drop a course must attach a statement from his or her faculty adviser to that

petition indicating whether or not the advisor supports the request.

- After the seventh week of the term, any student granted permission to drop a course after petitioning will automatically receive a grade of **W** (Withdrawn), and the course will remain on the official transcript.

Deadlines for Half-Term Courses

Students may drop half-term courses within the first three-and-one-half weeks of the course. Students may add a course after the first week of classes only with the permission of the instructor. After the first three-and-one-half weeks, students must petition to drop the course. (See **Petition Process, General Petition Form** for information on the procedure.)

Procedures

It is to the student's advantage to make any necessary course enrollment changes as early in the term as possible. Adding new classes early makes it easier for the student to keep up with class work. Dropping an unneeded class early makes room in the class for other students who may need it for their academic programs.

Ideally, students evaluate their class work load carefully at the beginning of the term. If, in the first week or two, the instructors do not discuss the amount of material to be covered and the extent of student assignments, students need to ask about course requirements.

Some procedures required for class enrollment are also required for class enrollment changes. For example, the instructor's permission must be obtained for a course requiring it, and the same forms for special studies courses must be completed. Aside from the procedures listed below for course enrollment changes, all course change forms for **nutritional science majors** must be signed by the faculty department adviser.

Waiting List: The Human Ecology Registrar's Office maintains waiting lists for students who want to enroll in courses that have been filled. Waiting lists are maintained on a first-come, first-served basis without regard to seniority or other factors. To keep their names active on a waiting list, students must **check in person every 48 hours** with the Human Ecology Registrar's Office. 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 Human Ecology Registrar's Office, 145 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 Human Ecology Registrar's Office; for courses outside the college, the forms should be taken to the appropriate departmental office of 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 Human Ecology Registrar's Office, including the forms for out-of-college courses.** Changes are not completed until the signed forms are filed in that office. If a student does not drop a course that he or she no longer attends, the student is in danger of receiving an **F** in the course.
5) Receives carbon copies of each course change form at the time it is submitted. It is **important** for students to keep these copies to verify later that the forms were filed.

To make course changes during the **fourth through seventh** weeks of the term, a student takes the following steps:

1) Completes the five steps listed above for changes made during the first three weeks.
2) Obtains the instructors' signatures on the course change form for human ecology courses.

To make course changes **after the seventh week** of the term, a student must file a general petition form. (See the section below, **Petition Process**.) Students are expected to attend classes and to do assigned work until the petition has been formally approved or denied.

In absentia Study

Under certain conditions, credit toward a Cornell degree may be given for in absentia study, that is, study done at an accredited institution away from Cornell after the student matriculates in the College of Human Ecology.

To be eligible for in absentia study, a student must be in good academic standing and must receive permission in advance from the college registrar. Students not in good standing may study in absentia but will not receive transcript credit until they have been returned to good standing by the Committee on Academic Status. In some cases, students may petition for in absentia credit after the work has been completed, but there is no guarantee that such credit will be awarded without advance approval.

In absentia petition forms are available in the Human Ecology Registrar's Office, 145 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 Human Ecology Registrar's Office, 145 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 as long as the courses do not duplicate courses already taken and the in absentia courses are applicable to the requirements of the college. On rare occasions student's petition for more than 15 credits in absentia may be allowed: (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 Human Ecology Registrar's Office. Only then will credit be officially assessed and applied to the Cornell degree. Credit for in absentia study will be granted **only** for those courses with grades of C- or better. Only credits (not course names and grades) for in absentia study appear on the Cornell University transcript.

A student who holds a Regents' or Children of Deceased or Disabled Veterans Scholarship may claim that scholarship for study in absentia if the study is done in a college in New York State and if it is for a maximum of 15 credits acceptable to the College of Human Ecology.

The rules regarding study in absentia apply to transfer students with the additional stipulation that at least 60 credits must be taken at Cornell. At least 40 of the 60 credits must be in the College of Human Ecology at Cornell unless the student has transferred equivalent human ecology credit. (No more than 20 credits of equivalent credit may be applied to the 40 credits required in human ecology course work.)

Leaves of Absence

A student may request a leave of absence before the beginning of the semester or during the first seven weeks of the semester for which a leave is sought. A leave may be extended for a second semester by requesting an extension in writing from the Office of Admission, Student, and Career Services. Note that in absentia study and leave of absence status are mutually exclusive.

A student considering a leave of absence is urged to discuss plans with a counselor in the Office of Admission, Student, and Career Services. The counselor can supply the necessary forms for the student to complete and file with the Human Ecology Registrar's Office, 145 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 Admission, Student, and Career Services and filing a written notice of withdrawal in the Human Ecology Registrar's Office. A student considering such an action is urged to discuss plans with a counselor in the Office of Admission, Student, and Career Services, 172 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 Office of 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 Admission, Student, and Career Services, 172 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 Human Ecology Registrar's Office.

Students may appeal petitions denied by the college registrar to the Committee on Academic Status. Students who appeal a denied petition **must** attach a statement from the student's faculty adviser before CAS will consider the appeal.

GRADES

See the "Grading Guidelines" section for information on the official university grading policies.

S-U Grades

Some courses in the college and in other academic units at Cornell are offered on an S-U basis; that fact is indicated in the *Cornell University: Courses of Study*. University regulations concerning the S-U system require that a grade of S be given for work equivalent to a C– or better; for work below that level, a U must be given. **No grade point assignment is given to S, and S or U grades are not included in the computation of semester or cumulative averages**. A course in which a student receives an S is, however, counted for credit. No credit is received for a U. Both the S and U grades appear on a student's record. A student who is attempting to qualify for the Dean's List must take at least 12 credits for the usual A–F grades. See the *Human Ecology Pocket Book of Useful Information* for specific details about the Dean's List.

A student may take no more than 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 9 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. If a required course is only offered S-U, it will not count toward the 12-credit or 4-course limit.

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 during course enrollment, or file an add/drop/change form in the Human Ecology Registrar's Office before the end of the third week of the term. Forms are available in the Human Ecology Registrar's Office. After the third week of the term, students can not change grade options.

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.

A grade of incomplete may remain on a student's official transcript for a maximum of two semesters and one summer after the grade is given, or until the awarding of a degree, whichever is the shorter period of time. The instructor has the option of setting a shorter time limit for completing the course work.

If the work is completed within the designated time period, the grade of incomplete will be changed to a regular grade on the student's official transcript. **If the work is not completed within the designated time period, the grade of incomplete automatically will be 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 Human Ecology Registrar's Office. This form is submitted with the final grade sheets whenever a grade of incomplete is given.

This form is for the student's protection, particularly in the event that a faculty member with whom a course is being completed leaves campus without leaving a record of the work completed in the course.

If circumstances prevent a student from being present to consult the instructor, the instructor may, if requested by the student, initiate the process by filling out and signing part of the form and turning it in to the Human Ecology Registrar's Office with the grade sheet. Before a student will be allowed to register for succeeding semesters, he or she must go to the Human Ecology Registrar's Office 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 Human Ecology Registrar's Office (about two weeks after the work has been handed in) to make sure that the grade has been received. Any questions should be discussed with the course instructor.

ACADEMIC HONORS

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

Dean's List. Excellence in academic achievement is recognized each semester by placing on the Dean's List the names of students who have completed satisfactorily at least 12 credits with letter grades other than S or U and who have a semester grade point average of 3.5 or above. No student who has received an F or U in an academic course will be eligible.

Kappa Omicron Nu seeks to promote graduate study and research and to stimulate scholarship and leadership toward the well-being of individuals and families. As a chapter of a national honor society in the New York State College of Human Ecology, it stimulates and encourages scholarly inquiry and action on significant problems of living—at home, in the community, and throughout the world.

Students are eligible for membership if they have attained junior status and have a cumulative average of not less than B. Transfer students are eligible after completing one year in this institution with a B average.

Current members of Kappa Omicron Nu elect new members. Not more than 10 percent of the junior class may be elected to membership and not more than 20 percent of the senior class may be elected. Graduate students nominated by faculty members may be elected.

Bachelor of Science with Honors recognizes outstanding scholastic achievement in an academic field. Programs leading to a degree with honors are offered to selected students by the Department of Human Development and 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 Janet Brown-Aist, N118A Martha Van Rensselaer Hall, their sophomore year or the first semester of their junior year.

Bachelor of Science with Distinction recognizes outstanding scholastic achievement. Distinction is awarded to students in the top 10 percent of the graduating class based on the last 60 credits earned at Cornell. The graduating class includes students who will complete requirements for Bachelor of Science degrees in January or May of the same academic year.

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. Letter or S-U grades.
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 Prefreshman Summer Program students. Letter or S-U grades.
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, exam preparation, 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 either fall or spring semester students enroll in three classes 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 two-week winter intercession course (2 credits) enables students to do community service through a reflective practice curriculum. In the eight-week summer semester (3 credits), students carry out a literacy project with pre-k and kindergarten children. 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 Career Development Center, N–155 Martha Van Rensselaer Hall.

New York City offers a wide variety of intership 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 Project
- **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
- **Wall Street firms and other private businesses**—Bloomingdales, Prudential Securities, Oppenheimer, Inc., The Advertising Council, GKN Securities, Rogers and Cowan, Inc., Kidder Peabody, Co., Hill and Knowlton, Young and Rubican, Altschiller Reitzfeld, Terry Williams Agency
- **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
- **Design and arts organizations**—Harlem Textile Works, Perry Ellis International, Caribbean Cultural Center, Delacour & Ferrara, Architects, P.C., New York Shakespeare Festival Theatre, New York Theatre Workshop, Cynthia Rowley Company, SOHO20 Gallery, Museum of African Art, Lower East Side Tenement Museum
- **Communication and media**—*Good Housekeeping, Mirabella,* William Morrow Co., MTV, NBC-TV, ABC-TV, Good Morning America, WBAI-Radio, *The Village Voice, The New Yorker,* Telemundo Group, Inc., *Essence,* McNeil-Lehrer News, Ad Council, *McCalls, Child,* Children's Television Workshop, Time Warner, Inc.

HE 470 Multicultural Practice
Fall and spring semesters.
Students immerse themselves in internship activities three days each week. During small group seminars, students reflect on their experiences in their internships with a focus on multicultural issues, professional practice, and organizational culture.

HE 480 Multicultural Issues in Urban Affairs
Fall and spring semesters.
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. Readings will reflect the focus on inner-city children and youth effected by many multicultural influences. Costs include travel to and from sites by public transportation at about $3.00–6.00 each week.

HE 490 Communities in Multicultural Practice
Fall and spring semesters: HE 490.
This course provides students with an understanding of community building processes and enables them to interact with children, youth, and their families in school settings. For a full day once each week, students work in inner city schools with teachers, staff, and children, providing community service. Student learning is focused on how to increase children's learning capacities and expand their horizons by teaching them to envision success. Students focus on the assets that inner city children bring to their school environment and learn how to mentor them. They help teach skills, knowledge, values, behaviors, and perspectives that school children must develop in order to enter the working world. Costs include public transportation costs to and from the various sites, about $3.00–6.00 each week.

DESIGN AND ENVIRONMENTAL ANALYSIS COURSES

F. Becker, chair; P. Eshelman, director of undergraduate studies; J. Laquatra, director of graduate studies; A. Basinger, S. Danko, J. Elliott, G. Evans, K. Gibson, R. Gilmore, A. Hedge, J. Jennings, L. Maxwell, W. Sims

Note: A minimal charge for photocopied course handouts may be required.

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.

DEA 101 Design Studio I
Fall. 3 credits. Each section limited to 18 students. Permission of instructor required for non-DEA majors. Priority given to interior design majors. Option I majors must take DEA 101 in fall of their first year. Approximate cost of materials, $60. M W 1:25–4:25; or T R 10:10–1:10. J. Elliott.
A studio course introducing the fundamental vocabulary and principles of two- and three-dimensional design. Students experiment with the development of form through problem-solving approaches.

DEA 102 Design Studio II
Spring. 3 credits. Limited to Option I DEA majors only. B– or higher in DEA 101 required to register for this course. Option I majors must take DEA 102 and 115 concurrently. Approximate cost of materials, $200; shop fee, $10. T R 1:25–4:25. P. Eshelman.
A studio course in three-dimensional design with an interior design emphasis. Problems in spatial organization are explored through drawings and models.

[DEA 111 Making a Difference: By Design
Fall. 3 credits. Limit 285. Lab Fee: $25. M W F 11:15–12:05. Not offered fall 1999; next offered fall 2000. S. Danko.
Students in any academic area examine how design affects their daily life and future profession. Course focuses on issues of leadership, creative problem-solving, and risk-taking through case study examination of leaders in business, education, medicine, human development, science, etc., who have made a difference using design as a tool for positive social change. Utilizing a micro to macro framework, students explore the impact of design from the person to the planet. Additional topics: nurturing innovation, visual literacy, design criticism, design and culture, semiotics, proactive/reflective decision-making, and ecological issues.]

DEA 115 Design Graphics
Spring. 3 credits. Option I DEA majors only. Prerequisite: DEA 101; must take DEA 102 and DEA 115 concurrently. Minimum cost of materials, $100; technology fee $10. Permission of instructor only. M W F 8:00–10:00. K. Gibson.
A studio drawing course for interior designers. Discussion groups on drawing techniques are held to develop a visual understanding and vocabulary. Students are introduced to the functions of line, shape, and value. Perspective, spatial, and conceptual drawing are emphasized.

DEA 150 Introduction to Human-Environment Relations
Spring. 3 credits. M W F 12:20–1:10. G. Evans.
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 Studio III
Fall. 4 credits. Limited to Option I DEA students. Prerequisites: DEA 101,102, and 115 (minimum grades of B–) Recommended: DEA 111 and 150. Coregistration in DEA 203 is required. Minimum cost of materials, $150; lab fee, $40; optional field trip, approximately $100. M W F 1:25–4:25. C. Sherwyn.
Beginning interior design studio. Focus is on development of basic proficiency in interior design skills. The course is structured around a series of elementary interior and interior-product design problems of 3 to 5 weeks in length.

DEA 202 Design Studio IV
Spring. 4 credits. Each section limited to Option I DEA students. Prerequisites: DEA 201 and 203. Prerequisites or corequisites: DEA 204. Minimum cost of materials, $120; diazo machine fee, $8; field trip fee. T R 12:20–4:25. Sherwyn.
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 of 3 to 5 weeks duration is structured to emphasize different aspects of the design process.

DEA 203 Digital Communications
Fall. 2 credits. Priority given to DEA majors. Lab fee $10. M 7:30–9:55. J. Elliott.
Communication techniques for architectural and interior designers. Students study the various forms of communication used throughout the design process, from programming and conceptualization through construction documentation, and the most effective utilization of those forms. Both verbal and visual presentation methods are stressed.

DEA 204 Introduction to Building Technology
Spring. 2 credits. M 2:30–4:25. W. Sims.
Introduction to building technology for interior designers and facility managers. Emphasis is placed on developing basic understanding of buildings and building systems and their implications for interior design and facility management. Covers basic building types; structural systems; construction materials and methods; HVAC systems; plumbing, electrical, lighting, fire, and security systems; and telephone, computer, and other communication systems.

DEA 243 Inside Out: The American Everyday Interior (also WOMNS 243, AM ST 243)
Spring (odd-numbered years). 3 credits. Limited to 65. S-U option. T R 10:10–11:15. J. Jennings.
A study of late nineteenth- and twentieth-century everyday interiors in socio-cultural contexts, with an emphasis on design dissemination, consumer patterns, and gender issues. Topics include women's walls, power in the parlor, photographs as a mirror, the love of the colonial.

DEA 250 The Environment and Social Behavior
Fall. 3 credits. Limited to 16. Priority order: DEA seniors, juniors, sophomores, freshmen. Prerequisite: DEA 150 or permission of instructor. Field trip fee $65. T R 2:55–4:10. G. Evans.
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. Limited to 65. Priority given to DEA majors. M W F 9:05–9:55. Not offered fall 1999; next offered fall 2000. J. Jennings.
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 and isolate 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 multicopy description of the study they want to undertake on a form available from the College Registrar's 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 Studio V
Fall. 4 credits. Prerequisites: DEA 111,150, 201, 202, 203, and 204. Corequisite: DEA 303 and 459. Minimum cost of materials, $150; shop fee, $10; optional field trip, approximately $100; diazo machine fee, $8. T R 12:20–4:25. P. Eshelman.
Intermediate-level interior design studio. The course is organized around a series of interior and interior-product design problems of intermediate-level complexity, 3 to 5 weeks in duration. Focus is on development of design skills and on understanding of a selected set of generic problem types.

DEA 302 Design Studio VI
Spring. 5 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. M W F 1:25–4:25. K. Gibson.
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. 2 credits. W 7:30–9:25 p.m. R. Gilmore.
Basic understanding of furniture types and systems; interior products and equipment such as work-stations; window, wall, and floor coverings; ceiling and lighting systems; and materials and finishes. Emphasis is placed on criteria for selection of furnishings, materials, and finishes for typical interior design and facility management problems.

DEA 304 Introduction to Professional Practice of Interior Design
Spring. 1 credit. W 2:30–4:25. A. Basinger.
Introduction to organizational and management principles for delivery of interior design and facility management services. Covers basic organizational structures and basic management functions within interior design and facility management organizations, work flow and scheduling, business practices, legal and ethical responsibilities and concerns, contracts, basic contract documents such as working drawings and specifications, supervision of construction and installation, and cost estimation.

DEA 305 Construction Documents and Detailing
Spring. 2 credits. Prerequisites: DEA 301 and DEA 303. Corequisites: DEA 302 and DEA 304. Minimum cost of materials $50. Field trips, $50. W 7:30–9:25 p.m. R. Gilmore.
Comprehensive study of drafting, detailing, schedules and 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: DEA 150. T R 8:40–9:55. A. Hedge.
Implications of human physical and physiological characteristics and limitations on the design of settings, products, and tasks. An introduction to engineering anthropometry, biomechanics, control/display design, work physiology, and motor performance. Course includes practical exercises and field project work.

DEA 350 Human Factors: The Ambient Environment
Spring. 3 credits. Recommended: DEA 150. T R 8:40–9:55. A. Hedge.
An introduction to human-factor 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 374 Elements of Business for Non-Business Majors (also Hotel Administration 104)
Spring. 1 credit. Limited to 36. Weekend course. P. Rainsford.
Focus will be to provide hands-on skills and knowledge about how to start or run a small business. Especially appropriate for students interested in professional careers such as architecture, design, writing, art, engineering, law, and other service businesses. Course structure will use a computer-based management simulation game and will require students to work in management teams of six to start and operate a hotel. Introductory-level course. No previous business experience or computer knowledge required. Students are required to attend all sessions and complete a paper, which will be due a week after conclusion of the course.

DEA 400–401–402–403 Special Studies for Undergraduates
Fall or spring. Credits to be arranged. S-U grades optional. Department faculty.
For advanced independent study by an individual student or for study on an experimental basis with a group of students in a field of DEA not otherwise provided through course work in the department or elsewhere at the university. Students prepare a multicopy description of the study they want to undertake on a form available from the department 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 in 145 MVR, College Registrar's Office, along with an add/drop slip. To ensure review before the close of the course registration or change-of-registration period, early submission of the special studies form to the department head is necessary. Students, in consultation with their advisers and the instructor should register for one of the following subdivisions of independent study.

DEA 400 Directed Readings
For study that predominantly involves library research and independent reading.

DEA 401 Empirical Research
For study that predominantly involves data collection and analysis, or laboratory or studio projects.

DEA 402 Supervised Fieldwork
For study that involves both responsible participation in a community setting and reflection on that experience through discussion, reading, and writing. Academic credit is awarded for this integration of theory and practice.

DEA 403 Teaching Apprenticeship
For study that includes teaching methods in the field and assisting faculty with instruction. Students must have demonstrated a high level of performance in the subject to be taught and in the overall academic program.

DEA 407 Design Studio VII
Fall. 5 credits. Prerequisites: DEA 302, DEA 303, DEA 304, and DEA 305. Minimum cost of materials, $150. Diazo machine fee $8. Field trip $50. M W F 1:25–4:25. R. Gilmore.
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 408 Design Studio VIII
Spring. 5 credits. Prerequisites: DEA 301, 302, 303, and 304. Minimum cost of materials, $150; diazo machine fee, $8 per semester. T R 12:20–4:25. J. Elliott.
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 430 Furniture as a Social Art
Spring. 3 credits. Limited to 15. Permission of instructor. Cost of building materials: $150. Students must also sign up for 2 hours of DEA shop time each week for model building. M W 10:10–12:05. P. Eshelman.
This course examines furniture as a design process that emphasizes support of human behavior. Information about specific social issues including health care, aging, child care, and education is the starting point for assignments. Students analyze products currently available and design new furniture. Also covered are furniture materials, fabrication processes, and manufacturing techniques.

[DEA 443 Cultural Construction: The Nineteenth- and Twentieth-Century American Interior
Spring (even-numbered years). 3 credits. Enrollment limited to 15 students. S-U option. Field trips $50. T R 10:10–11:30. Not offered spring 2000; next offered spring 2002. 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. M 3:35–4:25. F. Becker, W. Sims.
Series of seminars led by Cornell faculty and other facility management professionals. Topics include strategic space planning, space standards, office automation, project management, energy conservation, environmental protection and regulatory issues.

DEA 453 Planning and Managing the Workplace
Spring. 3 credits. Prerequisite: limited to juniors and seniors. M 7:30–10:30. F. Becker.
Intended for students interested in the planning, design, and management of facilities for complex organizations. The purpose of the course is to explore how characteristics of the workplace, including building, design, 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 454 Facility Planning and Management Studio
Spring. 4 credits. Prerequisite: DEA 459 or permission of instructor. Letter grades only. Minimum cost of materials, $100. T R 1:25–4:25. W. Sims.
For advanced undergraduates interested in facility planning and management. Purpose is to provide basic tools, techniques, and concepts useful in planning, designing, and managing facilities for large, complex organizations. Covers strategic and tactical planning for facilities, organizing to deliver facility management services, project management, space forecasting, space allocation policies, programming, relocation analysis, 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. M W F 1:25–2:15. G. Evans.
The course develops the student's understanding and competence in the use of research and analytical tools to study the relationship between the physical environment and human behavior. Emphasis is placed on selection of appropriate methods for specific problems and the policy implications derived from research. Topics include research design, unobtrusive and obtrusive data-collecting tools, the processing of qualitative and quantitative data, and effective communication of empirical research findings.

DEA 459 Programming Methods in Design
Fall. 3 credits. T R 10:10–11:25. L. Maxwell.
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 Applied Ergonomic Methods
Spring. 3 credits. Prerequisite: DEA 325. T R 2:55–4:10. A. Hedge.
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 for the analysis 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 Senior Honors Thesis
Fall or spring. Variable credit. Prerequisite: permission of thesis advisor and DEA director of undergraduate studies. Letter grades only.
This is an opportunity for DEA majors to undertake original research and scholarly work leading to the preparation of a thesis. Students work closely with their thesis advisor on a topic of interest.

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 Cultural Construction: The Nineteenth- and Twentieth-Century American Interior
Spring (even-numbered years). 4 credits. Enrollment limited to 15 students. S-U option. Field trips $50. T R 10:10–11:30. Not offered spring 2000; next offered spring 2002. J. Jennings.
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 Dancing Mind/Thinking Heart: Creative Problem—Solving Theory and Practice
Spring. 3 credits. Limited to 15 graduate and advanced undergraduate students. Prerequisite for undergraduates: permission of instructor. T 4:30–7:30. Not offered spring 2000; next offered spring 2001. S. Danko.
Focuses on thinking processes and techniques that support creative problem solving. Theories of creative behavior and critical thinking are examined. Course is highly participatory and experiential by design. Weekly discussions include hands-on applications of theories on short problems tailored to the backgrounds of the students. Primary goal is to demonstrate perceptual, emotional, intellectual, cultural, and environmental blocks to creative thinking and expand the student's repertoire of creative problem solving strategies for use in day-to-day professional practice. Case studies of creative individuals and organizations from a variety of fields are presented.]

DEA 648 Advanced Applications in Computer Graphics
Fall. 3 credits. Limited to 14 graduate and advanced undergraduate students. Prerequisites for undergraduates: DEA 302 or permission of instructor. Minimum cost of materials $150. Lab fee $35. T R 9:05–12:05. K. Gibson.
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. T R 10:10–11:25. L. Maxwell.
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. T R 8:40–9:55. A. Hedge.
A course intended for graduate students who want a more thorough grounding in human factors than is provided by DEA 325. Each student is required to attend DEA 325 lectures, meet with the instructor and other graduate students for an additional class each week, and do additional readings and projects. See DEA 325 for more detail.

DEA 652 Human Factors: The Ambient Environment
Spring. 4 credits. Recommended: DEA 150. T R 8:40–9:55. A. Hedge.
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. For detailed description, see DEA 350.

DEA 653 Planning and Managing the Workplace
Spring. 4 credits. Letter grades only. M 7:30–10:30. F. Becker.
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 459/650 or permission of instructor. Letter grades only. Minimum cost of materials, $100. For graduate students in facility planning and management. T R 1:25–4:25. W. Sims.
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. M W F 1:25–2:15. G. Evans.
Intended for graduate students who want a more thorough understanding of the use of research to study the relationship between physical environment and human 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 interested in careers in facility planning and management. S-U grades only. M 3:35–4:25. F. Becker, W. Sims.
Series of seminars led by Cornell faculty members and other professionals directly involved in facility planning and management. Topics include strategic 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. T R 2:55–4:10. G. Evans.
Intended for graduate students who want a more thorough understanding of the influence 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
Spring. 3 credits. Enrollment limited to 25 students. T R 10:10–11:25. J. Jennings.
Directed toward advanced undergraduate and graduate students with interest in the theory of design. The purpose is to provide an understanding of major theoretical ideas underlying design movements of the twentieth century. Explores these ideas through readings, lectures by faculty and visitors, student presentations of research papers, and seminar discussions.

DEA 670 Applied Ergonomics Methods
Spring. 4 credits. Enrollment limited to 20. Prerequisite: DEA 651. T R 2:55–4:10. A. Hedge.
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.

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 COURSES

J. Eckenrode, chair; M. Cochran, director of graduate studies; J. Haugaard, director of undergraduate studies; C. Anderson, U. Bronfenbrenner, J. Brumberg, R. Canfield, S. Ceci, S. Cornelius, D. Dempster-McClain, R. Depue, J. Doris, J. Garbarino, K. Greene, S. Hamilton, C. Hazan, B. Koslowski, L. C. Lee, B. Lust, P. Moen, K. Pillemer, M. Potts, C. Raver, H. Ricciuti, S. Robertson, J. Ross-Bernstein, R. Savin-Williams, E. Wethington, W. Williams

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.

HD 115 Human Development
Fall or summer. 3 credits. S-U grades optional. M W F 1:25–2:15. J. Garbarino.
Provides a broad overview of theories, research methods, and current knowledge of human development from conception into adulthood. Course material covers infancy, childhood, and adolescence. Topics include biological, intellectual, linguistic, social and emotional development as well as the cultural, social, and interpersonal contexts that affect developmental processes and outcomes of these domains.

HD 150 Families and the Life Course (also Sociology 151)
Spring. 3 credits. S-U grades optional. M W F 1:25–2:15. T. Mitrano.
This course provides an introduction to social scientific research on family roles and functions in American society. Topics include family history, how families change over the life course, and how families are influenced by cultural and economic forces.

HD 216 Human Development: Adolescence and Youth
Spring or summer. 3 credits. Prerequisite: HD 115 or Psychology 101 or permission of instructor. S-U grades optional. T R 10:10–11:25. C. Schelhas-Miller.
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.

HD 218 Human Development: Adulthood and Aging
Spring. 3 credits: Prerequisite: HD 115. S-U grades optional. T R 10:10–11:25. S. Cornelius.
Provides a general introduction to theories and research in adult development and aging. Psychological, social, and biological changes from youth through late adulthood are discussed. Both individual development within generations and differences among generations are emphasized.

HD 230 Cognitive Development
Spring. 3 credits. S-U grades optional. Prerequisites: HD 115 or Psychology 101. T R 11:40–12:55. R. Canfield.
This course surveys theories and research in perceptual and cognitive development from infancy through adolescence. Extensive coverage of infant perception, cognition and learning during the first two years of life forms the foundation of the course. Significant linkages between brain development and behavioral development are covered when possible. Language, memory, concepts, and problem solving are covered in the second half of the semester. The course is intended to serve as a foundation for more advanced study in cognitive development, but also as an overview for students whose primary interests lie in other areas.

[HD 233 Children and the Law
Fall. 3 credits. Prerequisites: HD 115 and an introductory statistics course. W 2:30–5:00. Not offered 1999–2000. S. Ceci.
This course examines psychological data and theories that shed light on the practical issues that arise when children enter the legal arena. It attempts to integrate theories, research, and methodology from several areas of psychology including, developmental, cognitive, social, and clinical. This course also attempts to examine the degree to which basic research can (and should) be used to solve applied issues. The topic of children and the law provides an opportunity to meet all these requirements. Rapid changes involving child witnesses in our legal system have forced social scientists to bring their work into the courtroom. At the same time, bringing this fray into the legal system has changed the course of research and thinking about certain aspects of child development and cognition: it has encouraged researchers to tackle new issues and to develop innovative experimental paradigms. Selected topics to be covered include: memory development, suggestibility, theory of mind, childhood amnesia, expectancy formation, symbolic representational ability, and repression. Several actual cases involving child witnesses will be presented to illustrate the application of scientific data to the courtroom. Because of the heavy use of case materials; video and textual coverage of actual trials, it is expected that students will devote more than the usual number of hours to this course.]

HD 241 History of Childhood in the United States (also History 271, American Studies 241)
Fall. Limited to 50 students. 3 credits. M W 8:40–9:55. J. Brumberg.
An examination of childhood and adolescence in various historical contexts: Puritan New England, slave plantations, evangelical revivals, the Western frontier, Victorian families, reform schools, early 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 adolescence. This course is designed to give students a humanities perspective on approaches to childhood.

HD 242 Participation with Groups of Young Children
Fall or spring. 4 credits. Limited to 20 students (limit depends on availability of placements and of supervision). Prerequisites: HD 115 and permission of instructor. S-U grades optional. W 10:10–12:05. J. Ross-Bernstein.
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. This class involves participation, observation, reflection, reading, writing, and sharing of viewpoints. Placements are in local nursery schools, day care centers, Head Start programs, and kindergartens.

HD 251 Social Gerontology: Aging and the Life Course
Spring. 3 credits. Limited to 60 students. Strongly recommended: HD 150 or equivalent to be determined by instructor. S-U grades optional. T R 10:10–11:25. D. Dempster-McClain.
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 of 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.

[HD 253 Gender and the Life Course
Fall. 3 credits. Limited to 110 students. S-U grades optional. Not offered 1999–2000. T R 10:10–11:40. P. Moen.
We will examine the complex interplay between gender and age as well as the social construction of the life course. Students explore the relationship between social change and individual lives, observing the significance of two key institutions—work and family—in shaping basic life choices and their consequences throughout the life course. Implications of key life trajectories and transitions for individual lives and for social policy will also be discussed.]

[HD 258 History of Women in the Professions, 1800 to the Present (also Women's Studies 238 and History 238, American Studies 258)
Fall. 3 credits. S-U grades optional. Human ecology students must register for HD 258. Not offered 1999–2000. J. Brumberg.
The historical evolution of the female professions in America (midwifery, nursing, teaching, librarianship, home economics, and social work) as well as women's struggles to gain access to medicine, law, and the sciences. Lectures, reading, and discussion aim to identify 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.]

HD 260 Introduction to Personality (also Psychology 275)
Fall. 3 credits. Recommended: introductory course is psychology or human development. T R 10:10–11:25. D. Bem.
An introduction to personality psychology, with an emphasis on personality development and contemporary research. Covers the major theories of personality, influences on personality development (including genetic, biological, experiential and environmental factors), and methods for assessing personality.

HD 261 The Development of Social Behavior
Spring. 3 credits. Strongly recommended: HD 115 or Psychology 128. Offered alternate years. T R 1:25–2:40. C. Raver.
Issues in the development of social behavior are viewed from the perspective of theory and research. 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.

HD 266 Emotional Functions of the Brain
Fall. 3 credits. Prerequisite: a biology course. Letter grades only. M 10:10–12:35. R. Depue.
Much of our social behavior, and what we refer to as personality, is related to phylogenetically-old emotional systems, systems that help us to adapt to critical stimuli in the environment. These systems are structured and organized within the brain, but they are also capable of being modified by our everyday experiences. After an overview of the gross anatomy of the primate brain is presented, the focus of the course concerns networks of brain regions that are organized around the integration of processes related to emotion and motivation. First, general features of the brain in relation to emotional evaluation and expression processes are discussed, and then the brain organization related to several specific types of emotional systems are explored. Neurobiological modulation of emotional processes by neurotransmitters of wide distribution in the brain are detailed as well. The latter helps to lay the groundwork for understanding the nature of individual differences in much of our social and emotional behavior.

HD 281 Foundations of Clinical Practice (also Psychology 281)
Fall. 3 credits. Enrollment limited to 60 students. Letter grades only. W 1:30–4:30. C. Maxwell Miller.
This course provides an introduction to the theoretical and practical aspects of some of the basic elements of counseling. Students will develop an understanding of the most current research on important aspects of counseling and will be introduced to the basic theoretical foundations underlying different approaches. Students will be expected to acquire and demonstrate elementary helping skills. Through role-play, observation of videos, and class demonstrations, students will learn such skills as attending and active listening; they will also develop a capacity to recognize internal conflicts and cognitive distortions as well as the similarities between intra-psychic and interpersonal processes. Other topics include issues of transference and countertransference, the multi-axial dimensions of the DSM IV, defensive strategies as they appear in the DSM IV, and ethical considerations and practices. While this course gives an introduction to the applied aspects of psychology, it does not prepare students to provide treatment of any sort.

HD 284 Introduction to Sexual Minorities (also Women's Studies 285)
Fall. 3 credits. Prerequisite: one social science course. S-U grades optional. M 6:30–9:00 p.m. R. Savin-Williams.
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. Videos supplement the readings and lectures.

HD 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 College Registrar's 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.

[HD 313 Problematic Behavior in Adolescence
Fall. 3 credits. Prerequisite: HD 115 or Psychology 101; HD 216 recommended. T R 2:55–4:10. Not offered 1999–2000. J. Haugaard.
This course will explore several problematic behaviors of adolescence, including depression, drug abuse, eating disorders, and delinquency. Various psychological, sociological, and biological explanations for the behaviors will be presented. Appropriate research will be reviewed; treatment and prevention strategies will be explored. An optional discussion section will be available to students who would like an opportunity to discuss readings and lectures in greater depth.]

[HD 334 The Growth of the Mind
Spring. 4 credits. Open to undergraduate and graduate students. Graduate students should also enroll in HD 635, a supplemental graduate seminar. Prerequisites: a course in human experimental psychology, statistics, or HD 115 or equivalent; or permission of the instructor. S-U grades optional. Offered alternate years. Not offered 1999–2000. B. Lust.
In this course the fundamental issues of cognition are introduced. What is the nature of human intelligence? of logical and scientific reasoning? How are knowledge and understanding acquired and represented in the human mind? What is the nature of mental representation? What are the cognitive characteristics of the mind at birth? What is the relation of the acquisition of knowledge and understanding to their final representation? What are the relations between language and thought? In the study of those issues, how can epistemology and experimental psychology be related through the experimental method?

Basic debates within the study of cognition are introduced and discussed throughout: for example, the roles of innateness and learning, the distinction between competence and performance, and the relation between induction and deduction in the acquisition of knowledge. Those psychological issues are set in a context of basic epistemological issues involving the tension between rationalism and empiricism. The course will analyze Piaget's comprehensive theory of cognitive development and experimental results. Current research in cognitive development will be contrasted.]

HD 344 Infant Behavior and Development
Fall. 3 credits. Prerequisites: HD 115, a biology course, and a statistics course. Not open to freshmen. M W F 1:25–2:15. S. Robertson.
Behavior and development from conception through the first two years after birth will be examined in traditional areas (e.g., perception, cognition, socioemotional, language, motor). The fundamental interconnectedness of these aspects of development will be strongly emphasized, as well as their relation to the biology of fetal and infant development. Topics with implications for general theories of development will be emphasized (e.g., the functional significance of early behavior, the nature of continuity and change, the role of the environment in development). Conditions which put infants at risk for poor development (e.g., premature birth, exposure to environmental toxins, maternal depression) and topics with current social, ethical, or

political implications (e.g., infant day care, fetal rights) will also be considered. An emphasis on research methodology in the study of early behavior and development will be maintained throughout the course.

HD 346 The Role and Meaning of Play
Fall. 2 credits. Limited to 30 juniors and seniors. Prerequisite: HD 115. M 7:30–9:25 p.m. J. Ross-Bernstein.
The aim of this course is to examine the play of children ages three through seven. Through seminar discussions, workshops, films, and individualized research the student will explore the meaning 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.

[HD 347 Human Growth and Development: Biological and Behavioral Interactions (also Biology and Society 347 and Nutritional Sciences 347)
Spring. 3 credits. Prerequisites: Biological Sciences 101 or 109 or equivalent, and HD 115 or Psychology 101. Limited to 150 students. M W F 1:25. Offered alternate years. Not offered 1999–2000. S. Robertson and J. Haas.
This course is concerned with the interrelationships of physical and psychological growth and development in humans during infancy. Intrinsic and extrinsic causes of variations in growth, including various forms of stimulation, are considered. In addition, the consequences of early growth and its variations for current and subsequent behavioral, psychological, and physical development are examined. The interaction between physical and behavioral or psychological factors is emphasized throughout the course.]

HD 348 Advanced Participation with Children
Spring. 4–8 credits. Limited to 20 students (limit depends on availability of placements and supervision). Prerequisites: HD 115 and HD 242; and permission of instructor. Recommended: HD 346. S-U grades optional. T 12:20–2:15. J. Ross-Bernstein.
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 within their placement. Conference groups 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 three to eight years of age and provide education, care, or special-purpose interventions for them.

[HD 353 Risk and Opportunity Factors in Childhood and Adolescence
Spring. 3 credits. Enrollment limited to 100 students. Prerequisites: HD 115 and HD 150. S-U grades optional. T R 1:25–2:40. Not offered 1999–2000. J. Garbarino.
This course explores the meaning of risk and opportunity in the lives of children and youth. It begins from an understanding of risk accumulation and resilience as they relate to social policy, professional practice, and community development. The concept of "social toxicity" is a central theme of the course. Assignments include writing research-based editorials and participating in a simulated public policy debate.]

[HD 359 American Families in Historical Perspective (also Women's Studies 357, History 359, American Studies 359)
Spring. 3 credits. Prerequisite: HD 150 or one 200-level social science or history course. S-U grades optional. Human ecology students must register for HD 359. Not offered 1999–2000. J. Brumberg.
This course provides an introduction to and overview of problems and issues in the historical literature on American families and the family life cycle. Reading and lectures demonstrate the pattern of American family experience in the past, focusing on class, ethnicity, sex, and region as important variables. Analysis of the private world of the family deals with changing cultural conceptions of sexuality, sex roles, generational relationships, stages of life, and life events. Students are required to do a major research paper on the history of their family, covering at least two generations, and demonstrating their ability to integrate life-course development theory, data drawn from the social sciences, and historical circumstances.]

HD 362 Human Bonding
Fall. 3 credits. Recommended: introductory course in psychology or human development. S-U grades optional. T R 1:25–2:40. C. Hazan.
The science of interpersonal relationships. Examines the basic nature of human affectional bonds, including their functions and dynamics. Covers such topics as interpersonal attraction and mate selection, intimacy and commitment, love and sex, jealousy and loneliness, the neurobiology of affiliation and attachment, and the role of relationships in physical and psychological health.

HD 363 The Psychological Development of Women
Fall. 3 credits. Limited to 60 students. Strongly recommended: HD 115, 150, and a 200-level course. Letter grades only. T R 11:40–12:55. C. Raver.
Historically, psychologists have effectively charted the pathways of boys' normative development yet sometimes neglected to pursue a full understanding of girls' development. To address this gap, this seminar will pursue a number of theoretical perspectives that focus on the social development of girls and women. Theory and research on girls' gender identity, peer relationships, romantic relationships, and parenting will be covered, with an eye toward understanding their meaning within different historical and sociocultural frameworks. Relations between psyche, body, and culture will be considered, using the works of such authors as Freud, Horney, Miller, Chodorow, and Gilligan. Students will rigorously evaluate these theoretical perspectives in light of recent empirical research on women's psychological development.

HD 366 Psychobiology of Temperament and Personality
Spring. 3 credits. Letter grades only. Prerequisite: HD 266. T R 10:10–11:40. R. Depue.
This course is for students who have an interest in the neurobiology of behavior, in general, and in temperament and personality, in particular. The course material is presented within an evolutionary biology perspective, where the development of neurobehavioral systems as a means of adapting to critical stimuli is explored as the basis of emotional traits in humans. The nature of temperament, social affiliation, and personality is explored from psychometric, social, genetic, and biological points of view. There is a focus on the general role played by the biogenic amines (dopamine, norepinephrine, and serotonin) and opiates in determining individual differences in temperament and personality. Implications for several forms of personality disorders and psychopathology are also discussed. Finally, the manner in which environmental influences across the life span may be coded in the brain and influence the development of personality is explored.

HD 370 Psychopathology (also Psychology 325)
Spring. 3 credits. Limited to sophomores, juniors, and seniors. Prerequisites: HD 115 or Psychology 101. Letter grades only. M W F 11:15–12:05. C. Maxwell-Miller.
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.

HD 397 Experimental Child Psychology
Fall. 4 credits. Prerequisites: HD 115 or Psychology 101 and one course in statistics. Intended primarily for students interested in entering graduate programs involving further research training. Limited to 16 students. M W 10:10–12:00. L. Lee.
A study of experimental methodology in research with children. Includes lectures, discussions, and practicum experiences covering general experimental design, statistics, and styles and strategies of working with children.

HD 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 HD 115, 150, and two intermediate level HD courses, or four courses in pyschology 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 HD not otherwise provided through course work in the department or elsewhere at the university. Students prepare a multicopy description of the study they want to undertake, on a form available from the 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 in the College Registrar's Office, 145 MVR along with an add/drop slip. To ensure review before the close of the periods, early submission of the special studies form to the Office of Undergraduate Education is necessary. Students, in consultation with their supervisor, should register for one of the following subdivisions of independent study (guidelines for each are available in NG14 Martha Van Rensselaer Hall).

HD 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.

HD 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.

HD 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.

HD 403 Teaching Apprenticeship
Prerequisites: in addition to the general prerequisite courses, students 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.

HD 417 Female Adolescence in Historical Perspective (also Women's Studies 438, History 458, American Studies 417)
Fall. 3 credits. Prerequisites: HD 216, 241 or, 258 or 300-level history or women's studies course. Juniors and seniors only. M 7:30–10:00 p.m. J. Brumberg.
A reading, writing, and discussion course that will attempt to answer a basic historical question that has consequences for both contemporary developmental theory and social policy: how has female adolescence in the United States changed in the past 200 years? The focus will be on the ways in which gender, class, ethnicity, and popular culture shape adolescent experience. Although the required readings are primarily historical in nature, students are encouraged to think about the interaction of biology, psychology, and culture. Students are required to do a primary source research paper.

HD 436 Language Development (also COGST 436, PSYCH 436 and LING 436)
Spring. 4 credits. Open to undergraduate and graduate students. Graduate students should also enroll in HD/LING 700, a supplemental graduate seminar. Prerequisite: at least one course in developmental psychology, cognitive psychology, cognitive development, or linguistics. S-U grades optional. T R 2:55–4:10. B. Lust.
This course surveys basic issues, methods, and research in the study of first-language acquisition. Major theoretical positions in the field are considered in the light of experimental studies in first-language acquisition of phonology, syntax, and semantics from infancy on. The fundamental issues of relationships between language and thought are discussed, as are the fundamental linguistic issues of universal grammar and the biological foundations for language acquisition. The acquisition of communication systems in nonhuman species such as chimpanzees is addressed, but major emphasis is on the child.

HD 438 Thinking and Reasoning
Fall. 3 credits. Prerequisite: HD 115 or Psychology 101. T R 1:25–2:40. B. Koslowski.
The course will examine problem solving and transfer, pre-causal thinking, logical thinking, practical syllogisms, causal reasoning, scientific reasoning, theories of evidence, expert vs. novice differences, 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.

HD 439 Cognitive Development: Infancy through Adolescence
Spring. 3 credits. Prerequisites: HD 115 or Psychology 101. Letter grades only. T R 1:25–2:40. B. Koslowski.
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.

HD 440 Internship in Educational Settings for Children
Fall or spring. 8–12 credits. Prerequisites: HD 115, 242, or 243 and 348. Recommended: HD 346. Permission 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 participants in varied settings 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.

HD 451 Nontraditional Families and Troubled Families
Spring. 3 credits. Limited to 30 students. Prerequisites: HD 115 and 150. Letter grades only. T R 8:40–9:55. Offered alternate years. J. Haugaard.
This is an advanced course designed to explore the functioning of families. The first part of the course examines family system theory 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).

[HD 456 Families and Social Policy
Spring. 3 credits. Prerequisite: one course in the area of the family or in sociology. S-U grades optional. Not offered 1999–2000. P. Moen.
An examination of the intended and unintended family consequences of governmental policies, using case studies in areas such as social welfare, day care, and employment. The policy implications of changes in the structure and composition of families are also considered.]

HD 457 Health and Social Behavior (also SOC 457)
Fall. 3 credits. Prerequisites: a course in statistics and one of the following: HD 150, Sociology 101, Sociology 151, or Rural Sociology 101. Letter grades only. T R 10:10–11:25. Offered alternate years. E. Wethington.
This course critically examines theories and empirical research on the relationships among social group membership, social status, and physical and mental health. The lectures focus on social stress, social support, and family structure, all of which are associated with variations in physical health, mental health, and health maintenance behaviors. Students are expected to read widely from current literature in medical sociology, health psychology, public health, and epidemiology.

[HD 464 Sexual Minorities and Human Development (also WOMNS 467)
Spring. 3 credits. Limited to 15 students. Permission of instructor required. T R 2:55–4:10. Not offered 1999–2000. R. Savin-Williams.
The first half of the course covers topics selected by students regarding theoretical, research, and applied issues on sexual minorities. In the second half of the course, students present their field experience or research topic to the class as a teaching experience. The success of the course depends on students feeling personally engaged and committed to the course content, their selected field experience, and their chosen specialized research topic. Because of the multidisciplinary nature of the course, it is hoped that students from a variety of backgrounds in academic disciplines, gender, sexual orientation, ethnicity, race, class, and religious affiliation will feel comfortable in the course.]

HD 467 Psycho-social Issues in Asian American Identity (also AAS 467)
Spring. 3 credits. Prerequisites: HD 115 or Psychology 101 preferred. Letter grades only. M 6:30–9:00 p.m. L. Lee.
The course will review theories of identity and self and their usefulness in understanding identity formation for various ethnic groups within the Asian American population. It will

examine the impact of various societal forces, e.g., racism, stereotypes, etc. as well as life experiences, e.g., immigration, family values, etc. in shaping or contributing to the formation of identity or identities of Asian Americans.

[HD 468 Stress in Childhood and Adolescence
Fall. 3 credits. Recommended: HD 115, HD 150 and a statistics course. Letter grades only. TBA. Not offered 1999–2000. J. Eckenrode.
This is an advanced seminar that will review research related to the nature and consequences of stressful experiences in childhood and adolescence, particularly those arising in the family. Topics covered represent common stressors in the lives of children (e.g. divorce of parents), which have potentially damaging consequences for development (e.g. child abuse). Topics in which faculty at Cornell have conducted significant research (e.g. children's memory for stressful events) are also covered. In addition to considering the negative impact of stress on development, we will also consider issues of individual differences in stress reactivity, including the concepts of coping and resilience. These topics lead naturally into discussions of practice and policy.]

[HD 471 Child Development and Psychopathology
Spring. 3 credits. Limited to 60 advanced-level students. Prerequisites: HD 115 or Psychology 101. Strongly rcommended: a basic course in psychopathology. Letter grades only. T R 11:40–12:55. Not offered 1999–2000. J. Haugaard.
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 preventive 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.]

[HD 482 Child Development and Social Policy
Fall. 3 credits. Enrollment limited to 25 juniors and seniors or by permission of instructor. Prerequisites: HD 115, HD 150, and a course in statistics. HD 260 OR 261 strongly recommended. Letter grades only. Offered alternate years. Not offered 1999–2000. T R 12:20–1:45. C. Raver.
Course work and seminar discussion emphasize the integration of basic research in young children's social and emotional development with intervention- and prevention-oriented research. The course also examines theoretical models of the relations between risk and resilience in child development, family functioning, community and culture. Policies in the domains of parenting, early childhood education, family and community violence, poverty, and child care are analyzed. Broad questions regarding the identification of social problems and the design of solutions are considered within cultural and historical contexts.]

[HD 483 American Child Care in Global Perspective
Fall. 3 credits. Enrollment limited to 25 juniors and seniors. Prerequisites: HD 115 and HD 150. S-U grades optional. T R 2:55–4:10. Not offered 1999–2000. M. Cochran.
In this course we examine American child care policies and programs, broadly defined, in the context of policies and programs in Africa, Asia, Europe, and Latin America. Comparison and analysis are guided by several complementary conceptual frameworks. Particular attention is given to relativism and universalism as applied to developmental and educational principles and concepts. Students specialize in the child care policies and programs of another country, work in teams to analyze a contemporary policy issue, and apply course content to an issue of their choice in a final paper.]

HD 498 Senior Honors Seminar
Fall. 1 credit. Required for, and limited to, seniors in the HD honors program. S-U grades only. TBA. S. Cornelius.
This seminar is devoted to discussion and presentation of honors theses being completed by the senior students.

HD 499 Senior Honors Thesis
Fall or spring. Credit to be arranged. Prerequisite: permission of thesis adviser and coordinator of honors program. S-U grades optional. Department faculty.

HD 106, 206, 306, 406 Topics in Human Development
2–4 credits. S-U grades optional.
These topics vary each time the course is offered and are taught by advanced graduate students in the field of human development. Descriptions are available at the time of course registration. These courses do not fulfill any requirements for the major; they must be taken as electives.

Topics Courses

Fall or spring. 2–4 credits. Prerequisites and enrollment limits vary with topic being considered in any particular term. Permission of instructor may be required.
This series of courses provides an opportunity for undergraduates to explore an issue, a theme, or research in the areas of departmental concentration. Topics vary each time the course is offered. Descriptions are available at the time of course registration. Although the courses are usually taught as seminars, a subject may occasionally lend itself to lecture, practicum, or other format.

HD 215, 315, 415 Topics in Adolescent and Adult Development

HD 235, 335, 435 Topics in Cognitive Development

HD 245, 345, 445 Topics in Early-Childhood Development and Education

HD 255, 355, 455 Topics in Family Studies and the Life Course

HD 265, 365, 465 Topics in Social and Personality Development

HD 275, 375, 475 Topics in Developmental Psychopathology

HD 285, 385, 485 Topics in the Ecology of Human Development

The Graduate Program

HD graduate courses are only open to undergraduates with instructor's permission.

General Courses

HD 610 Processes in Human Development: Theoretical Models and Research Designs
Spring. 3 credits. Open to graduate students and juniors and seniors in HD and related fields with instructor's permission. Prerequisite: a minimum of one course in statistics. Letter grades only. W 2:00–4:25. U. Bronfenbrenner.
The purpose of the seminar is to acquaint students with selected scientific paradigms being employed at the frontiers of developmental science for investigating the conditions and processes that shape human development over the life course. Particular attention will be given to research models that draw on disciplines (such as evolutionary biology, human genetics, developmental psychology, sociology, anthropology, history, economics). The principal seminar activities consist of faculty and student development of research questions, critical analysis of these questions in the light of diverse theoretical perspectives, and their corresponding research designs. In this process, the human being is treated as an integrated organism.

[HD 617 Adolescence
Spring. 3 credits. Not offered 1999–2000. Staff.
Critical examination of seminal theoretical and empirical writings on adolescent development. Empirical research on specific questions chosen by students is considered in the light of these approaches.]

[HD 631 Cognitive Development
Fall. 3 credits. Letter grades only. Offered alternate years. Not offered 1999–2000. 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.]

HD 640 Infancy
Fall. 3 credits. TBA. S. Robertson.
Development in infancy will be examined through a critical review of key research and theory in selected aspects of neurobehavior, perception, cognition, language, emotion, and social relationships. Theoretical issues to be considered include the role of experiences 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.

HD 650 Contemporary Family Theory and Research
Fall. 3 credits. E. Wethington.
Sociological and social psychological theories and research on the family are examined with reference to the relationship between the family and society. Topics change from year to year, but focus on the processes of socialization and social control, the reproduction of gender and social class across

generations, changes in family "values" across time, the rise of divorce and single motherhood, family diversity, and the genesis of deviance and psychological disorder.

HD 660 Social Development
Spring. 3 credits. S-U grades optional. C. Raver.
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.

[HD 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. Not offered 1999–2000. TBA. Staff.
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.

HD 618 Seminar in Adolescence and Adult Development
Topics include peer relations, parent-teen relationships, self-esteem, youth and history, work, and moral development.

HD 633 Seminar on Language Development
Topics include acquisition of meaning in infancy, precursors of language in early infancy, and atypical language development.

HD 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.

HD 645 Seminar on Infancy
Focuses on selected topics in the developmental psychology and psychobiology of infancy (including fetal development). Special topics vary and depend in part on student interests.

HD 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.

HD 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.

HD 665 Seminar in Personality and Social Development
Focuses on selected issues related to personality and social development. The issues selected vary each year according to current importance in the field and student interests.

HD 675 Seminar in Developmental Psychopathology
Topics include learning disabilities, therapeutic interventions in atypical development, child abuse and maltreatment, family factors in the etiology of functional disorders, and cognitive characteristics of atypical groups.

HD 685 Seminar in Human Development and Family Studies
Topics include development of self-concept, sex-role identity, observational methods, and interviews in developmental research.

HD 690 Seminar on Ecology of Human Development
Topics include the institutional setting as a determinant of behavior, the poor family, and the identification and measurement of ecological variables.

Individualized Special Instruction

HD 700–806 Special Studies for Graduate Students
Fall or spring. Credits and hours to be arranged. Credits 1–15 (3 hours work per week per credit). S-U grades at discretion of instructor.
Independent advanced work by graduate students recommended by their Special Committee chair with permission of the instructor.

HD 700 Directed Readings
For study that predominantly involves library research and independent study.

HD 701 Empirical Research
For study that predominantly involves collection and analysis of research data.

HD 702 Practicum
For study that predominantly involves field experience in community settings.

HD 703 Teaching Assistantship
For students assisting faculty with instruction. Does not apply to work for which students receive financial compensation.

HD 704 Research Assistantship
For students assisting faculty with research. Does not apply to work for which students receive financial compensation.

HD 705 Extension Assistantship
For students assisting faculty with extension activities. Does not apply to work for which students receive financial compensation.

HD 706 Supervised Teaching
4 credits.
For advanced students who assume major responsibility for teaching a course. Supervision by a faculty member is required.

HD 806 Teaching Practicum
4 credits. For advanced graduate students to independently develop and teach an undergraduate topics course under the supervision of a faculty member.

HD 899 Master's Thesis and Research
Fall or spring. Credit to be arranged. Credits 1–15 (3 hours work per week per credit). S-U grades only. Prerequisite: permission of thesis adviser.

HD 999 Doctoral Thesis and Research
Fall or spring. Credit to be arranged. Credits 1–15 (3 hours work per week per credit). S-U grades only. Prerequisite: permission of thesis adviser.

POLICY ANALYSIS AND MANAGEMENT

R. Burkhauser, chair; D. Kenkel, Consumer Economics and Housing, director of graduate studies; J. Greene, Human Service Studies, director of graduate studies; A. Mathios, director of undergraduate studies; J. Kuder, director of Sloan Program; J. Allen, R. J. Avery, D. Barr, R. Battistella, B. J. Bristow, R. Brooks, W. K. Bryant, D. Burchfield, R. Burkhauser, P. Chi, L. Dimmler, M. Dyer, J. Ford, J. Gerner, J. Greene, R. Heck, A. Kabcenell, D. Kenkel, J. Kuder, N. Kutty, A. Mathios, C. McClintock, L. Morton, A. Parrot, E. Peters, P. Pollak, E. Rodriguez, W. Rosen, S. Tennyson, J. Tiffany, D. Tobias, W. Trochim, S. Walston; R. Babcock, Emeritus; H. Biesdorf, Emeritus; G. Bymers, Emerita; F. M. Firebaugh, Emerita; A. Hahn, Emeritus; E. S. Maynes, Emeritus; J. Mueller, Emerita; L. Noble, Emerita; J. Robinson, Emerita; C. Shapiro, Emerita; L. Street, Emeritus; K. Walker, Emerita; B. L. Yerka, Emerita; J. Ziegler, Emeritus

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.

[PAM 180 Human Services in Contemporary Society (formerly HSS 101)
Fall. 3 credits. Recommended for freshmen and first-year transfer students. Not offered 1999–2000. D. Barr.
A lecture and discussion course designed as an introduction to the community base of services. Current and historical human services are examined. Emphasis is placed on social services, education, health, and criminal justice. Barriers to service delivery are discussed, such as racism, sexism, classism, sexual preference, physical disability, and age. Contemporary issues that impact on service delivery will also be discussed with attention to the relationship between direct service and public policy.]

PAM 200 Intermediate Microeconomics (formerly CEH 210)
Fall or spring. 4 credits. Prerequisite: Econ 101 or equivalent. Fall: preference to sophomores and juniors. Spring: preference to juniors and seniors. R. Brooks, W. Rosen.
A section is mandatory. Theory of demand and consumer behavior including classical and indifference curve analyses; theories of production and cost; models for the following markets—competitive, monopoly, monopolistic competition, oligopoly, and inputs; general equilibrium; welfare economics; public goods; risk.

PAM 201 Determinants of Behavior (formerly HSS 246)
Fall. 3 credits. Prerequisites: introductory sociology and introductory psychology. J. Mueller.
This course provides an interdisciplinary knowledge base for human service professionals. We examine social behavior in the human environment from ecological, ethological, historical, cultural, and social system perspectives. Applications are made to professional practice at the micro level (counseling with individuals and families or other small groups) and at the macro level (social planning and policy formulation for vulnerable groups in our society).

PAM 204 Applied Public Finance (also CEH 204)
Fall or spring. 3 credits. Prerequisites: PAM 200. S-U grades optional. E. Peters, D. Kenkel.
The public sector now spends nearly $2 out of every $5 generated as income in the U.S. economy. A thorough knowledge and understanding of this important sector is an essential part of training in policy analysis and management. This course will provide an overview of the public sector of the U.S. economy, the major categories of public expenditures, and the main methods used to finance these expenditures. The principles of tax analysis and cost-benefit analysis will be presented with a focus on the role of public policy in improving economic efficiency, promoting the goals of equity and social justice improving equity by altering the distribution of wealth and income.

PAM 205 Research Methods (formerly HSS 292)
Fall or spring. 3 credits. Sections TBA. W. Rosen, W. Trochim.
Students will learn the logic and methods of social science research, as well as how to create researchable questions out of their issues of interest. Readings, written assignments, and in-class exercises focus on stating hypotheses, designing studies and samples to test hypotheses, measuring variables, and simple statistical analysis. PAM majors should take this course no later than their junior year.

[PAM 206 Race, Power, and Privilege in the United States (formerly HSS 280)
Fall. 3 credits. Not offered 1999–2000. J. Turner/D. Barr.
For description, see AS&RC 280.]

PAM 220 Introduction to Management: Principles and Differences Among Sectors (also HSS 220)
Fall or spring. 3 credits. D. Tobias, S. Walston.
This course is a basic introduction to major management and related concepts of planning, organizing, controlling, leadership, and special topics within five major management contexts including individual/personal, groups/families, firms, not-for-profit organizations, and governments/communities.

PAM 223 Consumer Markets I (formerly CEH 233)
Fall. 4 credits. R. J. Avery.
A study of the structure and functions 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 each of these perspectives. Case studies and outside lecturers are used.

PAM 230 Introduction to Policy Analysis (formerly CEH 230)
Fall or spring. 3 credits. R. Avery, J. Gerner.
Policy analysis is an interdisciplinary field that uses theories, concepts, and methods from disciplines such as economics, sociology, and political science to address substantive issues in the public policy arena. Students will be introduced to the functions of and interactions between the major institutions (public and private) at the national, state, and local level involved in the policy making process. The course will focus on public policy analysis in the consumer, health, and family/social welfare areas and will also include an introduction to the technical skills required to undertake policy analysis.

PAM 240 Critical Perspectives (also HSS 240)
Fall or spring. 4 credits. D. Barr, J. Greene and J. Allen.
This course examines the implications and importance of perspective when examining of public policy. It considers the sources of differing perspectives, including demographic characteristics, historical experience, and intellectual tradition. We also consider how these differing perspectives affect what is considered to be empirical evidence, what assumptions are made, and what outcomes are considered to be important. We will explore these ideas using several specific public policy proposals.

PAM 270 Housing and Society (formerly CEH 247)
Spring. 3 credits. S-U grades optional. P. Chi.
A survey of contemporary American housing issues as they relate 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.

PAM 300 Special Studies for Undergraduates (formerly CEH and HSS 300)
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 multicopy description of the study they want to undertake on a form available from the College Registrar's 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.

PAM 301 Economic Organization of the Household (formerly CEH 325)
Fall. 3 credits. Prerequisite: Econ 101 or equivalent. S-U grades optional. W. K. Bryant.
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 in 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.

PAM 303 Ecology and Epidemiology of Health (formerly HSS 330)
Spring. 3 credits. S-U grades optional. Limited to 50 students. E. Rodriquez.
Ecological and epidemiological approaches to the problems which restrict 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.

PAM 305 Introduction to Multivariate Analysis (formerly CEH 307)
Fall or spring. 4 credits. Prerequisites: ARME 210 or ILRST 210 or equivalent. Staff.
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. Factor analysis and analysis of variance will be covered as well. Section meets once a week.

[PAM 310 Evaluation of Public Policies (formerly CEH 485)
Fall. 3 credits. Prerequisites: PAM 200, 330 or permission of instructor. Not offered 1999–2000. B. Rosen.
This is an advanced course in economic policy analysis that builds on the material covered in PAM 330, Intermediate to Policy Analysis. The course will use a series of policy examples to demonstrate the economic approach. Special topics in cost-benefit analysis and policy evaluation techniques will be developed when necessary for the example under study. Examples of topics that may be addressed include excise taxation, economic evaluations of health care innovations, environmental policies, traffic regulations, consumer policies, and welfare reform.]

PAM 323 Consumer Markets II (formerly CEH 333)
Spring. 4 credits. R. J. Avery.
This course focuses on external and internal forces that drive consumer demand. Material in this course will cover the processes whereby consumers interpret market-provided information and the social forces impacting consumer purchase decisions. Particular emphasis will be placed on communication institutions in the market (advertising, the news, and other mass media) and the control of these institutions through government regulation. A select group of consumer policy issues will be covered, such as consumer evaluation of product safety and quality, food additives, consumer privacy, and socially responsible advertising.

PAM 326 Personal Financial Management (formerly CEH 315)
Fall. 3 credits. Preference given to human ecology students; limit 200; not open to freshmen. S-U grades optional. R. Heck.
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 insolvency 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.

PAM 330 Intermediate Policy Analysis (formerly CEH 250)
Spring. 3 credits. Prerequisite: PAM 200. N. Kutty.
Introduction to the tools and techniques of policy analysis. Topics covered include microeconomic concepts such as consumer and producer surplus, deadweight loss; rationale for public policy; benefit-cost analysis; impact assessments; experimental, quasi-experimental, and non-experimental designs; and the social ecology of policy analysis.

PAM 340 The Economics of Consumer Policy (formerly CEH 330)
Fall. 4 credits. Prerequisites: PAM 200 or permission of instructor. S. Tennyson.
This course is designed to familiarize students with the basic approaches to consumer policy and the economic analysis of consumer policy issues. The course is structured around the major forms of government intervention in consumer markets, and examines a wide variety of economic and social regulations from the economic perspective. Students are required to write a term paper analyzing a consumer policy issue of their choosing.

[PAM 341 Economics of Consumer Law and Protection (formerly CEH 365)
Spring. 3 credits. Prerequisite: Econ 101 or equivalent. S-U grades optional. Not offered 1999–2000. A. Mathios.
Economic analysis of the roles played both by the courts and by federal and state regulatory legislation in altering consumer markets, consumer behavior, and consumer welfare. Topics include economic analyses of contract law, products liability, accident law and antitrust law, as well as the activities of such agencies as the Federal Trade Commission, the Food and Drug Administration, and the Consumer Product Safety Commission.]

PAM 346 Economics of Social Security (also CEH 346)
Spring. 3 credits. Prerequisite: PAM 200. S-U grades optional. R. Burkhauser.
This course provides students with an economic perspective on social security policies. The readings illustrate the use of economic analysis to predict the behavioral effects and income distributional consequences of policy. The course primarily focuses on the Old-Age, Survivors and Disability Insurance Program. But other programs such as, the Supplemental Security Income, Food Stamps, etc., will be discussed as will policies that attempt to end discrimination against the elderly or those with disabilities.

PAM 350 Contemporary Issues in Women's Health (formerly HSS 335)
Fall. 3–4 credits. Offered alternative years. A. Parrot.
This course will deal with the history of women in medicine and historical and cultural treatment of women's health problems. Health care research and the exclusion of women from research trials and protocols will also be addressed. Reproductive issues, alternative approaches to treatment, medical problems, ethical issues, cancers, factors that contribute to post-traumatic stress disorders, health promotion behaviors, political issues, and routine medical recommendations will also be discussed in depth. Students may take the course for a fourth credit, which will require attending a discussion section every other week and observations of seven facilities that provide a variety of women's health care (i.e., birthing center, mammogram, and ultrasound center, wellness center, hospital labor and delivery unit, LaMaze class, women's self defense class, etc.) on the alternate weeks.

[PAM 370 Wealth and Income (formerly CEH 355)
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 PAM 600. Prerequisites: Econ 101–102 or equivalent. S-U grades optional. Not offered 1999–2000. E. Peters.
The wealth and income positions of American households are defined and described. Various statistics are employed to present conflicting pictures of the distribution of income using the same underlying data. Several models of economic determinants of income are presented and redistributive policies are discussed in the context of the economics of the political and philosophical positions for and against such policies.]

[PAM 371 Economics of Family Policy—Adults (formerly CEH 320)
Fall. 4 credits. Limited to 40 students. Junior or senior standing; non-PAM majors by permission of instructor. Not offered 1999–2000. Staff.
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.]

PAM 372 Economics of Family Policy—Children (formerly CEH 321)
Spring. 4 credits. Limited to 40 students. Junior or senior standing; non-PAM majors by permission of instructor. J. Gerner.
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 behavior that result from the policies. Topics include child welfare, education, day care provision, child support, and adoption.

[PAM 373 The Economics of Welfare Policy (formerly CEH 356)
Fall. 4 credits. Prerequisite: Econ 101 or equivalent. S-U grades optional. Not offered 1999–2000. D. Burchfield.
Using the tools of economics, this course examines welfare policy. Included is an examination of the populations affected, the behavior various policies are likely to engender, and how much income redistribution occurs as a result of these welfare policies. Various proposals for welfare reform are also evaluated.]

PAM 374 Urban Economics and Policy (formerly CEH 348)
Spring. 4 credits. Prerequisite: PAM 200 or equivalent. S-U grades optional. N. Kutty.
This course explores the economics of cities and urban problems and studies the growth of cities, location choices of firms and households, and the factors which determine land rents. The urban policy issues explored include—housing, urban poverty, zoning, and urban congestion.

PAM 375 Housing and Long-term Care for the Elderly (formerly CEH 444)
Fall. 3 credits. S-U grades optional. P. Chi.
Through a wide range of service experiences, this service-based seminar will allow students to explore the different ways community agencies enable older adults to remain independent within diversified residential settings as planned retirement housing, subsidized housing for the low-income elderly, home-sharing projects, ECHO housing, accessory apartments, assisted living facilities, and continuing care retirement community. This seminar will focus on the linkage between housing and long-care alternatives. 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 two times every other week. Students are also required to give 4–6 hours of service a week, 4 during the weeks the seminar meets and 6 during the other weeks.

[PAM 376 Housing, Neighborhood and Community (formerly CEH 445)
Spring. 3 credits. Prerequisite: PAM 270 or permission of instructor. S-U grades optional. Not offered 1999–2000. P. Chi.
The course examines the interrelationships of housing conditions, neighborhood transitions, and community development. Both theoretical and empirical perspectives on residential patterns, neighborhood change, and community power will be examined. Special attention is given to government policies that deal with fair housing, residential segregation, neighborhood revitalization, and community development.]

PAM 380 Human Sexuality (formerly HSS 315)
Spring. 3 credits. Limited to 500 students. Prerequisite: an introductory course in human development and family studies, psychology, or sociology (or equivalent social science course). Recommended: one course in biology. A. Parrot.
The aim of this course is to provide students with an understanding of the interactions and interrelationships of human behavior that influence sexual development and behavior. The course will focus on the evolution of sexual norms, cross-cultural customs, legislation within changing sociopolitical systems, 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 underlying issue is the influence of our social and cultural system on the development of sexual needs, standards, and values. Research and theory of human sexuality will be explored through human and organizational behavior, biology, history, communication arts, education, research theory, law, sociology, and psychology.

[PAM 381 Health-care Services and the Consumer (formerly HSS 325)
Fall. 3 credits. Prerequisite: an introductory course in human services or health or biology. S-U grades optional. Offered alternate years. Not offered 1999–2000. A. Parrot.
This course is an introduction to health care services and will present developments in the health field that affect the availability and kinds of health services. Emphasis is placed on the interrelationships of practitioners, institutions, and agencies. The part each can play in prevention, diagnosis, and treatment of disease and disability is also explored. Topics 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.]

PAM 383 Social Welfare as a Social Institution (formerly HSS 370)
Fall. 3 credits. J. Allen.
A philosophical and historical introduction to social welfare services. The course reviews the historical, social, and political contexts 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 way 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.

PAM 392 New York State Government Affairs (also HSS 392)
Spring semester only. 12 credits. Letter grade only. Preference given to juniors and seniors. Sophomores considered. PAM 220 or a course in political science strongly recommended. C. McClintock.
Students participate in the New York State Assembly Intern Program which includes coursework on legislative, intergovernmental and political party dynamis, that has been approved as upper division baccalaureate credit by the New York State Regents National Program on Noncollegiate Sponsored Instruction. Students also participate in a three day a week supervised New York State Assembly internship requiring research on proposed legislation, committee and public hearings and constituent issues that link policy analysis and implementation. Course and internship performance recommendations are reviewed and finalized by the faculty coordinator of the PAM Experiential Learning Honors Program and recorded as Cornell credit.

PAM 400–401–402 Special Studies for Undergraduates (formerly CEH and HSS 400–401–402)
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, HSS, or PAM not otherwise provided through course work in the department or elsewhere at the university. Students prepare a multicopy description of the study they want to undertake, on a form available from the department field 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 with an add/drop slip in 145 MVR, College Registrar's Office. To ensure review before the close of the course registration or change-of-registration period, early submission of the special studies form to the department chair is necessary. Students, in consultation with their faculty supervisor, should register for one of the following subdivisions of independent study.

PAM 400 Directed Readings (formerly CEH and HSS 400)
For study that predominantly involves library research and independent reading.

PAM 401 Empirical Research (formerly CEH and HSS 401)
For study that predominantly involves data collection and analysis.

PAM 402 Supervised Fieldwork (formerly CEH and HSS 402)
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.

PAM 403 Teaching Apprenticeship (formerly HSS 403)
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.

PAM 404 Senior Seminar: Self-Evaluation of Professional Practice (formerly HSS 473)
Spring. 3 credits. Prerequisite: limited to students with field experience or ongoing field experience. Faculty.
The process of change at the individual, family, and community level is a major theme of the senior seminar. The second theme, which is integrated throughout the course, concerns ethical principles and values that should inform professional practice. We will also discuss value dilemmas attendant on interventions to promote change at both the micro and macro levels of practice.

PAM 423 Risk Management and Policy (also CEH 423)
Spring. 3 credits. Prerequisite: Econ 101 and a course in statistics. Enrollment limited to 80. S. Tennyson.
The objective of this course is to provide students with a broad understanding of risk management problems and solutions, a greater appreciation of the importance of risk and risk regulation in our society, and increased comprehension of the complexities of making decisions about risk. Topics covered include alternative ways to define and measure risk, the importance of risk-tradeoffs, and models of decision making under risk. With this background, alternative approaches to risk management are discussed, including insurance, non-insurance financing alternatives, and loss control. The impact on risk management of the legal liability system and government programs, laws and policies are also considered.

[PAM 424 Families in Business (formerly CEH 435)
Spring. 3 credits. Prerequisites: introductory statistics or permission of instructor. S-U grades optional. Not offered 1999–2000. R. Heck.
Offers students the opportunity to explore family business topics such as business formation, growth and expansion, strategic management, professionalization, succession, locational choices, and family dynamics, conflicts, and relationships relative to the business. An overview of families who own businesses and the profiles of their businesses will be presented along with the examination of the course topics relative to the various stages of business activity including feasibility, start-up, ongoing maintenance, expansion or redirection, and exit or transfer. Case studies from the Harvard Business School series will be utilized to examine the course topics listed above. The course also provides an introduction to research on family businesses by surveying the conceptual issues and methodological approaches related to the study of family businesses.]

[PAM 425 Empirical Research on Family Businesses (formerly CEH 436)
Fall. 3 credits. Prerequisites: introductory statistics or permission of instructor. S-U grades optional. Not offered 1999–2000. R. Heck.
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 extant databases used to research business ownership; and implementation and completion of an actual survey of fieldwork project of selected family business owners, or the use of extant databases for descriptive analyses of family-owned businesses.]

PAM 427 Complementary Alternative Medicine (also HSS 491)
Fall. 3 credits. Prerequisites: a health course and intro biology or permission of instructor. A. Parrot.
This course will help pre medical students, health administration students, as well as health economics students understand the relationship between alternative medicine and western allopathic medicine. The course will educate students about health and wellness, treatments for specific health conditions, differing philosophies of health care, financing health services, and cross cultural approaches to health and wellness.

PAM 435 The U.S. Health Care System (also HSS 435)
Fall or spring. 3 credits. R. Battistella, D. Burchfield.
This course provides an introduction to the health care delivery systems in the United States, and covers the inter-relatedness of health services, the financing of health care, and the key stakeholders in health care delivery including regulators, providers, health plans, employers and consumers. The course describes the history and organization of health care, behavioral models of utilization, issues of health care reform, and current trends. The course provides an overview of the key elements of the field including ambulatory care services, mental health services, hospitals and clinicians, insurers, the role of public health organizations, and the politics of health care in the U.S.

[PAM 450 Economics of Health Behavior and Policy (formerly CEH 432)
Spring. 3 credits. S-U grades optional. Prerequisites: PAM 200 or equivalent or permission of instructor. Not offered 1999–2000. D. Kenkel.

This course uses the tools of economics to provide a better understanding of health behavior and policy. One focus is on policies that promote public health, including education programs and cigarette and alcohol taxation. Policies that influence consumer choices about health care and health insurance are also considered. A common theme is that to understand the effects of health policy it is necessary to analyze the incentives faced by consumers and the incentives of their employers, insurers, and health care providers. Analyses of specific health policies help develop this theme.]

[PAM 470/HD 485 Psycho-Economic Perspectives on Human Intelligence and Achievement: Did the Bell Curve Get It Right? (formerly CEH 475)

Spring. 3 credits. Prerequisites: basic statistics: any of the following (ARME 210, ARME 411, BTRY 215, ILRST 210, PAM 305, ECON 319, ECON 320); basic economics: ECON 101 or permission of either instructor. Open to juniors and seniors; limited to 100. Not offered 1999–2000. S. Ceci, E. Peters.

The course brings together the analytical tools and key models of economics and psychology to investigate issues raised by Herrnstein and Murray's book *The Bell Curve*. The objective of the course is to bring research into the classroom by enabling students to understand and use (in the lab) the methods available for defining and assessing intelligence and its relationship to success in life and social issues.]

PAM 471 The Politics of Power and Empowerment in Community Development (formerly HSS 417)

Spring. 3 credits. Limited to 20 students. D. Barr.

The course will take a theoretical world view of power and the historically colonial relationship between the American ruling class and other people. The three dimensions of power will be used as the framework for analysis. The relationships between social class, race, sex, and power will be studied. In addition, the class will explore the nature of empowerment and new theories of power and empowerment.

PAM 473 Social Policy (formerly HSS 475)

Spring. 3 credits. Prerequisite: PAM 383 or Government 111 or Sociology 141. S-U grades optional. J. Allen.

An examination of the policy-making process and the significance of national policies as they affect the distribution of social services. Frameworks for analyzing social policy are used to evaluate existing social programs and service-delivery systems. Implications for change in policies at the national, state, and local levels are discussed.

PAM 480 Professional Internship in Human Service Studies (formerly HSS 414)

Fall or spring. 4–7 credits. Limited to juniors and seniors majoring in human service studies. Prerequisite: PAM 100. Precourse enrollment required. Staff.

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.

PAM 481–482 Social Work Methods and Practice I and II (formerly HSS 471–472)

Introduction to concepts and methods used in a generalist model of social work practice. Examination of the values and ethics of professional practice. Students acquire knowledge and skills appropriate for working with individuals, groups, families, organizations, and communities. Class content is integrated with 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.

PAM 481 Social Work Methods and Practice I (formerly HSS 471)

Fall. 9 credits. Limited to 25 social work students. Lab fee: $63. Prerequisites: introductory psychology, introductory sociology, one course in human development, grades of C+ or better in PAM 201 and 383. Staff.

PAM 482 Social Work Methods and Practice II (formerly HSS 472)

Spring. 9 credits. Limited to 25 social work students. Prerequisites: grade of B- or better in PAM 481 and satisfactory performance in fieldwork. Staff.

Topics Courses

Fall or spring. 2–4 credits. Prerequisites and enrollment limits vary with topic being considered in any particular term. Permission of instructor required. Hours to be arranged. Department faculty.

This series of courses provides an opportunity for advanced undergraduates to explore an issue, a theme, or research in the areas of departmental concentration. Topics vary each time the course is offered. Descriptions are available at the time of course registration. Although the courses are usually taught as seminars, a subject may occasionally lend itself to lecture, practicum, or other format.

PAM 483 Human Service Environments—Topic course (formerly HSS 490)

PAM 484 Human Service Programs—Topic course (formerly HSS 491)

PAM 485 Performance Management and Measurement in Nonprofit Organizations—Topic course (formerly HSS 492)

PAM 486 Child Welfare I (formerly HSS 490)

Fall. 3 credits. O. Heath-Crump.

This course is an introduction to the field of child welfare with its many contemporary, traditional, and sometimes controversial issues. Included is an overview of current child welfare practice and policy as it affects such problem areas as drugs and alcohol, children and homelessness, and children and violence. This seminar will present a broad perspective on these subjects along with a systems theory orientation.

PAM 487 Child Welfare II (formerly HSS 490)

Spring. 3 credits. O. Heath-Crump.

This course is a sequel of Child Welfare I, which exposes students to the numerous problems plauging children of the child welfare system. Students will have the opportunity to take a closer look at how the system works, how it is not working to improve the lives of children, and what might be done about it. The purpose of the course is to prepare students to be change agents regarding the child welfare system and to not accept the status quo. The course will also focus on the major policy issues that are emerging for the future of children contending with the system.

PAM 499 Honors Program (formerly CEH 499 and HSS 499)

Fall or spring. This course is a combination of CE&H 499 and HSS 499. For CE&H and PA majors.

The honors program provides students with the opportunity to undertake basic or applied research which will be preparation of a thesis representing original work of publishable quality. The program is intended for students who desire the opportunity to extend their interests and efforts beyond the current course offerings in the department. Furthermore, the program is designed to offer the student the opportunity to work closely with a professor on a topic of interest. CE&H or PA majors doing an honors program may take PAM 499 for up to 15 credits. See Professor Alan Mathios for more details. For HSS majors the honors program allows them to pursue independent literature or field investigation. The HSS Honors Program is open to HSS majors who have been admitted as juniors to the College of Human Ecology Honors Program. HSS majors may take up to 6 credits of PAM 499 and should spread the credit over two semesters in their senior year.

PAM 520 Policy and Management Issues on Foreign Investment in China (formerly CEH 520)

Spring. 3 credits. P. Chi.

This course will help students understand the general investment environment in China and learn how social, cultural, political and economic factors affect decisions on market entry strategies, marketing mix strategies and other management strategies for foreign-invested enterprises (FIEs) in China. This course will not only examine the growth of FIEs since the 1980s, but also discuss the policy initiatives and institutional barriers for direct foreign investment in China. Both multiplier and linkage effects of foreign investment on China's economy will also be evaluated. Further, the management issues on formation, performance, profitability, and dissolution of FIEs will be systematically examined.

PAM 600 Special Problems for Graduate Students (formerly CEH and HSS 600)

Fall and spring. Credits 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 the instructor.

[PAM 601 Research Workshop in Consumer Economics and Housing (formerly CEH 601)
Fall and spring. 1 credit. S-U grades only. Not offered 1999–2000. Staff.
Research workshop designed to provide a forum for graduate students in consumer economics and housing to present their research.]

PAM 603 Teaching Experience (formerly HSS 603)
Fall and spring. 1–3 credits. S-U only.
For students assisting faculty with instruction. The aspects of teaching and the degree of involvement 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.

PAM 604 Economics of Consumer Demand (formerly CEH 613)
Fall. 3 credits. Prerequisite: PAM 200, Economics 311 or 313, or concurrent enrollment in one of the three, and two semesters of calculus. S-U grades optional. W. K. Bryant.
A graduate level introduction to theory and empirical research on household demand, consumption, and saving. Emphasis is on the use of the theory in empirical research. Topics include neo-classical theory of demand, duality, complete demand systems, conditional demand, demographic scaling and translating, consumption and savings. Becker and Lancaster models of demand will be introduced.

PAM 605 Economics of Household Behavior (formerly CEH 624)
Spring. 3 credits. Prerequisite: PAM 604 or Economics 609–610 or consent of instructor. S-U grades optional. E. Peters.
This course examines household decision making in both single agent and multiple agent (e.g., game theoretic or bargaining) frameworks. The first half of the course focuses on 1) fertility, 2) household production, and 3) time allocation models of behavior—decisions that are usually modeled in a single-agent framework. The second half of the course looks at 1) marriage markets, 2) family formation and dissolution, 3) bargaining models of resource allocation within the household, and 4) intergenerational transfers across households. These kinds of behaviors are more fruitfully studied using multiple agent models such as contract theory, game theory, and household bargaining. Empirical applications of the theoretical models are presented for both developed and developing countries. Implications for family policies such child care subsidies, divorce laws, family planning, government subsidies to education, and social security are also discussed. Much of the material covered by this course could also be found in economic demography and economics of the family courses.

PAM 606 Demographic Techniques (formerly CEH 606)
Fall. 3 credits. S-U grades optional. W. Brown.
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.

PAM 610 Introduction to Program Evaluation (formerly HSS 689)
Fall. 1 credit. J. Greene.
This course provides a conceptual introduction to the theory and practice of social program evaluation. It is designed particularly but not exclusively for students planning a major or minor in HSS program evaluation and planning. The course emphasizes two major dimensions of evaluation: 1) its practical, real-world, political dimension and 2) its theoretical, methodological dimension. At the intersection of these two dimensions lie issues of evaluation's purpose and role, which are also addressed in the course.

PAM 611 Program Evaluation and Planning—Topic course (formerly HSS 611)

PAM 612 Measurement for Program Evaluation and Research (formerly HSS 690)
Fall. 4 credits. Priority given to HSS students. Limit 35. E. Rodriguez.
The course reviews measurement theory and its application to the evaluation of human service programs. Topics include validity; reliability; scaling methods; basic principles of instrument design; and varied methods of data collection with an emphasis on structured questionnaires and interviews. Student work is focused around an applied course project. Attention is also given to ethical and managerial issues that arise in applied measurement settings.

PAM 613 Program Evaluation and Research Design (formerly HSS 691)
Spring. 3 credits. W. Trochim.
This course reviews research design and its application to the evaluation of human service programs. Major topics include experimental, quasi-experimental, and nonexperimental research designs; basic sampling and measurement theory; and the theory of validity in research. Attention is given to issues that arise in the application of research designs, and the evaluation of programs, including problems of randomization, causal inference, replication, and utilization of results. The central role of the general linear model in the statistical analysis of outcome evaluation is presented through case examples and computer simulation. Students will encounter examples of outcome evaluation outcomes from a wide range of disciplines including health, mental health, social welfare, criminal justice, social policy, and education.

[PAM 614–615 Program Evaluation in Theory and Practice (formerly HSS 692–693)
614, fall; 615, spring. 4 credits each semester. Prerequisites for PAM 614: 612 and 613 or 617, or permission of instructor. Prerequisite for PAM 615: 614. Students must register for both semesters. Not offered 1999–2000. Staff.
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 to 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).]

PAM 616 Strategies for Policy and Program Evaluation (formerly HSS 695)
Fall. 3 credits. Prerequisites: PAM 612 and 613 or 617 or equivalent. Offered alternate years. C. McClintock.
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.

PAM 617 Qualitative Methods for Program Evaluation (formerly HSS 696)
Spring. 3 credits. Prerequisites: PAM 612 and 613 or equivalent. J. Greene.
This course presents a qualitative approach to applied research and the evaluation of human service programs. Topics include the epistemological assumptions underlying this approach, questions of entry into setting, methods for data collection and data analysis, reporting, confidentiality of participants, and the ethics of qualitative inquiry. The course aims to help students understand how, when, and why a qualitative approach to social inquiry can be used appropriately, effectively, and defensibly.

PAM 618 Seminar in Program Evaluation and Evaluative Research (formerly HSS 697)
Fall and spring. 1 credit. W 12:20–1:10. J. Greene, E. Rodriguez, and W. Trochim.
This ongoing seminar is topically organized according to student and faculty projects. Focus is on professional issues in evaluation practice, including consulting, ethics and standards, preparation of conference and publication materials, and various methodological issues.

PAM 620 Human Service Administration—Topic Course (formerly HSS 610)

[PAM 623 Consumer Decision Making (formerly CEH 639)
Spring. 3 credits. Not offered 1999–2000. R. J. Avery.
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 consumer decision making 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.]

PAM 630 Seminar in Program Planning and Development (formerly HSS 669)
Fall. Variable credit. Staff.
Topics include microlevel program planning, third-sector organizations, and intergovernmental influences on program planning, policy formation, program implementation, and mainstreaming. Two or more human services are examined.

PAM 631 Ethics, Public Policy, and American Society (formerly HSS 658)
Fall. 3 credits. J. Ziegler.
This course will explore current issues of ethics and public policy against a background of theories of ethical behavior. Questions of how public officials and managers of public and non-profit agencies and private enterprises act will be examined. How do standards of ethical behavior in these professions get established? How are public policy issues with ethical implications resolved? Readings will draw from political philosophy, contemporary social science, and imaginative writing. This class is a seminar and class participation is essential. Open to seniors and graduate students.

[PAM 632 The Intergovernmental System: Analysis of Current Policy Issues (formerly HSS 664)
Fall. 3 credits. Open to seniors who have had a course in American government and to graduate students. Not offered 1999–2000. J. Ziegler.
This course offers advanced policy analysis of current political/social/economic issues in the context of the intergovernmental system. Particular attention is paid to how certain policy and human service issues are played out at the federal, state, and local levels of government, and to the formulation of federal and state budget policy. General public administration theory is considered. Students work in teams on a policy/administrative research project and report to the class.]

PAM 633 Social Policy and Program Planning in Human Services (formerly HSS 660)
Spring. 3 credits. S-U grades optional. Staff.
An examination of the policy process with an emphasis on the ways in which this process determines the allocation and distribution of social services in the fields of health, education, income security, employment, criminal justice, and housing. The relationship of the policy process to the political economy, to intergovernmental relations, and to social change at the national, regional, state, and local levels will be analyzed. To this end history, theory, cultural values and beliefs, and the structure of society will also 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.

[PAM 640 Information and Regulation (formerly CEH 635)
Spring. 3 credits. Prerequisite: PAM 604 or PAM 200 and two semesters of calculus. Class packets on sale at Campus Store. Not offered 1999–2000. A. Mathios.
A survey of the problems and policies accompanying informational failures and other market failures with regard to consumer well-being. Governmental regulation of products, producers, consumers, and prices are examined. Antitrust activity, disclosure requirements, advertising restrictions, and regulatory agencies are examined in terms of their ability to serve the public and special interests. Economic analysis, rather than institutional structure, is emphasized.]

PAM 650 Applications in Health Management Practice, Enterpreneurship and Consulting (formerly HSS 612)
Spring. 3 credits. S. Walston.
Seminars and practica, offered periodically and reflecting faculty and student interest, with changing topics and instructors. Content, time, credits, and instructors to be announced. Seminars and practica offer concentrated study in a specific human service area or in the education, planning, or evaluation processes within human services.

[PAM 651 Seminar in Mental Health Services (formerly HSS 613)
Fall. 3 credits. Open to undergraduate seniors with instructor's approval. Not offered 1999–2000. J. Mueller.
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 infirm, or seriously emotionally and/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 impaired. State/federal partnerships will be discussed in terms of their impact on fiscal and human resources for both public and for-profit agencies.]

PAM 652 Health Care Services: Consumer and Ethical Perspectives (formerly HSS 625)
Fall. 3–4 credits. Limited to 30 students; undergraduates with permission of instructor. 4-credit option, may be used as Biology and Society Senior Seminar option. A. Parrot.
The course will focus on consumer and ethical issues faced by the health care field today. Broad topics to be discussed include ethical standards and guidelines, health care costs and accessibility of services, government role in health care delivery, 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 granny Doe cases.

[PAM 653 Health Economics and Policy (formerly CEH 632)
Spring. 3 credits. Prerequisites PAM 604 . Econ 609 or permission of instructor. S-U grades optional. Not offered 1999–2000. D. Kenkel.
This course provides an overview of research in health economics and its relevance for health policy. Models of health capital, household production, and insurance are developed and used to address public health policies and health insurance programs and reforms. Major issues in the economics of the health care sector are discussed, including the markets for physician services, hospital care and long-term care. Much of the course focuses on the U.S., but it will also review research on other countries, especially developing countries that face a very different set of health policy issues.]

PAM 654 Legal Aspects of Health Care (formerly HSS 627)
Spring. 3 credits. Prerequisites: PAM 657 or permission of instructor. H. Allen and R. Brooks.
This course introduces principles of the law that are specifically applicable to health-service 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.

[PAM 655 Comparative Health-Care Systems (formerly HSS 630)
Spring. 3 credits. Open to graduate students and a limited number of seniors with permission of instructor. Not offered 1999–2000. P. J. Ford.
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.]

PAM 656 Managed Health Delivery Systems: Primary-Ambulatory Care (formerly HSS 631)
Spring. 3 credits. Prerequisite: PAM 657. R. Battistella.
The concept of primary care is used to enhance understanding of the direction and purpose of ongoing changes in health services organization and financing. Pressures on traditional indemnity insurance and solo fee-for-service medicine are examined in the context of the transition from unmanaged to managed delivery systems. The course is divided into two parts: Part 1 examines the development of health maintenance organizations and related forms of managed care against the backdrop of larger public policy concerns. Part 2 centers on administrative-financial topics associated with the design, marketing, and operation of managed delivery systems in highly competitive markets. Considerable attention is given to the relationship between physicians and management with respect to such subjects as medical practice styles, productivity, quality assurance, and outcome measurement. The consumer health care behavior literature is reviewed in the light of marketing strategies and utilization control objectives. Many of the managerial topics are highlighted with field trips and visiting speakers.

PAM 657 Health Care Organization (formerly HSS 634)
Fall. 3 credits. Limited to 30 students. Priority given to Sloan students or permission of the instructor. R. Battistella.
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 the 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.

PAM 658 Field Studies in Health Administration and Planning (formerly HSS 635)
Fall or spring. 1–4 credits. TBA. Staff.
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.

PAM 659 Epidemiology, Clinical Medicine, and Management Interface Issues (formerly HSS 637)
Spring. 3 credits. E. Rodriguez.
From an empirical and analytical framework this course explores 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 utilization and cost of health care services. In addition, students will have an opportunity to explore issues of resource allocation and continuous quality improvement. The format for the class is lecture, discussion, and case analysis.

PAM 660 Quality in Health Care Organizations (formerly HSS 638)
Fall. 3 credits. A. Kabcenell and S. Walston.
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. It is also a central concern of the providers and managers of health services and those who pay for care. It is 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.

PAM 661 Economics of Health and Medical Care (formerly HSS 640)
Fall. 3 credits. D. Kenkel.
The course is designed for graduate students who seek an understanding of the tools, vocabulary, and way of thinking of economics as it applies to decision making in health services delivery, administration, and policy. The philosophy of the course approach is based on the often-quoted credo of John M. Keynes: "The theory of economics does not furnish a body of settled conclusions immediately applicable to policy. It is a method rather than a doctrine, 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.

PAM 662 Health Care Financial Management I (formerly HSS 641)
Fall. 3 credits. D. Burchfield.
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 demonstrate important points, which will be reinforced by examples and applications. The course emphasizes the internal financial management knowledge and skill necessary for financial success in complex health organizations.

[PAM 663 Health Care Financial Management II: Payment Systems (formerly HSS 642)
Spring. 3 credits. Prerequisite: PAM 662. Not offered 1999–2000. Staff.
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 by which they operate.]

PAM 664 Information Resources Management in Health Organizations (formerly HSS 645)
Spring. 3 credits. Recommended: strong basic computer skills. S-U grades optional. D. Burchfield.
Students are expected to have basic computer skills upon entry into the course. This course is a graduate course in Health Services Administration. Students will be exposed to the opportunities and challenges inherent in the use of health management information systems (HMISs) in clinical and non-clinical applications. The course focuses on the manager's role in the application of HMISs to solve problems and address concerns in today's health care service industry. Students will learn how an HMIS can enhance the ability to appraise multi-clinical and non-clinical services of care.

PAM 665 Managing Health and Human Service Organizations I (formerly HSS 648)
Fall and spring. 3 credits. Staff.
This is the first segment of an 8-credit sequence addressing the management and leadership of health and human services organizations. Different perspectives are examined, from that of the first-line supervision to 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 looks at 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.

PAM 666 Strategic Management and Organizational Design of Health Care Systems (formerly HSS 649)
Spring. 3 credits. Prerequisite: PAM 665. S. Walston.
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 studies the importance of roles, structure, and inter- and intra-institutional relationships within these organizations. The course is taught via a case study approach.

PAM 667 Health and Welfare Policy (formerly HSS 685)
Fall. 3 credits. R. Battistella.
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 development such as the evaluation 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.

PAM 668 Long-Term Care and the Aged: Alternative Health and Social Service Delivery Systems (formerly HSS 688)
Fall. 3 credits. Prerequisite: PAM 657. R. Battistella.
Alternatives for the organization and delivery of long-term care services are examined within the context of public-financing constraints. Progressive long-term care is viewed as a continuum encompassing medical and social services positioned to optimize independent living. Relevant experience from other highly developed countries is presented. Visiting speakers from the public and private sectors are featured. Field trips provide additional insights into the many challenges and opportunities of long-term care policy and management.

PAM 674 Housing Economics (formerly CEH 648)
Spring. 3 credits. Prerequisite: Economics 311 or 313. Instructor's permission **required**. N. Kutty.
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. Housing policy issues such as tax policy, housing for the elderly, fair housing, rent control, and zoning also will be addressed.

PAM 680 Leadership in the Human Services (formerly HSS 655)
Fall. 3 credits. Open to seniors with instructor's permission. S-U grades optional. J. Mueller.
Students in this seminar will study human service organizations in the context of their changing economic, political, 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 forms and strategies 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 literature and practical how-to-do-it guides for administrators. The seminar format provides an opportunity for simulations so that students can give and receive feedback on their leadership skills.

PAM 704–705 Internship in Human Service Studies (formerly HSS 704–705)
Fall, spring, or summer. 1–15 credits. S-U grades optional.
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.

PAM 718 Advanced Seminar in Program Evaluation (formerly HSS 790)
Fall, spring. 1–3 credits. S-U grades optional. Prerequisite: permission of instructor. Staff.
This advanced course is intended for students with at least three courses in evaluation (PAM 612 series or equivalent) and statistics through multiple regression. The seminar focuses on analysis and appraisal of current literature on program evaluation and evaluative research. The seminar is topical, addressing current issues of importance in the field.

PAM 799 MPS Problem Solving Project (formerly HSS 799)
Fall or spring. Credits to be arranged. For students recommended by their chair and approved by the instructor in charge of independent advanced work. S-U grades optional.

PAM 899 Master's Thesis and Research (formerly CEH and HSS 899)
Fall and spring. Credit to be arranged. Prerequisite: permission of the chair of the graduate committee and the instructor. S-U grades optional.

PAM 999 Doctoral Thesis and Research (formerly CEH and HSS 999)
Fall and spring. Credit to be arranged. Prerequisite: permission of the chair of the graduate committee and the instructor. S-U grades optional.

Topical Seminars and Practica—PAM 618 and 630 (formerly HSS 697 and 669)
Seminars and practica, offered periodically and reflecting faculty and student interest, with changing topics and instructors. Content, time, credits, and instructors to be announced. Seminars and practica offer concentrated study in a specific human service area or in the education, planning, or evaluation processes within human services.

Topics Courses—PAM 611, 620, and 650 (formerly HSS 611, 610 and 612)
Fall or spring. 2–4 credits. Prerequisites and enrollment limits vary with topic being considered in any particular term. Permission of instructor required. Hours to be arranged.
This series of courses provides an opportunity for graduate students to explore an issue, a theme, or research in the areas of departmental concentration. Topics vary each time the course is offered. Descriptions are available at the time of course registration. Although the courses are usually taught as seminars, a subject may occasionally lend itself to lecture, practicum, or other formats.

TEXTILES AND APPAREL COURSES

A. Lemley, chair, A. Netravali, director of graduate studies; A. Racine, director of undergraduate studies; S. Ashdown, C. C. Chu, C. Coffman, C. Jirousek, S. Loker, S. K. Obendorf, A. Racine, P. Schwartz

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 summer. 3 credits. Fall, T or R 1:25–4:25. It is important for students on wait lists to attend the first class. Limit 18 per lab section. Priority given to all TXA and other freshmen and sophomore students. Not open to those who have taken or are currently enrolled in DEA 648. S–U grades optional. A. Racine.
A studio course that explores the creative potential of microcomputers. The AutoCAD software program is used as a design tool for generating a wide variety of visual images. Basic Photoshop software commands are introduced to enhance AutoCAD drawings. Daily hands-on demonstrations and studio work. Students develop two-dimensional designs based on historical, cultural, and museum sources for portfolios and display. Supplies cost about $60.00; lab fee $15.00.

TXA 125 Art, Design, and Visual Thinking
Fall. 3 credits. S-U grades optional. Lecs M W F 12:20–1:10. C. Jirousek.
An introduction to the visual arts and design that explores aesthetic and cross-cultural dimensions of visual experience. Augmented by slide presentations, artifacts, video, and an internet-based electronic textbook, lectures emphasize the varieties of visual expression seen in works of art and design. Social, cultural, and historic interpretations of visual expression are discussed.

TXA 135 Fibers, Fabrics, and Finishes
Spring. 3 credits. S-U grades optional. Lecs M W F 9:05–9:55. A. Netravali.
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 145 Introduction to Apparel Design
Spring. 4 credits. Limited to 30 students with 15 students per lab section; priority given to all TXA, other freshmen and sophomore students, and students transferring into TXA; not open to seniors outside of TXA. Letter grades only. Apparel design majors should take course during the first year. Minimum cost of materials, $125; lab fee, $10. Lec T 1:25–4:25 and lab F 10:10–12:05 or lec R 1:25–4:25 and lab F 12:20–2:15. A. Racine.
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 the 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 students. Letter grades only. Minimum cost of supplies $125.00. Lab fee: $30. T R 10:10–1:10. Staff.
The goal of this course is to improve a student's capacity to communicate apparel design ideas visually by drawing clothing on the human body. Emphasis will be on development of techniques used to express the human body, materials, and clothing designs quickly and clearly in working sketches and to present clothing designs in finished renderings.

TXA 237 Structural Fabric Design
Fall. 3 credits. S-U grades optional. Prerequisite: TXA 135. Recommended: college algebra. Lecs M W F 9:05–9:55. P. Schwartz.
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 264 Draping
Fall. 4 credits. Limited to 20 students. Prerequisite: TXA 125 and TXA 145; one drawing course recommended. Minimum cost of materials, $125; lab fee, $10. T R 10:10–1:10. S. Ashdown.
This studio course examines the process of creating a three-dimensional garment from the two-dimensional fabric. Through exercises, the 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 269 Style, Fashion, and the Apparel Industry
Spring (last seven weeks of semester). 2 credits. Recommended: TXA 125 and TXA 135. Not open to freshmen. S-U grades optional. Lec M W 10:10–12:05. A. Racine.
Illustrated lectures will focus on changes in the U.S. apparel industry and fashion from the nineteenth century to the present day due to social forces, technological developments, and shifting demographics. The Cornell Costume Collection will be used for discussion. Students will write a term paper on issues relating to the fashion industry.

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 multicopy description of the study they want to undertake on a form available from the College Registrar's 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 331 Apparel Production and Management
Fall. 3 credits. Prerequisites: Economics 101 and 102 and an upper-division course in either apparel or textiles. T R 10:10–11:25. Not offered 2000-2001. S. Loker.
Introduction to the global textile and apparel industry, particularly the technical and economic aspects of apparel production. Analysis of specific apparel manufacturing and management issues such as international sourcing, Quick Response, mass customization, production and information technology, labor, and logistics.

TXA 335 Fiber Science
Spring. 3 credits. Limited to 20 students. Prerequisites: college chemistry and physics. Lecs M W 1:25–2:15. Lab M 2:30–4:25. A. Netravali.
This course covers fibers commonly used in various engineering, medical, and apparel applications. Topics include nature of polymer molecules, chemical structure of organic fibers, inorganic fibers, micro-macro structure of fibers, fiber dimensions, environmental effects, mechanical, optical, thermal, and frictional properties of fibers. Fiber uses such as composites in aerospace and other structural components, circuit boards, bulletproof vests, sutures, artificial arteries, geotextiles, sporting goods, etc. will be discussed.

TXA 336 Fundamentals of Color and Dyeing
Fall. 3–4 credits. 3 credits for lecture only; 4 credits for lecture and lab. Prerequisite: college Natural Science Requirements. Fiber science students are required to take the lab. Lab fee, $15. Lecs M W F 10:10–11:00; lab M 1:25–4:25. C. C. Chu.
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 color in design, marketing, or research. How colorants are used to dye fabrics will be addressed. Although fabrics are chiefly used to illustrate color in the class, much of the information and knowledge will be useful to non-textile majors. Guest lecturers from the industry will address the practical aspects of color in business.

TXA 346 Apparel Design Process and Pattern Development
Spring. 4 credits. Prerequisite: TXA 135 and TXA 145. Letter grades only. Minimum cost of materials, $125; lab fee, $10. M W 1:25–4:25. Staff.
This studio course applies the principles and processes of advanced pattern making and the theory of functional clothing to the development of sportswear, actionwear, and clothing for active leisure activities. Assigned problems will require students to use the design process to apply information about body structure, user needs (thermal protection and comfort, mobility, and visibility), and the nature of materials to the production of functional, fashionable apparel.

TXA 368 Computer-Aided Apparel Design
Spring (first seven weeks of semester). 2 credits. Prerequisite: TXA 114, TXA 125, and TXA 264. Minimum cost of materials, $50; lab fee, $10. M W F 10:10–12:05. A. Racine.
Intermediate apparel students prepared to challenge and refine their design skills will be presented with a variety of complex studio problems. This class uses computer-aided apparel design and team work.

TXA 375 Color and Surface Design of Textiles
Fall. 4 credits. Recommended: TXA 114 and TXA 135. Minimum cost of other materials, $100; lab fee, $75. Limited to 18 students. T R 1:25–4:25. C. Jirousek.
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, silk 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, summer, or 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 TXA not otherwise provided through course work in the department or elsewhere at the university. Students prepare a multicopy description of the study they want to undertake on a form available from the department 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 along with an add/drop slip in 145 MVR, College Registrar Office. To ensure review before the close of the course registration or change-of-registration period, early submission of the special-studies form to the department chair is necessary. Students, in consultation with their supervisor, should register for one of the following subdivisions of independent study.

TXA 400 Directed Readings
For study that predominantly involves library research and independent reading.

TXA 401 Empirical Research
For study that predominantly involves data collection and analysis, or laboratory or studio projects.

TXA 402 Supervised Fieldwork
S-U only.
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.
Apprenticeship includes both a study of teaching methods in the field and assisting the faculty with instruction.

TXA 432 Product Quality Assessment
Fall. 3 credits. Prerequisites: TXA 135 and Statistics. Lab fee, $15. Lecs M W 1:25–2:15; lab M or W 2:30–4:25. S. K. Obendorf.
This course covers evaluation of fibers, yarns, fabrics, and garments, with emphases on the meaning of standards, testing philosophy, quality control, and statistical analysis. Day-to-day tests done in textile and apparel industry will be discussed. Laboratory sections will introduce students to various test methods, data generation for analysis, and evaluation.

TXA 436 Fiber Chemistry
Spring. 3 credits. S-U grade optional. Senior and first-year graduate students. Lecs M W F 10:10–11:00. Offered alternate years. Not offered 2000–2001. C. C. Chu.
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
Spring. 2–3 credits. 2 credits meets Tues. only; 3 credits meets Tues. and Thurs. S-U grades only for 2 credits, letter grades only for 3 credits. Juniors and seniors only. Prerequisites: college Natural Science requirement. (Chem. or Biol.). T 1:25–2:40, R 1:25–2:40. C. C. Chu.
Survey of materials and devices for repair of injured, diseased, or aged human tissues/organs. It includes properties of synthetic and biological materials, wound healing processes, medical devices for repair of wounds, blood vessels, hearts, joints, bones, nerves, male impotence, vision/hearing/voice, and drug control/release.

TXA 444 Apparel/Textile Retailing and Distribution
Spring. 3 credits. S-U grades optional. Juniors and seniors only. Prerequisite: TXA 135, TXA 331, and ARME 240 or equivalent. Lec M W 2:55–4:10. Staff.
This course provides an overview of the business of design, production, distribution, marketing, and merchandising of apparel and related products from a management perspective. The organization and structure of both domestic and international retailers is included along with pricing strategies, merchandise planning, inventory management, and sales promotion. New uses of computer systems and information technologies will be emphasized throughout.

TXA 446 Apparel Design: Intermediate Functional Clothing Design
Spring. 4 credits. Prerequisites: TXA 367 and TXA 246 or permission of instructor. Minimum cost of materials, $125; lab fee, $15. Offered alternate years. M W 10:10–1:10. Staff.
Complex problems in functional apparel design will be studied with an emphasis on totally encapsulating 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. 4 credits. Prerequisites: minimum of three drawing or art courses, TXA 264, TXA 368, and TXA 375 or permission of instructor. Recommended: TXA 114. Minimum cost of materials, $250; lab fee, $10. M W 10:10–1:10. 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 475 Photoshop for Portfolio Presentations in Textiles and Apparel
Spring (first seven weeks of semester). 2 credits. Limited to 16 students. Prerequisite: TXA 217 or TXA 375. Course fee covering CAD lab color printing, $15.00. T R 10:10–12:05. Staff.
This course will explore the use of Adobe Photoshop as a tool for portfolio development in textile and apparel design. Building on studio work produced in other courses, students will learn the basics of Photoshop and create a design line for a formal portfolio that will involve textile design applied to either apparel or home furnishings use.

TXA 499 Honors Thesis Research
Fall and spring. 1–6 credits (maximum 6 credits for graduation). S-U grades optional. Prerequisite: TXA students who have been admitted to college honors program. Staff.
Independent research leading to the honors thesis. College honors program guidelines are to be followed.

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
Fall. 3 credits. Prerequisite: permission of instructor. Offered alternate years. Not offered 1999–2000. 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. Offered alternate years. Not offered 1999–2000. 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 637 Research Seminars in Apparel Design
Fall and spring. 1 credit; S-U only; 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: solid mechanics or permission of instructor. Offered alternate years. Not offered 2000–2001. 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 compressive 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 grades optional. Prerequisites: course in statistics and permission of instructor. Open to advanced undergraduates. Offered alternate years. Not offered 2000–2001. 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 sizing techniques; national and international sizing systems and standards; impact of sizing systems on various populations (elderly, handicapped, etc.).

[TXA 675 Aesthetics and Meaning in World Dress
Spring. 3 credits; S-U grades optional. Prerequisites: TXA 125 or course in history of art, costume history, or other history. Offered alternate years. Not offered 1999–2000. 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. Credits 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

Allen, Josephine A., Ph.D., U. of Michigan. Assoc. Prof., Policy Analysis and Management
Anderson, Carol L., Ph.D., Iowa State U. Assoc. Prof., Human Development, Assistant Dean
Ashdown, Susan, Ph.D., U. of Minnesota. Assoc. Prof., Textiles and Apparel
Avery, Rosemary J., Ph.D., Ohio State U. Assoc. Prof., Policy Analysis and Management
Barr, Donald J., Ph.D., Indiana U. Prof., Policy Analysis and Management
Battistella, Roger M., Ph.D., U. of Michigan. Prof., Policy Analysis and Management
Becker, Franklin D., Ph.D., U. of California at Davis. Prof. and Chair, Design and Environmental Analysis
Brannon, Patsy, Ph.D., Cornell U. Prof., Nutritional Sciences, Dean
Brooks, Richard, Ph.D., U. of California at Berkeley, J.D., U. of Chicago. Asst. Prof., Policy Analysis and Management
Brumberg, Joan J., Ph.D., U. of Virginia. Prof., Human Development
Bryant, W. Keith, Ph.D., Michigan State U. Prof., Policy Analysis and Management
Burkhauser, Richard, Ph.D., U. of Chicago. Prof. and Chair, Policy Analysis and Management
Canfield, Rick, Ph.D., U. of Denver. Assoc. Prof., Human Development
Ceci, Stephen J., Ph.D., U. of Exeter (England). Prof., Human Development
Chi, Peter S., Ph.D., Brown U. Prof., Policy Analysis and Management
Chu, Chih-Chang, Ph.D., Florida State U. Prof., Textiles and Apparel
Cochran, Moncrieff, Ph.D., U. of Michigan. Prof., Human Development
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Depue, Richard, Ph.D., U. of Oklahoma. Prof., Human Development
Eckenrode, John J., Ph.D., Tufts U. Prof. and Co-Director, Family Life Development Center
Elliott, John, M.E. Des., U. of Calgary. Asst. Prof., Design and Environmental Analysis
Eshelman, Paul E., M.F.A., U. of Illinois. Assoc. Prof., Design and Environmental Analysis
Evans, Gary, Ph.D., U. of Massachusetts at Amherst. Prof., Design and Environmental Analysis
Ewert, D. Merrill, Ph.D., U. of Wisconsin at Madison. Assoc. Prof., Assoc. Dean
Ford, John L., Ph.D., U. of Michigan. Prof., Policy Analysis and Management
Garbarino, James, Ph.D., Cornell U. Prof. and Co-Director, Family Life Development Center
Gerner, Jennifer L., Ph.D., U. of Wisconsin. Prof., Policy Analysis and Management, Associate Dean
Gibson, Kathleen J., M.A., Ohio State U. Asst. Prof., Design and Environmental Analysis
Greene, Jennifer C., Ph.D., Stanford U. Prof., Policy Analysis and Management
Greene, Katrina, Ph.D., U of Virginia. Asst. Prof., Human Development
Hamilton, Stephen F., Ed.D., Harvard U. Prof., Human Development
Haugaard, Jeffrey, Ph.D., U. of Virginia. Assoc. Prof., Human Development
Hazan, Cindy, Ph.D., U. of Denver. Assoc. Prof., Human Development
Heck, Ramona K.Z., Ph.D., Purdue U. Prof., Policy Analysis and Management
Hedge, Alan, Ph.D., U. of Sheffield (England). Prof., Design and Environmental Analysis
Jennings, Jan, M.S., Oklahoma State U. Assoc. Prof., Design and Environmental Analysis
Jirousek, Charlotte, Ph.D., U. of Minnesota. Assoc. Prof., Textiles and Apparel

Kenkel, Donald, Ph.D., U. of Chicago. Assoc. Prof., Policy Analysis and Management
Koslowski, Barbara, Ed.D., Harvard U. Assoc. Prof., Human Development
Kuder, John, Ph.D., U. of Michigan. Assoc. Prof., Policy Analysis and Management
Kutty, Nandinee K., Ph.D., Syracuse U. Asst. Prof., Policy Analysis and Management
Laquatra, Joseph Jr., Ph.D., Cornell U. Assoc. Prof., Design and Environmental Analysis
Lee, Lee C., Ph.D., The Ohio State U. Prof., Human Development
Lemley, Ann T., Ph.D., Cornell U. Prof. and Chair, Textiles and Apparel
Loker, Suzanne, Ph.D., Kansas State U. Prof., Textiles and Apparel
Lust, Barbara C., Ph.D., City U. of New York. Prof., Human Development
Mathios, Alan, Ph.D., U. of Pennsylvania. Assoc. Prof., Policy Analysis and Management
Maxwell, Lorraine E., Ph.D., City U. of New York. Asst. Prof., Design and Environmental Analysis
McClintock, Charles, Ph.D., SUNY at Buffalo. Prof., Policy Analysis and Management, Associate Dean
Moen, Phyllis, Ph.D., U. of Minnesota. Prof. and Director, Bronfenbrenner Life Course Center
Netravali, Anil, Ph.D., North Carolina State U. Assoc. Prof., Textiles and Apparel
Obendorf, Sharon K., Ph.D., Cornell U. Prof., Textiles and Apparel, Assoc. Dean
Parrot, Andrea, Ph.D., Cornell U. Assoc. Prof., Policy Analysis and Management
Peters, Elizabeth, Ph.D., U. of Chicago. Assoc. Prof., Policy Analysis and Management
Pillemer, Karl A., Ph.D., Brandeis U. Prof., Human Development
Pollak, Patricia B., Ph.D., Syracuse U. Assoc. Prof., Policy Analysis and Management
Raver, C. Cybele, Ph.D., Yale U. Asst. Prof., Human Development
Robertson, Steven S., Ph.D., Cornell U. Prof. and Chair, Human Development
Rodriguez, Eunice, Ph.D., U. of California at Berkeley. Asst. Prof., Policy Analysis and Management
Savin-Williams, Ritch C., Ph.D., U. of Chicago. Prof., Human Development
Schwartz, Peter, Ph.D., North Carolina State U. Prof., Textiles and Apparel
Sims, William R., Ph.D., Massachusetts Inst. of Technology. Prof., Design and Environmental Analysis
Tennyson, Sharon, Ph.D., Northwestern U. Assoc. Prof., Policy Analysis and Management
Tobias, Donald J., Ph.D., Michigan State U. Assoc. Prof., Policy Analysis and Managment
Trochim, William M. K., Ph.D., Northwestern U. Prof., Policy Analysis and Management
Walston, Stephen, Ph.D., U. of Pennsylvania. Asst Prof., Policy Analysis and Managment
Wethington, Elaine, Ph.D., U. of Michigan. Assoc. Prof., Human Development
Williams, Wendy M., Ph.D., Yale U. Assoc. Prof., Human Development

Lecturers

Basinger, Annette, B.A., Michigan State U. Lecturer, Design and Environmental Analysis
Beck, Sam N., Ph.D., U. of Massachusetts. Sr. Lecturer, Urban Semester
Dempster-McClain, Donna I., Ph.D., Cornell U. Sr. Lecturer, Human Development
Dimmler, Laura, M.P.A., Harvard U. Lecturer, Policy Analysis and Management
Dyer, Margaret, M.S.W., Smith College. Lecturer, Policy Analysis and Management
Gilmore, Rhonda, M.A., Cornell U. Lecturer, Design and Environmental Analysis
Heath-Crump, Ossie, Ph.D., Cornell U. Lecturer, Policy Analysis and Managmeent
Racine, Anita, Ph.D., Cornell U. Sr. Lecturer, Textiles and Apparel
Rosen, William, Ph.D., U. of CA. Sr. Lecturer, Policy Analysis and Management
Ross-Bernstein, Judith, M.Ed., Northwestern U. Lecturer, Human Development
Schelhas-Miller, Christine, Ed.D., Harvard U. Lecturer, Human Development

SCHOOL OF INDUSTRIAL AND LABOR RELATIONS

ADMINISTRATION

Edward J. Lawler, dean

Robert Smith, associate dean, academic affairs

Ronald L. Seeber, associate dean, extension and public affairs

James E. McPherson, assistant dean, Office of Student Services

Gordon Law, librarian

Allan Lentini, director, administrative services

Francine Blau, director, research

Michael O'Hara, director, external relations

Robert Stern, graduate faculty representative

Tove Hammer, editor, *Industrial and Labor Relations Review*

DEGREE PROGRAMS

	Degree
Industrial and Labor Relations	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 720 undergraduates and approximately 120 graduate students, even as ILR students participate fully in the activites of the larger Cornell community.

ILR students study in modern, technologically advanced lecture halls, seminar rooms, and libraries.

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 industrial and labor relations, 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 120 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, 216 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

In the study of workers, employers, and the government policies affecting them, members of this faculty concentrate on subjects of industrial and labor relations best understood by reliance on the fields of administration, economics, history, and law. Courses explore subjects within the framework of American society, stress fundamental forces of change, and analyze texts and empirical data with methods drawn from the social sciences, the humanities, and the legal professions.

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.

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 in Asia, Latin America, and South America.

Labor Economics

Labor Economics deals with labor markets: that is, the institutional arrangements, terms, and conditions under which workers supply their labor and under which firms demand their labor. Faculty members are especially concerned with understanding the workings of labor markets and the effects of various public policies. The topics dealt with in courses and research include the following: analysis of the labor force, employment and unemployment, wages and related terms of employment, income distribution, income security programs, health and safety in industry, retirement, pensions and social security, economic aspects of collective bargaining, and economic demography.

Organizational Behavior

By studying individuals, groups, single organizations, and associations or organizations, persons in the field of organizational behavior understand human behavior within organizations as well as the actions of the organizations themselves. At the individual level of analysis, courses consider motivation, leadership, attitudes, personality, group processes, organizational change, and worker participation. At the organizational level, courses examine occupations, deviance in the work place, conflict, power, organizational design, public policy regarding organizations, and industrial conflict. The department also offers courses on research methods in organizational research and general survey courses in both psychological and sociological research.

Social Statistics

Economic and social statistics includes the principles of statistical reasoning, statistical methods, and the application of statistical tools of analysis.

A full list of required and elective courses is available from the Office of Student Services, 101 Ives Hall.

RESIDENT INSTRUCTION

This division conducts the on-campus programs leading to the degrees of Bachelor of Science, Master of Industrial and Labor Relations, Master of Professional Studies, Master of Science, and Doctor of Philosophy from Cornell.

Office of Student Services

Staff members from the Office of Student Services, 101 Ives Hall, work closely with faculty and faculty committees to administer degree programs for the school and many of the school's support services. The office's responsibilities include the admitting and orienting of new students, maintaining students' personal and academic records, and counseling students on personal and academic problems. The office also works closely with seniors who are planning graduate study.

Counseling and Advising

New students will be provided advising on orientation, academic procedures, and course registration by counselors in the Office of Student Services.

Each of the school's academic departments names faculty members to serve as advisers for students who wish to consult with them regarding career possibilities in the field, postgraduate programs, or similar matters. Questions or issues related to graduation requirements, course registration, and related academic procedures should be raised with counselors in the Office of Student Services.

Minority Programs

Cornell University administers a variety of special opportunity programs designed to provide financial assistance and other forms of assistance to (1) minority students and (2) low-income students meeting program guidelines. The purpose of these programs is to provide access to a Cornell education for capable students who otherwise might not secure the admissions consideration, financial assistance, or supportive services necessary for their success at the university. The associate director for minority education in the Office of Student Services provides academic and personal counseling to all ILR minority students. ILR offers a variety of support services to enhance academic achievement.

STUDY OPTIONS

Several study options are open to ILR undergraduates, making it possible to tailor a program to fit special circumstances.

One such option is the five-year ILR master's degree. With early planning, some students may earn the M.S. degree in the fifth year. Using another option, some ILR students arrange for dual registration in the Johnson Graduate School of Management, earning their bachelor's degree in ILR and a master's degree in the Johnson Graduate School of Management after five years of study.

Some students elect to spend a semester in New York City, Albany, or Washington, D.C., with a chance to observe actual labor problem solving as interns in congressional offices, labor organizations, personnel offices, and state and federal agencies. For more information, see "Special Academic Programs," below.

Study abroad options are also available at a number of foreign universities. Qualified students may spend a semester or a full year studying abroad.

A number of ILR courses deal directly with today's problems and involve fieldwork in the Ithaca area and elsewhere in New York State. The ILR program allows juniors and seniors who want to conduct their own research to receive course credit for individually directed studies if the program is supervised by a faculty member.

Study in Absentia

Registration in absentia enables a student to seek admission in another American institution for a semester or a year and transfer credit toward completion of the Cornell degree. This study option requires the development of a plan of study, a statement of appropriate reasons for study away from the university (e.g., availability of courses not offered at Cornell), good academic standing, approval of the plan by the director of student services, and payment of a special in absentia registration fee. Course work taken in absentia is usually not evaluated for transfer credit until the work has been completed and the student has returned to the school. Students then submit a course syllabus and other evidence of content to the chairman of the department that might have offered the respective course, or to a counselor in the Office of Student Services if the course is more appropriate as a general elective.

Leave of Absence or Withdrawal

If a student desires to withdraw or to take a leave of absence from the university, an interview should be scheduled with a counselor in the Office of Student Services. Counselors will assist students in petitioning for approval of a leave of absence and in contacting the appropriate offices or departments of the university.

REQUIREMENTS FOR GRADUATION

To earn the Cornell Bachelor of Science degree in industrial and labor relations, the student needs to successfully complete 120 credits. This requires eight terms for an average of 30 credits a year although some students accelerate their studies.

Freshman Year

Fall Semester

Freshman Writing Seminar	3
Introductory Microeconomics (ECON 101)	3
History of American Labor: Nineteenth Century (ILRCB 100)	3
Social and Psychological Foundations of Organizational Behavior I (ILROB 170)	3
ILR Colloquium (ILRID 150)	1
Elective	3
	16

Spring Semester

Freshman Writing Seminar	3
Introductory Macroeconomics 102	3
History of American Labor: Twentieth Century (ILRCB 101)	3
Social and Psychological Foundations of Organizational Behavior II (ILROB 171)	3
Elective	3
	15

Physical Education, Fall and Spring

Sophomore Year

Fall Semester

Statistics I (ILRST 210)	3
Development of Economic Institutions (ILRLE 140)	3
Labor and Employment Law (ILRCB 201)	3
Human Resource Management (ILRHR 260) Fall	3
Elective	3
	15

Spring Semester

Statistics II (ILRST 211)	3
Economics of Wages and Employment (ILRLE 240)	3
Distribution: Cultural Perspectives	3
Distribution: Western Intellectual Tradition	3
Elective	3
	15

Junior and Senior Years

Economic Security (ILRLE 340)	3
Collective Bargaining (ILRCB 300)	3
Distribution: International and Comparative ILR	3
Distribution: Upper Division Writing	3
Distribution: Science and Technology	3
Advanced Organizational Behavior (ILROB 420)	3

ILR and General Electives

ILR Advanced Electives—27 credit hours in no fewer than 9 courses

General Electives—34 credit hours of which up to 22 hours may be freely elected in the university's endowed divisions

Required Courses

(55 credits)

The curriculum prescribes the courses and subjects listed in the table above; some are illustrative. 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 9 courses and 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, ILR 495, Honors Program, or one semester of Study Abroad.

Undergraduates are required to select one intensive writing course (for a minimum of three credits) from a list of designated courses.

The remaining 34 credits may be selected from the courses of any other college at Cornell, but a student who takes more than 34 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 34, *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.

ILR Math Requirement

If you took AP calculus in high school and scored a 3 or better on the AB exam or a 2 or better on the BC exam, you have fulfilled the ILR math requirement. If you did not take AP calculus, or if you did not achieve the scores noted above, you will be expected to take and pass the ILR Math Assessment before you may register for required courses in Statistics and Labor Economics. The Math Assessment is based on materials covered in New York State Regents Exams for Courses 2 and 3. (Calculus is not covered in those courses.)

The ILR Math Assessment will be scheduled in August, January, and May. Those who do not pass in the first attempt will be expected to register in an appropriate math course and pass the assessment *before the beginning of their third semester* in the school. Anyone who cannot meet the requirement by the beginning of the third semester may be enrolled for a terminal term and will be expected to leave the school thereafter.

Transfer students will be expected to meet the same standards in math: either present the score required by Cornell University for AP calculus (AB or BC) credit, or pass the ILR Math Assessment before being permitted to register in ILRST 210 or ILRLE 240 with a terminal semester possible after failing the assessment given at the beginning of a third semester as an ILR student.

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 excuses have been approved by the faculty. In some courses an instructor may permit a maximum number of class absences without a grade penalty or dismissal from the course. An explanation for absence from class may occasionally be secured from the Office of Student Services in advance of the expected absence. An approved absence may be warranted by:

1) participation in authorized university activities such as athletic events, dramatic productions, or debates;
2) medical problems supported by a record of clinic or infirmary treatment;
3) serious illness or death in the immediate family;
4) other circumstances beyond the student's control.

A request for explanation of an absence should, when possible, be made to the Office of Student Services before the date of expected absence. A reported and explained absence does not relieve a student from fulfillment of academic requirements during the period of absence. The course instructor has the authority to determine what work must be completed. The office can only confirm the explanation for absence. Students should inform the Office of Student Services of any problems they have meeting course requirements.

ACADEMIC STANDING AND GRADES

Academic Integrity

In 1987 the faculty of the School of Industrial and Labor Relations approved a revised code of academic integrity. This code, while based on the Cornell University code, varies somewhat.

Absolute integrity is expected of all Cornell students in all academic undertakings. They must in no way misrepresent their work, fraudulently or unfairly advance their academic status, or be a party to another student's failure to maintain academic integrity. The code specifically prohibits:

1) knowingly representing the work of others as one's own;
2) using or obtaining unauthorized assistance in any academic work;
3) fabricating data in laboratory or field work;
4) giving fraudulent assistance to others;
5) fabricating data in support of laboratory or field work.

Full details on the applications of those prohibitions to course work, term papers, examinations, and other situations are listed in the code. Copies are available from the Office of Student Services, 101 Ives Hall.

Dean's List

A Dean's List is compiled for each of the four undergraduate classes each term on the seventh day following receipt of final grades from the registrar. Eligibility for the Dean's List is determined by applying all of the following criteria:

1) achievement of a term average for freshmen of 3.3 or better; for sophomores of 3.4 or better; and for juniors and seniors of 3.6 or better;
2) a minimum course load for the term of 12 letter-graded credits;
3) completion of all courses registered for at the beginning of the term;
4) satisfaction of all good-standing requirements.

Academic Standing

Good standing requires that all of the following criteria be met at the end of each term:

1) an average of C– (1.7) for the semester's work, including a minimum of 8 completed and letter-graded credits;
2) no failing grades in any course, including physical education;
3) a cumulative average of C– (1.7) for all completed terms.

If at the end of any term a student fails to maintain good standing or if overall academic performance is so marginal as to endanger the possibility of meeting school and university degree requirements, his or her record is reviewed by the Committee on Academic Standards and Scholarships. The committee may issue a written warning to the student at that time. If a student does not improve after the written warning, he or she may be denied permission to register for the next term.

Involuntary Separation from the School for Academic Reasons

A student may be denied permission to reregister at the end of any term when he or she has failed:

1) to establish good standing after a semester on warning;
2) to maintain an average of 1.7 in any term after a previous record of warning;
3) to achieve good standing after being on warning any two previous semesters;
4) two or more failures 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 will be completed later and credit given. Instructors may grant a grade of incomplete for a limited number of clearly valid reasons, but only to students with substantial equity in a course. A firm and definite agreement on the conditions under which it may be made up must be made with

the instructor. The school's policy allows a maximum of two full terms of residence for removal of a grade of incomplete. If it is not made up within this time, the grade automatically becomes an F.

SPECIAL ACADEMIC PROGRAMS

To meet the special academic objectives of some students, the school's faculty has established several special academic programs. For additional information, students should contact a counselor in the Office of Student Services. Counselors will explore the program with students to help them decide if it suits their interests.

Dual Registration in the Johnson Graduate School of Management

Dual informal registration in the Johnson Graduate School of Management leads to a Bachelor of Science degree in industrial and labor relations and a master's degree in management after five years of study and is open to students who meet the requirements of the Johnson Graduate School of Management.

Early planning by each student, preferably in the sophomore year, is desirable to ensure that the expectations of the Johnson Graduate School of Management and ILR curriculum requirements are fulfilled. Students interested in the very limited and selective program of the Johnson Graduate School of Management should contact the Admissions Office, 319 Malott Hall, and a counselor at the Office of Student Services.

Five-Year Master of Science Degree Program

With early planning it is possible to earn the M.S. degree in a fifth year of study. This program is designed specifically for those who wish concentrated study in an area of specialization in the school for a Master of Science degree. Students considering this program should consult a counselor in the Office of Student Services after their freshman year.

Internships

The Credit Internship Program has provided students with a vivid understanding of problems in labor and industrial relations through observation and participation in "real-life" labor problem solving. A number of selected students spend a term of the junior year in Albany, New York City, or Washington, D.C., in close contact with practitioners. Their activities include independent research under direction of ILR faculty members and seminars drawing on fieldwork experience with employers, labor organizations, and government agencies. More information about this program is available from the Office of Student Services.

Honors Program

Undergraduates who are ranked in the top 20 percent of their class at the end of the junior year may propose a two-semester research project, an honors thesis, for review by the Committee on Academic Standards and Scholarships. When approved, the candidate for graduation with honors works for two semesters (for 3 credits in each term) to research, write, and then defend the thesis.

Study Abroad

Cornell students with strong academic records and the necessary preparation in required and elective courses are encouraged to consider study abroad. The university currently has contact with universities in more than 40 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 at Cornell. Students should consult the Office of Student Services and Cornell Abroad in the freshman and sophomore years to be sure that they comply with the academic and procedural requirements for study abroad.

COLLECTIVE BARGAINING, LABOR LAW, AND LABOR HISTORY

H. Katz, chair; M. Cook, C. Daniel, I. DeVault, M. Gold, L. Gray, J. Gross, R. Hebdon, S. Kuruvilla, R. Lieberwitz, D. Lipsky, P. Ross, N. Salvatore, K. Stone, L. Turner

ILRCB 100 Introduction to U.S. Labor History: Nineteenth Century
Fall. 3 credits. C. Daniel, I. DeVault, N. Salvatore.
This first semster of a two-semester sequence covers the major changes in the nature of work, the workforce, and the institutions involved in industrial relations in the United States through the end of the nineteenth century.

ILRCB 101 Introduction to U.S. Labor History: The Twentieth Century
Spring. 3 credits. Prerequisite: ILRCB 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.

ILRCB 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.

ILRCB 300 Collective Bargaining (200)
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.

ILRCB 301 Labor Union Administration
Fall. 3 credits. Staff.
Study and analysis of the structure and operations of American unions, including the complicated internal life of the organizations; the varied environments in which unions develop and grow or decline; the relationship of national unions, local unions, and members in the many different sections of internal union government; the ways in which unions are set up to handle organizing, collective bargaining, contract administration, and political activity; and the widespread movement toward merger and consolidation of unions that began in the sixties and continues today. All of these will involve a study of union constitutions and other primary documents, in addition to secondary readings. Attention will be given to relevant legislation, current problems of unions, and the eternal problems of attaining union democracy.

ILRCB 302 Strangers and Citizens: Immigration and Labor in U.S. History
Fall or spring. 3 credits. I. DeVault.
Will explore immigrant workers' experiences in the 19th and 20th centuries from different perspectives. We will examine what it meant to the immigrants themselves to arrive as strangers in the United States while also examining the ways in which pre-existing American groups defined these immigrants as "strangers." Similarly, we will look at U.S. citizens in their roles as greeters of immigrants, detractors of immigrants, and as models for the aspirations of immigrants. Throughout the course our main examples will come from the industrial and union realms.

ILRCB 304 Seminar in American Labor and Social History
Fall or spring. 4 credits. Permission of instructor. C. Daniel, I. DeVault, N. Salvatore.
An undergraduate seminar whose topic changes depending on semester and instructor.

ILRCB 305 Introduction to Labor Arbitration and Alternative Dispute Resolution
Fall. 3 credits. J. Gross.
An introductory survey that focuses in part on the U.S. labor arbitration process in the private and public sectors (legal issues, discipline and discharge, contract language interpretation, remedies, and procedures) and in part on alternative dispute resolution systems in the United States and other countries. Student participation in class discussion is expected and assignments will include an original research paper.

ILRCB 384 Women and Unions (also WOMNS 384)
Fall or spring. 4 credits. I. DeVault.
Will explore women's participation in the United States labor movement in the nineteenth and twentieth centuries. Issues covered will include women workers' relations with male-dominated union movements, the role of cross-class alliances of women in organizing women workers, interactions with radical parties and organizations, problems faced by women union leaders and activities, and others.

ILRCB 385 The African-American Workers, 1865–1910: The Rural and Urban Experience
Spring. 3 credits. Prerequisites: 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.

ILRCB 386 The African-American Workers, 1910–the Present: Race, Work and the City
Fall. 3 credits. Prerequisites: junior or senior. N. Salvatore.
Examines the history of blacks in America from the start of the Great Migration through the 1970s, with a focus on the work experience. Topics will include the effect of migration and urbanization on black workers; the nature of the relationship between black and white workers as influenced by depression and two world wars; and an examination of the effect of the Civil Rights movement on the economic circumstances of black workers.

ILRCB 400 Union Organizing
Spring. 3 credits. Prerequisites: undergraduates, ILRCB 201 and 300; graduate students, ILRCB 500 and 501. K. Bronfenbrenner.
Explores various aspects of unions' attempts to organize workers: why some workers join unions and others do not; strategy and tactics implemented by unions and management during organizing campaigns; present status of labor law as it affects organizing; creative approaches to union organizing; the organizing model of unionism.

ILRCB 401 My Brother's Keeper: Volunteerism and Philanthropy
Spring. 3 credits. Prerequisites: junior or senior or permission of instructor. M. Gold.
The philosophy, practice, economics, and law of volunteering labor and donating money. Topics include altruism versus self interest; why individuals volunteer labor and raise and donate money; the structure and practices of charitable organizations; the economic effects of voluntary labor and philanthropic gifts; and the law of raising and distributing money.

ILRCB 404 Contract Administration
Fall. 3 credits. Prerequisites: ILRCB 300 and 201 or ILRCB 500 and 501. K. Bronfenbrenner.
This course will focus on the practice, nature, and challenges of union representation under collective bargaining agreements. Working with union contracts, constitutions, and by-laws from a diversity of national and local public and private sector agreements, the course examines how U.S. unions represent their members in different industries and different collective bargaining environments. Issues to be addressed include union representative/steward rights and responsibilities, contract enforcement structures and practice, access to information, new work systems, hours of work and scheduling, contingent staffing arrangements, workplace discrimination, health and safety, promotional opportunities, down-sizing, leadership development, membership involvement and commitment, internal organizing, community coalition building, and decertification campaigns. Students will practice hands-on work in interpreting contract language and preparing and presenting grievances and unfair labor practices.

ILRCB 405 Negotiation & Dispute Resolution
Spring. 3 credits. Prerequisites: background in economics and social sciences. Permission of instructor. D. Lipsky.
Distance Learning. Deals with four related topics: (1) nature of conflict particularly between organizations, (2) negotiation and bargaining, with a focus on process, practice, and procedures; (3) third party dispute resolution, with a focus on mediation and arbitration; and (4) alternative dispute resolution (ADR), with a focus on its current use in the corporate sector and the implications for our system of justice. It will be a generic dispute resolution course, i.e. it will not focus on labor relations or any particular types of disputes, but will deal with many different kinds of conflicts. Will use examples and cases to illustrate general principles. Few if any of these cases and examples will be drawn from labor relations, rather, illustrative material in the course will be based on exercises in areas such as product liability, environmental regulation, commercial relations, and personal injury disputes.

ILRCB 407 Contemporary Trade Union Movement
Spring. 3 credits. Prerequisites: undergraduates, ILRCB 100, 101, graduate students ILRCB 502. R. Seeber, R. Hurd.
An examination of contemporary trade union issues, including union power, political action, collective bargaining approaches, and organizing efforts. The course will cover structural, functional and strategic aspects of contemporary unions. Speakers from the union movement will address the class.

ILRCB 482 Ethics at Work
Fall or spring. 3 credits. Prerequisites: junior or senior or permission of instructor. M. Gold.
Major theories of ethics are examined, then applied to issues in the employment relationship such as genetic screening of job applicants, random drug testing of employees, affirmative action, discipline for off-duty conduct, whistle-blowing, worker safety and cost/benefit analysis, comparable worth, strikes by employees providing crucial services, and crossing a picket line.

ILRCB 488 Liberty and Justice for All
Fall or spring. 3 credits. Prerequisite: junior or senior or permission of instructor. M. Gold.
Major theories of ethics are examined, then applied to contemporary issues such as affirmative action and reverse discrimination, the right to life (from abortion to capital punishment), comparable worth, and constitutional rights such as freedom of speech.

ILRCB 495 Honors Program
Fall and spring (yearlong course). 3 credits each term. Admission to the ILR senior honors program may be obtained under the following circumstances: (a) students must be in the upper 20 percent of their class at the end of their junior year; (b) an honors project, entailing research leading to completion of a thesis, must be proposed to an ILR faculty member who agrees to act as thesis supervisor; and (c) the project, endorsed by the proposed faculty sponsor, is submitted to the Committee on Academic Standards and Scholarships.
Accepted students embark on a two-semester sequence. The first semester consists of determining a research design, familiarization with germane scholarly literature, and preliminary data collection. The second semester involves completion of the data collection and preparation of the honors thesis. At the end of the second semester, the candidate is examined orally on the completed thesis by a committee consisting of the thesis supervisor, a second faculty member designated by the appropriate department chair, and a representative of the Academic Standards and Scholarship Committee.

ILRCB 497–498 Internship
Fall and spring. 497, 3 credits; 498, 6 credits. Staff.
All requests for permission to register for an internship must be approved by the faculty member who will supervise the project and the chairman of the faculty member's academic department before submission for approval by the director of Off-Campus Credit Programs. Upon approval of the internship, the Office of Student Services will register each student for 497, for 3 credits graded A+ to F for individual research, and for 498, for 6 credits graded S-U, for completion of a professionally appropriate learning experience, which is graded by the faculty sponsor.

ILRCB 499 Directed Studies
Fall and spring. 3 credits.
For individual or group research projects conducted under the direction of a member of the ILR faculty, in a special area of labor relations not covered by regular course offerings. Sophomores, juniors and seniors with a preceding semester of 3.00 term average, are eligible to submit projects for approval by the Academic Standards Committee. Students should consult with a counselor in the Office of Student Services at the time of CoursEnroll in order to arrange for formal submission of their Directed Study.

ILRCB 500 Collective Bargaining
Fall. 3 credits. Open only to graduate students. Recommended: ILRCB 501 taken previously or concurrently. M. Cook, R. Hebdon, H. Katz, S. Kuruvilla, L. Turner.
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 employ-

ment, 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.

ILRB 504 The U.S. Industrial Relations System
4 credits. Offered only in New York City for the MPS Program. Staff.
Examines the development, operation, and outcomes of the US industrial relations system in a comparative context. Specifically, the course contrasts the American experience with industrial relations institutions and outcomes with the experience of several other countries in Europe and Asia. We will look at the process of union formation, the practice of collective bargaining at different levels, the methods of dispute resolution, and the legal regime germane to industrial relations.

We will also focus on both processes and outcomes of different country systems, focusing on the degree of collaboration or conflict, wage levels and wage inequality, and practices in different industries and firms. Finally we will attempt to address the role played by industrial relations and human resource policy in economic and social development in these nations.

ILRCB 602 Arbitration
Fall and spring. 4 credits. Limited to 21 students. Prerequisites: undergraduates, ILRCB 201, 300; graduate students, ILRCB 500 and 501; permission of instructor. J. Gross, R. Lieberwitz.
A study of the place and function of arbitration in the field of labor-management relations, including an analysis of principles and practices, the law of arbitration, the handling of materials in briefs or oral presentation, the conduct of a mock arbitration hearing, and the preparation of arbitration opinions and post-hearing briefs.

ILRCB 603 The Economics of Collective Bargaining in Sports
Fall or spring. 3 credits. L. Kahn.
Surveys economic and industrial issues in the sports industry. Topics include: 1) salary determination, including free agency, salary caps, salary arbitration; 2) competitive balance and financial health of sports leagues; 3) antitrust issues in sports; 4) labor disputes, union history, and contract administration issues in sports leagues; 5) discrimination in sports; 6) performance incentives.

ILRCB 604 Theories of Equality and Their Application in the Workplace
Spring. 3 credits. R. Lieberwitz.
An examination of the various aspects of equality in the workplace, focusing on issues of race, gender, and national origin, and the ways in which societal discrimination on these bases are institutionalized in the workplace. Theories attempting to define "equality" and specific workplace issues are studied, including the means for achieving equality at the workplace. The course entails a high level of student participation in class discussions, and assignments include a research paper.

ILRCB 605 Readings in the History of Industrial Relations in the United States
Fall. 3 credits. Limited to seniors and graduate students. 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, 300; graduate students, ILRCB 500. H. Katz.
Will trace the evolution of theory and research on industrial relations. Topics include: theories of the labor movement, institutional models and evidence regarding what unions do, the origins of internal labor markets and their relationship with unionization, models of strikes, empirical assessments of arbitration, research on union decline, and empirical evidence of the impacts of new technology.

ILRCB 607 Values in Law, Economics, and Industrial Relations
Fall and spring. 3 credits. Limited to 21. Prerequisites: ILRCB 201, 300, 500, 501. J. Gross.
An examination of the often hidden values and assumptions that underlie the contemporary U.S. systems of employment law, work and business, and industrial relations. Classroom discussions and student research projects will use novels and short stories (as well as the literature of industrial and labor relations) to focus on issues such as: discrimination; law, economics and the state; work and business; power, conflict and protest; and rights and justice.

ILRCB 608 Special Topics in Collective Bargaining, Labor Law, and Legislation
Fall and 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 609 Special Topics: Labor Law Policy Seminar
Spring. 3 credits. K. Stone.
The United States collective bargaining system, which had 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. I. DeVault.
Takes a historical perspective on the development of a service economy in the United States. Readings will include general and theoretical works, but the main focus will be recent historical scholarship on specific occupations and situations in the "nonproductive" workforce. Students will explore primary sources for research on the subject and write research papers.

ILRCB 651 Industrial Relations in Transition
Spring. 3 credits. Limited to seniors and graduate students. H. Katz.
Considers whether recent developments such as concession bargaining, worker participation programs, and the growth of nonunion firms represent a fundamental transformation in industrial relations practice. Will review recent research and new theories arguing that such a transformation is occurring, including the work of Piore and Sabel, Bluestone and Harrison, and Kochan, McKersie, and Katz. Will also review the counterarguments and evidence put forth by those who believe no such transformation is under way. Course material will focus on industrial relations practice in the private sector in the United States, although some attention will be paid to developments in Western Europe, the United Kingdom, and Japan.

ILRCB 655 Employment Law
Spring. 3 credits. Prerequisites: ILRCB 201/501. M. Gold.
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' right-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. 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. 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 300 or 500; permission of instructor. S. Kuruvilla.
Designed to provide an analytical survey of research on trade unions in the United States. Major topics include unions in politics, unions as complex organizations, public opinion and attitudes toward unions, determinants of union growth and decline, economic and non-economic effects of unions, internal union government, and commitment and participation in trade union activity. This is a research-oriented course.

ILRCB 686 Collective Bargaining in the Public Sector
Fall or spring. 3 credits. Prerequisites: undergraduates, ILRCB 300 and 201; graduate students, ILRCB 500 and 501. 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. R. Lieberwitz.
In-depth analysis of the Supreme Court decisions that interpret the United States Constitution as it applies in the workplace. This study will focus on the First Amendment, Fifth Amendment, Fourteenth Amendment, and Commerce Clause, with issues including freedom of speech and association, equal protection, due process, and other issues in the area of political and civil rights. The course entails a high level of student participation in class discussion, and assignments include a research paper.

ILRCB 703 Theory and Research in Collective Bargaining
Spring. 3 credits. Open to graduate students who have had ILRCB 500 and ILROB 723 or their equivalents. Recommended: a statistics course beyond the level of ILRST 510. Staff.
This is a second-level course in collective bargaining that builds on the institutional research covered in ILRCB 500. The existing literature in the area of collective bargaining is appraised for its theoretical and empirical content. Efforts are made to explore the appropriate role for theory and empirical analysis in moving research in collective bargaining toward a more analytical perspective and to identify and appraise the underlying paradigms used to study collective bargaining-related issues.

ILRCB 705 The Economics of Collective Bargaining
Spring. 3 credits. Prerequisites: ILRCB 500; ILRLE 540 (or their equivalents) and an understanding of multiple regression analysis; or permission of instructor. Staff.
Focuses on both the economic analysis of unions and collective bargaining in our economy and on the economic forces that affect collective bargaining. The method is to identify and conceptualize the structural determinants of relative bargaining power. On this basis, the course examines both the economic outcomes of collective bargaining and current bargaining trends in a variety of industries. Tentative theoretical analyses of unionism (neoclassical, institutionalist) are compared. The statistical techniques and empirical results of research on the union effect on economic outcomes (wages, prices, inflation, profits, productibility, earnings inequality) are also evaluated. The effect of technology, corporate structures, and public policy on union bargaining power is outlined, and a number of case studies of collective bargaining in the private sector are reviewed. A term paper is required.

ILRCB 783 Seminar in American Labor History
Spring. 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 790 ILR M.P.S. Program
Fall and spring. 1–9 credits. Staff.
Supervised research only for those enrolled in the ILR M.P.S. program.

ILRCB 798 Internship
Fall and spring. 1–3 credits.
Designed to grant credit for individual research under direction of a faculty member by graduate students who have been selected for an internship. All requests for permission to register for ILRCB 798 must be approved by the faculty member who will supervise the project.

ILRCB 799 Directed Studies
Fall and spring. Credit to be arranged.
For individual research conducted under the direction of a member of the faculty.

ILRCB 980 Workshop in Collective Bargaining, Labor Law, and Labor History
Fall and spring. 2 credits. Limited to M.S. and Ph.D. candidates in the department. S-U grades only. Staff.
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.

HUMAN RESOURCE STUDIES

P. Wright., chair; R. Batt, J. Bishop, J. Boudreau, V. Briggs, R. Broderick, M. Cavanaugh, L. Dyer, G. Milkovich, Q. Roberson, W. Wasmuth, T. Welbourne

ILRHR 260 Human Resource Management
Fall. 3 credits. Open only to ILR students; others by permission. M. Cavanaugh and staff.
An introductory overview of the management of human resources in organizations. Topics include human resource decisions dealing with staffing, employee development, work-system rewards, and employee relations. Emphasis is on (a) problem-solving and decision-making approaches; (b) operational methods, technologies, and practices; (c) application of relevant behavioral science theory and research; and (d) legislation and other environmental constraints having an important bearing on the effective utilization of human resources by an enterprise.

ILRHR 266 Personal Computer Basics
Fall, spring, and summer. 2 credits. Limited. Staff.
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), Internet and Lexis Nexis, Windows 95, Microsoft Excel, Access, and Powerpoint. 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, spring. 3 credits. Open to sophomores, juniors, and seniors. J. Bishop, 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 the disadvantaged—are examined. Special policy and programmatic issues pertaining to youth, rural workers, welfare reform, direct job creation, worker relocation, economic development, targeted 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, spring. 2 credits. 7 weeks. 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 organizational circumstances and practices encountered as careers develop. Grade based on short writing assignments and research paper.

ILRHR 363 Leadership Seminar for Fraternities and Sororities
Spring. 2 credits. S-U only. Permission of instructor. Staff.
Provide students with an opportunity to develop their leadership and management skills. The philosophy of the class is that fraternity and sorority houses are small businesses and the leadership must be capable of effective managing and leading in order for them to succeed. The learning method will be "hands on" with participants working on weekly assignments that involve their application of lessons learned to their current job duties. Students will participate in role plays, class discussions, meetings with guest speakers and debriefing sessions where they report the results of their using the material obtained from class in their current situations.

ILRHR 366 Women at Work
Spring. 3 or 4 credits. J. Farley.
Various aspects of female occupational roles in twentieth-century United States. Historical, social, and legal factors that influence women's choice of careers, work socialization and training, and subsequent labor-market experience are considered. Working women's entry-level jobs, opportunities for advancement, and income are compared to men's.

ILRHR 456 International Human Resource Management
Spring. 3 credits. Staff.
Will provide an examination of international human resource management issues in multinational enterprises. The course has two major objectives: to enhance understanding of key strategic and functional issues related to IHRM, and to develop analysis of practical IHRM issues in multinational enterprises. Will include topices such as strategic issues for IHRM, cross-cultural management issues, coordination issues, and expatriate management.

ILRHR 460 Human Resource Strategies for Entrepreneurial Firms
Fall. 4 credits. Open to juniors and seniors. ILR 260 or permission of instructor. T. Welbourne.
This class utilizes a semester-long case study that focuses on human resource issues and strategies for growing, entrepreneurial firms. Students solve weekly dilemmas by integrating their knowledge of the functional areas of human resource management with general management, human resource strategy, entrepreneurship, accounting/finance, marketing, public relations, and small business management. Creative solutions to problems are communicated to the class via role plays, formal presentations, inpromptu meetings, and class discussions. In addition to the semester-long case study, students work in teams to develop their own case of an existing company. The emphasis is on integration of concepts, application to real-life business situations, and acquisition of general management skills and knowledge.

[ILRHR 461 The Design of Work Systems: Comparative and Interdisciplinary Perspectives
Fall or spring. 3 credits. Prerequisite: ILR 260 or equivalent and consent of instructor. Limited to juniors and seniors. Not offered 1999–2000. R. Batt.
Seminar designed to explore the state of knowledge and current research concerning the design and development of alternative work systems. The focus is on understanding alternative approaches to work restructuring and their differential effects on firm competitiveness and employee welfare. The first half of the course considers classic texts on mass production, flexible specialization, sociotechnical systems, diversified quality production, and lean production. It compares these workplace models in their original national contexts and in subsequent transplants. Relevant research from economics, engineering, organizational behavior, human resources, and industrial relations is examined. The second half of the course considers these alternative approaches to restructuring in the context of specific manufacturing and service industries and occupational groups. Students are required to hand in weekly memos covering the readings, actively participate in seminar discussions, and write two research papers on topics relevant to the course.]

ILRHR 462 Staffing, Training, and Development
Spring. 3 credits. Prerequisites: ILRHR 260 or by permission of the instructor. M. Cavanaugh.
Provide overviews of the staffing, training, and development functions within organizations. The first half of the semester will focus on the process by which organizations fill positions. Topics will include legal issues, job/competency analysis and planning, external selection practices, and internal staffing decisions. The second half of the semester will focus on the process by which organizations train and develop employees. Topics will include training needs assessment, program design, training evaluation, and management development practices. Throughout the semester we will examine the relationship between the staffing and training/development functions.

ILRHR 466 Comparative Human Resource Management
Fall. 3 credits. Staff.
Provides a survey of human resource management practices in two key regions: Europe and the Asia-Pacific region. Focus of this course is on HRM issues such as selection and staffing, training and development, and appraisal and reward systems. Special attention is given to HRM trends and developments. Issues of transferability of HRM practices, and implications for multinational enterprises operating in those regions, will also be discussed.

ILRHR 468 Human Resources Management Simulation
Spring. 2 credits. Limited to 30 juniors and seniors. Prerequisite: ILRHR 260 or equivalent. 7 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 will be given to the implications and efforts of strategic human resource managerial and supervisory decisions as measured by ten organizational performance indicators, including quality of work life, employee productivity, customer satisfaction, employee retention, internal control, and the bottom line. Each student will be assigned to a group (team) of five members and must be committed to the work of that group. An individual research paper is also required. Regular attendance is required.

ILRHR 469 Immigration and the American Labor Force
Fall and spring. 3 credits.
V. Briggs.
Assesses the role that immigration policy plays as an instrument 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 commuters, 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 (yearlong course).
3 credits each term.
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILRHR 497–498 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 and spring. 3 credits. Open only to graduate students. Staff.
A survey course covering the major areas of the management of human behavior in work organizations. Consideration is given to such aspects of strategic and human resource planning, design and management of workteams, staffing, training and management development, organization development, compensation, and employee and labor relations. Emphasis is on the application of theory and research to the solution of personnel problems.

ILRHR 564 Human Resources Management in Effective Organizations
4 credits. Offered only in New York City for the MPS Program. Staff.
This course offers the opportunity to become better prepared to make effective decisions about human resources. Successful organizations depend on people, their human resources. The first module examines strategic human resource management and the effects of HR decisions on organization success and fair treatment of people. Another module focuses on alternative systems used to staff and develop people. The third module focuses on compensating and rewarding people. And the final module includes employee relations and alternative work systems. Case and field studies are used throughout the course.

ILRHR 653 Research on Education Reform and Human Resource Policy
Fall and spring. Permission of instructor.
J. Bishop.
A research seminar and tutorial in which students conduct *qualitative* empirical research on a common topic that varies from year to year that can inform education reform efforts or human resource policy. Topics vary from year to year.

ILRHR 656 International Human Resource Management (also NBA 588)
Fall. 3 credits. Prerequisite: ILRHR 260/560. Limited. Seniors or graduate students only or permission of the instructor. Staff.
The focus of the course is on international human resource strategies in multinational firms. It has two major objectives: to enhance the understanding of key functional and strategic issues related to HRM activities in international firms, and to review practical applications of concepts learned from the course in leading U.S. corporations. In the first part of the course, the emphasis is on the theory of international HRM; the second part is focused on field analysis. During the semester, students will conduct TEAM research on state-of-the-art IHRM practices in leading U.S. multinationals. In addition, each student will prepare a review paper on one specific area of IHRM of his or her choice.

ILRHR 661 Applied Personal and Organization Development
Spring. 3 credits. G. Thomas.
An experiential course that deals with OD and its role in the organizational change process. Combines the opportunity for hands-on practice in a workshop setting. Students will have responsibility for researching and writing a paper that examines a specific method, technique, or critical issue; an in-class demonstration/presentation illustrating applications of a chosen subject; and a final project requiring a comprehensive proposal that describes an appropriate and logically supported intervention strategy.

ILRHR 662 People in Agile Organizations
Fall. 4 credits. Prerequisites: ILRHR 260, 560 or equivalent, plus two functional courses in HR management. Enrollment limit, 25. L. Dyer.
Organizational agility is defined as the capacity to be infinitely adaptable without having to change. It is a core competence for organizations operating in rapidly moving marketplaces. Accordingly, an increasing number of organizations are striving to become more agile by inventing new ways of managing all aspects of organizational capability. Course explores the opportunities and challenges posed by organizational agility, with particular emphasis on crafting human resource strategies that support this evolving paradigm. Every effort is made to run the course as an agile organization rather than using a traditional classroom format.

ILRHR 664 HR Online Research and Reporting Skills
Fall. 3 credits. J. Boudreau, S. Basefsky.
Designed to teach students skill-based techniques in HR research methodology. The students will be taught to act as their own consultants in both a classroom and workforce setting as they access data and find statistical information to support their research topics. The first five weeks of the semester will consist of weekly meetings with the reference librarians at the Martin P. Catherwood Library. These meetings will cover a different research technique each week, and students will be given readings and a hands-on assignment to gain practical experience on these techniques.

ILRHR 665 Transforming Human Resource Management: Case Studies
Fall and spring. 4 credits. Limited. Prerequisite: ILRHR 260/560 plus two other courses in human resource studies and permission of instructor. L. Dyer, P. Wright.
As the capstone course in HR Studies, students will integrate the theories and practices learned in other courses. Extensive field work is involved. The field projects are designed to require students to draw upon and integrate their course work in HR planning, staffing, development, compensation and reward, and new work systems.

ILRHR 666 Human Resource Metrics
Fall. 4 credits. Prerequisites: ILRHR 260/560 or equivalent, one course in statistics, one elective in human resource studies. 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 and Diversity
Spring. 4 credits. Prerequisites: ILRHR 260/560 or equivalent and permission of instructor. Q. Roberson.
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. Special emphasis will be placed on fairness in managing members of under-represented groups.

ILRHR 668 Staffing Organizations
Spring. 4 credits. Limited to 25 students. Prerequisites: ILRHR 260/560 or equivalent, one course in statistics. M. Cavanaugh.
This seminar provides an overview of the process by which organizations staff positions from pools of external and internal applicants. Will focus on theories, research, policies, and practices concerning attraction and selection for the most effective utilization of human resources. Topics covered in the course include: staffing strategy and context, measurement of staffing effectiveness, job/competency analysis and human resource planning, recruitment and job choice, initial and substantive external selection practices, and internal staffing decisions. Throughout the course, considerable emphasis will be placed on relevant legislation and court decisions, and practical application of relevant theory and past research.

ILRHR 669 Managing Compensation
Fall and spring. 4 credits. Limited to 30 students. Prerequisites: ILRHR 260/560 or equivalent, ILRHR 266 and basic statistics or permission of instructor. R. Broderick, G. Milkovich.
Focuses on managing employee compensation in contemporary organizations. The major objectives are: to examine the current state of compensation decision making, to examine how recent theoretical and research developments inform compensation decisions, and to offer an opportunity to develop competencies in making compensation decisions.

ILRHR 670 Seminar in Manufacturing
Spring. 15 credits. R. Batt.
Semester in Manufacturing ("SiM") is designed to give students a basic understanding of the fundamentals of manufacturing, as well as a broad overview of current issues and trends. The 15-credit immersion format allows development of the linkage of manufacturing to other functions in the enterprise (Research & Development, marketing, corporate strategy, human resources, etc.) A highlight of SiM is that each student will visit more than 20 manufacturing facilities during the semester, representing diverse sets of products, processes, and manufacturing strategies. These visits include extended discussion sessions with management, and often union representatives, as well as a factory tour. These visits bring the "real-world" perspective to the course. SiM is built around five basic themes. The 15-credit immersion format allows each theme to be discussed in depth, and the interrelationships between themes to be developed over the semester, giving students a broad understanding of how an enterprise functions.

[ILRHR 690 Comparative Human Resource Management
3 credits. Prerequisites: ILRHR 260/560, or permission of instructor. Not offered 1999–2000. Staff.
Surveys human resource practices in two key regions of the world: Western Europe and the Pacific Rim. The focus is on HR 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., unification of Europe, transformation of Japanese firms). Implications for multinationals operating in these countries will also be discussed.]

[ILRHR 691 Human Resource Planning and Strategy
2 credits. Limited. Prerequisites: ILRHR 560 or equivalent, one course in statistics, and permission of instructor. 7 weeks. Not offered 1999–2000. 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 contribution, and employee morale. Much of the course is organized around cases and simulations in which students make policy and program decisions for fictional organizations. Decisions are evaluated on the basis of their contributions to the organizations' human resource and business objectives.]

[ILRHR 692 Training the Displaced and Disadvantaged
3 credits. Prerequisite: permission of instructor. Not offered 1999–2000. J. Bishop.
Examines public and private efforts to lower unemployment and underemployment of displaced and disadvantaged workers. The seminar examines the scope of the problem, its causes, and why specific programs have worked and others have not. Topics covered will include training for displaced workers, rehabilitation of the disabled, job-search training, tax credits for hiring, vocational training, literacy instruction, EEO, public service employment, assisting new business, and industrial policy. The seminar also investigates how the structure of the economy influences the ability of targeted training and job creation to achieve sustained reductions in unemployment and draws lessons from the experience of other societies.]

ILRHR 693 Training and Development in Organizations
Spring. 3 credits. Prerequisites: ILRHR 260/560 or equivalent, one course in statistics or permission of instructor. M. Cavanaugh.
The purpose of this course is to acquaint students with aspects of learning in organizations. We will begin by discussing organizational learning, and then focus more narrowly on specific ways in which learning is achieved through the training and development functions. Topics throughout the semester include: how learning is linked to organizational strategy, how to determine that training is needed, issues regarding the design of training programs, current training techniques, evaluation strategies, and management development practices.

[ILRHR 694 Human Resource Information System Applications
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. Not offered 1999–2000. J. Boudreau.
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 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 increased so little in the past two decades, (3) how education and training contribute to the growth and competitiveness, (4) why educational achievement has declined, and (5) how the responsibility for education and training should be apportioned among individuals, firms, private nonprofit organizations, and government.

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
Spring. 3 credits. J. Bishop.
A comparative study of human resource policies and institutions in Western Europe, North America, Japan, and East Asia (with special emphasis on math and science education) and of the effects of these institutions on productivity, growth, and equality of opportunity. The institutions studied include primary and secondary education, apprenticeship, employer training, and higher education. Data on the consequences of policies is presented and an effort made to understand how human resource policies and institutions have contributed to the rapid growth and low levels of inequality in Europe, Japan, and the Pacific Rim nations. Another focus of the course is understanding the causes of the low levels of achievement of American high school students relative to their counterparts abroad.

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. P. Wright.
A "floating" seminar designed to give faculty and students an opportunity to pursue specific topics in detail, with an emphasis on theory and research. Topics vary from semester to semester. Interested students should consult current course announcements for details.

[ILRHR 765 International Compensation
4 credits. Not offered spring 2000. G. Milkovich.
Seminar focuses on international developments in employee compensation. Will study recent research, theoretical developments and specific organizations' practices in a wide variety of countries. Local national practices will be our principal focus along with expatriates and others. Almost everyone believes they are experts in pay, so we will be drawing upon research and theories from sociology, economics, psychology, etc. Four operative terms are seminar, comparative, compensation, and organization. This is a seminar, so come to each session prepared to be an active player in discussions. Our focus is comparative, including research, theory, and practices of specific enterprises in different countries. Compensation includes all forms of pay including cash, benefits, allowances, and so on. Primary focus is at the organization level of analysis.]

[ILRHR 767 Human Resource Strategies for Entrepreneurial Firms
4 credits. Open to graduate students only. ILRHR 560, equivalent, or permission of instructor. Not offered 1999–2000. T. Welbourne.
For course description, see ILRHR 460.]

ILRHR 769 Topics in International Compensation Theory and Research
Spring. 4 credits. Prerequisite: ILRHR 669. G. Milkovich.
Examines recent developments in theory, research, and practice related to compensation. Discussion emphasizes the relevance of theory and research to compensation decision making. Students examine compensation and reward-related theories and research from supporting disciplines such as economics, psychology, sociology, and organizational behavior and evaluate their relevance to employee, managerial, executive, and international compensation.

ILRHR 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.

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 and spring. 2 credits. Enrollment limited to M.S. and Ph.D. candidates. S-U grades only. Staff.
The workshop is designed to provide a forum for the presentation and critical discussion of current research being undertaken by graduate students, faculty members, and invited guests in the field of 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.

[ILRHR 961 Doctoral Research Seminar in Human Resource Management
Fall. 3 credits. Ph.D. candidates only. Not offered 1999–2000. P. Wright.
This seminar is aimed at reading, understanding, and conducting research in HRM. Students should obtain thorough understanding of the current research in traditional areas of HRM such as validation, job analysis, EEO, selection, performance appraisal, compensation, and training, and should develop the skills necessary to evaluate, criticize, and contribute to the literature on HRM.]

[ILRHR 962 Doctoral Research Seminar in Strategic Human Resource Management
Fall. 3 credits. Ph.D. candidates only. Not offered 1999–2000. P. Wright.
Seminar is aimed at reading, understanding, and conducting research in SHRM. The course should enable students to obtain a thorough understanding of the current research in Strategic HRM, and to develop the skills necessary to evaluate, criticize, and contribute to the literature on SHRM.]

[ILRHR 963 Research Methods in HRM/ Strategic Human Resource Management
Spring. 3 credits. Ph.D. candidates only. Not offered 1999–2000. P. Wright.
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.]

INTERNATIONAL AND COMPARATIVE LABOR

G. Fields, chair; J. Abowd, R. Batt, J. Bishop, F. Blau, G. Boyer, V. Briggs, M. Cook, I. DeVault, L. Kahn, H. Katz, S. Kuruvilla, L. Turner

ILRIC 333 Western Europe, the United States, and Japan in a Changing World Economy
Fall. 3 credits (1 additional credit may be arranged). Open to juniors and seniors. L. Turner.

Offers an introduction to the contrasting national trajectories and current political economies of 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 each society as it grapples with intensifying trade competition, domestic political conflict, and the need for production reorganization and "new industrial relations."

ILRIC 337 Special Topics:
Fall. 3 or 4 credits. 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 339 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 immigration to NAFTA. 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 533 Western Europe, the United States, and Japan in a Changing World Economy
Fall. 4 credits. Graduate students.
L. Turner.
See description for ILRIC 333. Graduate students 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. 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 redemocratization 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 Revitalizing the Labor Movement: A Comparative Perspective
Fall. 4 credits. Graduate seminar open to seniors with permission of instructor only.
L. Turner.
Examines contemporary efforts in advanced industrial democracies to reform industrial relations. The first 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. The second half will cover Britain—the Thatcher reforms of the 1980s and the current labor-backed works council movement; France—the Auroux Laws of the 1980s and their effects; and Germany—the transformation of industrial relations in eastern Germany since 1989.

ILRIC 633 Labor, Industry, and Politics in Germany
Fall. 4 credits. Open to seniors with permission and graduate students.
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 codetermination, 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 635 Labor Markets and Income Distribution in Developing Countries
Spring. 4 credits. Prerequisite: ILRLE 240 or Economics 313 or permission of instructor. Not offered 1999–2000.
G. Fields.
A course analyzing who benefits and how much from economic growth in developing countries and how income distribution would be affected by various public policies. Topics to be covered include: poverty, inequality, social welfare, and economic growth-theory and evidence; poverty profiles, earnings functions, and decompositions; employment, unemployment, wages, and labor markets; and an introduction to benefit-cost analysis, with application to the economics of education.]

ILRIC 636 Comparative History of Women and Work (also Womens Studies 636)
Fall. 4 credits. Permission of instructor.
I. DeVault.
Will explore the similarities and differences between different cultures' assumptions about the work of women as well as women's experiences in varying work circumstances throughout history. Beginning with theoretical pieces and overviews of the history of women and work, most of the course will consist of in-depth examinations of specific work situations or occupations across time and geography. Comparative examples will be taken from the United States, Europe, and the Third World.

ILRIC 637 Labor Relations in Asia
Fall. 3 credits. Permission of instructor required. S. Kuruvilla.
A comparative survey of the industrial relations systems of selected Asian nations such as Japan, S. Korea, Thailand, Malaysia, Singapore, Hong Kong, China, and several others. The emphasis is on economic development strategies and industrial relations policies in these countries. Industrial relations practices, the extent of union organization, and labor force demographics of these countries will be examined. The primary objective is to provide students with an introduction to industrial relations systems in Asia. The countries chosen are representative, but not exhaustive.

[ILRIC 638 Labor, Free Trade, and Economic Integration in the Americas (also Government 630)
Spring. 3 credits. Limited. Open to seniors and graduate students; juniors by permission. Not offered 1999–2000.
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 (Mercosur), Central America, and 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.
G. Fields.
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 739 The Political Economy of Mexico
Spring. 3 credits. M. Cook.
For course description, see ILRIC 339.

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.

Other courses approved to fulfill ILRIC distribution

ILRCB 304 Latin American Labor History
Fall. J. Cowie.
For description, see the section, Collective Bargaining, Labor Law, and Labor History.

ILRHR 456 International Human Resource Management
Spring. Staff.
For description, see the section, Human Resource Studies.

ILRHR 461 The Design of Work Systems: Comparative and Interdisciplinary Perspectives
Fall or spring. R. Batt.
For description, see the section, Human Resource Studies.

ILRHR 466 Comparative Human Resource Management
Fall. Staff.
For description, see the section, Human Resource Studies.

ILRHR 469 Immigration and the American Labor Force
Fall and spring. V. Briggs.
For description, see the section, Human Resource Studies.

ILRHR 656 International Human Resource Management
Spring. V. Pucik.
For description, see the section, Human Resource Studies.

ILRHR 690 Comparative Human Resource Management
Fall. Staff.
For description, see the section, Human Resource Studies.

ILRHR 698 International Human Resource Policies and Institutions
Spring. J. Bishop.
For description, see the section, Human Resource Studies.

ILRLE 444 The Evolution of Social Policy in Britain and America
Spring. G. Boyer.
For description, see the section, Labor Economics.

ILRLE 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.

ILRLE 640 Economic History of British Labor 1750–1940
Fall. G. Boyer.
For description, see the section, Labor Economics.

ILROB 628 Cross-Cultural Studies in Organizaitonal Behavior
Spring. Staff.

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 small, randomly assigned groups of students. The course includes a plant visit and several meetings early in the semester designed to introduce issues encountered in studying the employment relationship.

ILRID 451 Science, Technology, and the American Economy
Spring. 4 credits. V. Briggs.
The industrial revolution did not begin in the United States, but the nation became the world's first technological society. Attention will be given to the evolutionary confluence of science, technology, mathematics, religion, 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 the employment impact of the computer, research and development policy, national defense influences, the "agricultural revolution," savings and investment rates, labor force preparedness) will be explored. Critical concerns pertaining to environmental impacts, income polarization, and consumerism will also be examined.

ILRID 452 Writing in Industrial and Labor Relations
Fall or spring. 3 credits. J. Farley.
Will require close reading of four or five 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.

ILRID 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.

LABOR ECONOMICS

L. Kahn, chair; J. Abowd, F. Blau, G. Boyer, R. Ehrenberg, G. Fields, R. Hutchens, G. Jakubson, R. Smith

ILRLE 140 Development of Economic Institutions
Fall. 3 credits. Prerequisite for non-ILR students: permission of instructor. G. Boyer.
Provides students with an understanding of the historical roots of the economic system currently dominant in Western Europe and the United States. The course will focus on (a) the process of European economic growth prior to 1914, (b) the effect of industrialization on labor in Great Britain, and (c) the historical evolution of economic thought from Adam Smith to J. M. Keynes.

ILRLE 240 Economics of Wages and Employment (also Economics 341)
Fall and spring. 3 credits. Prerequisites: Economics 101–102, Economics 313, or permission of instructor.
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 private 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 (also Econ 451)
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 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 348 The Economics of Unemployment (also Econ 453)
Fall. 4 credits. Prerequisite: ILRLE 240/540 or permission of instructor.
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 Special Topics in Labor Economics
Fall or spring. 4 credits.
An undergraduate seminar whose topic changes depending on semester and instructor.

ILRLE 441 Income Distribution (also Econ 455)
Fall. 4 credits. Prerequisite: ILRLE 240 or Economics 341. R. Hutchens.
Explores income distribution in the United States and the world. Topics to be covered include functional and size distributions of income, wage structure, income-generating functions and theories, discrimination, poverty, public policy and income distribution, and changing income distribution and growth. Students who have taken CEH 355 may not receive credit for 441.

ILRLE 442 The Economics of Employee Benefits (also Econ 456)
Fall. 4 credits. Prerequisites: ILR 240 or equivalent. F. Blau.
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 compensation provided as a service or contingent financial package to employees. Detailed international comparisons of health care and retirement systems are included.

ILRLE 444 Modern European Economic History
Spring. 4 credits. Prerequisite: ILRLE 240 or equivalent. G. Boyer.
An introduction to the economic development of Europe from 1500 to 1939. Topics covered include: the establishment of an institutional framework supporting economic growth in early modern Europe; the causes of the first industrial revolution in Great Britain; the effects of industrialization on workers' living standards; the spread of industrialization to the major continental powers—France, Germany, Austria-Hungary, and Russia; and the economic causes and effects of the First World War.

ILRLE 445 Women in the Economy (also Econ 457 also WOMNS 446)
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 446 Economic History of British Labor 1750–1940 (also Econ 459)
Fall or spring. 4 credits. G. Boyer.
Will examine various aspects of British labor history from the beginning of the Industrial Revolution until World War II. Specific topics will include: (1) monetary and non-monetary changes in workers' living standards; (2)

internal migration and emigration; (3) the London labor market; (4) the extent of poverty and the evolution of the welfare state; (5) Luddism and Chartism; and (6) the development of trade unions.

ILRLE 448 Topics in Twentieth Century Economic History: The Economics of Depression and the Rise of the Managed Economy (also Econ 458)
Spring. 4 credits. Prerequisites: ILRLE 240 or Economics 314. G. Boyer.
Topics covered include: the causes of the Great Depression in the United States; the economics of the New Deal; the causes of high unemployment in interwar Great Britain; the rise of Keynesian economics and the development of demand management policies in Great Britain and the United States after 1945.

ILRLE 495 Honors Program
Fall and spring (yearlong course). 3 credits each term.
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILRLE 497–498 Internship
Fall and spring. 3 and 6 credits.
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILRLE 499 Directed Studies
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILRLE 540 Labor Economics
Fall. 3 credits. Prerequisites: Economics 101–102 or Economics 103 or equivalent. Required of graduate students majoring or minoring 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 private 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 544 Labor Market and Personnel Economics
4 credits. Offered only in New York City for the MPS Program. Staff.
A four-module course, in which the first module covers the basic elements of supply and demand in the labor market, the second and third modules cover the "new personnel economics" (emphasizing economic issues within a firm that relate to selecting, training, assigning, motivating and compensating workers), and the final module covers key institutions and economic security issues (including unemployment, pensions, disability, discrimination, and unions). The goals of this course are to have students learn to analyze both business and public policy problems, taking into account both basic principles of economic theory and the relevant institutional environments.

ILRLE 642 Economic Analysis of the Welfare State (also Econ 460)
Spring. 4 credits. R. Hutchens.
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 644 The Economics of Occupational Safety and Health (also Econ 461)
Spring. 3 credits.
Analyzes the problem of occupational injuries and illnesses in the United States. The first section concentrates on legal requirements, judicial interpretations, and legal implications of the Occupational Safety and Health Act, then shifts to such questions as the need for, and appropriate goals of, the act; the stringency of safety standards considered in a benefit-cost framework; the difficulties in enforcing the act; and estimates of the impact of the act.

ILRLE 647 Evaluation of Social Programs
Fall. 4 credits.
An introduction to the methodologies used by economists to evaluate the impacts of social-action programs and legislation. General evaluation methodology, cost-benefit analysis, and econometrics are discussed. Case studies are considered to illustrate the uses of these techniques, to acquaint the student with major current government programs and legislation, and to estimate these programs' economic impacts. Throughout, the primary analytic framework used by the instructor is microeconomics.

ILRLE 648 Economic Analysis of the University (also Econ 342)
Spring. 4 credits.
Seeks to illustrate the complexity of decision making in a nonprofit organization and to show how microeconomic analysis in general, and labor market analysis in particular, can be usefully applied to analyze resource allocation decisions at universities. Among the topics covered are financial aid, tuition, admissions policies, endowment policies, faculty salary determination, the tenure system, mandatory retirement policies, merit pay, affirmative action, comparable worth, collective bargaining, resource allocation across and within departments, undergraduate versus graduate education, research costs, libraries, athletics, and "socially responsible" policies. Lectures and discussions of the extensive readings will be supplemented by presentations by Cornell administrators and outside speakers who have been engaged in university resource allocation decisions or have done research on the subject.

ILRLE 741 Applied Econometrics I
Fall. 4 credits.
Considers methods for the analysis of longitudinal data, that is, data in which a set of individual units are followed over time. The focus will be on both estimation and specification testing of these models. Will consider how these statistical models are linked to underlying theories in the social sciences. Course coverage will include panel data methods (including fixed vs. random effects models for both linear and non-linear systems) and, if time permits, duration analysis.

ILRLE 742 Applied Econometrics II
Spring. 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 744 Seminar in Labor Economics I (also Econ 641)
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 745 Seminar in Labor Economics II (also Econ 642)
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 746 Seminar in Labor Economics III (also Econ 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 Economics of Employee Benefits
Fall. 4 credits.
Students in this course attend the lectures in ILRLE 442 (see description for 442) but have 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 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

P. Tolbert, chair; S. Bacharach, L. Gruenfeld, T. Hammer, E. Lawler, M. Loundsbury, W. Sonnenstuhl, B. Smith, R. Stern, L. Williams

ILROB 170 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.

ILROB 171 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 central focus of the course is the study of industrial organizations and of complex organizations in general, emphasizing authority relations, goals, the division of labor, bureaucracy, and organizational design.

ILROB 320 The Psychology of Industrial Engineering
Fall. 4 credits. T. Hammer.
A study of the human factors in the industrial engineering of work, workplaces, tools, and machinery. The course examines the aspects of individual and social psychology that operate in the work setting and that should be taken into account in the design of jobs. These include limitations of the human sensory system; individual difference in skills, abilities, motives, and needs; group dynamics; intrinsic motivation; job satisfaction; conflict.

ILROB 321 Group Solidarity (also SOC 311)
4 credits. M. Macy.
What is the most important group that you belong to? What makes it important? What holds the group together, and how might it fall apart? How does the group recruit new members? Select readers? Make and enforce rules? Do some members end up doing most of the work while others get a free ride? We will explore these questions from an interdisciplinary perspective, drawing on sociobiology, economics, and social psychology, as we apply alternative theories of group solidarity to a series of case studies, such as urban gangs, spiritual communes, the civil rights movement, pro-life activists, athletic teams, work groups, and college fraternities.

ILROB 322 Work and Organization
3 credits. M. Lounsbury.
Will theoretically examine the concept of work and track how the nature of work and the operations of organizations are changing, highlighting the complex linkages between economic activity, social change and individual experience. Course includes a service-learning requirement that is designed to involve students in projects at local governmental or community organizations. This field based activity will also enable students to complement theoretical perspectives learned in class with a more grounded, experiential understanding of the relationship between work and organization.

ILROB 324 Gender and Work (also SOC 314/514 and Womns 314/514)
Spring. 4 credits. M. Brinton.
The purpose of this course is to familiarize students with the field of gender stratification. The first part of the course will examine long-term changes in women's labor force participation and the division of labor between the sexes as societies industrialize. We consider theoretical work as well as empirical case studies of a number of countries ranging from Taiwan to Ireland. The second part of the course focuses on gender and work in highly industrialized societies, and includes empirical studies of the gendered division of labor in households and the labor market of the United States in particular. The structure of the course is lecture one day per week and detailed discussion and critique of selected readings on the second day. Students take a mid-term exam and prepare a research proposal on some aspect of gender and work. During the last two weeks of the course, students present synopses of their research proposals and we discuss and constructively critique them.

ILROB 325 Organizations and Social Inequality (also SOC 322)
Spring. 3 credits. Removed from ILR writing intensive list. 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 329 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 ceremonials as a cultural form in organizational life that consolidates many of these expressive forms into one. The course will examine types of ceremonial behavior such as rites of passage, rites of enhancement, and rites of degradation, including the role of language gestures, physical settings, and artifacts in ceremonial behavior. The presence of subcultures and countercultures in organizational behavior will also receive attention, especially the part played by occupational subcultures in formal organizations.

ILROB 370 The Study of Work Motivation
Fall. 4 credits. Open to juniors and seniors. T. Hammer.
Designed to acquaint the student with the basic concepts and theories of human motivation with implications for job design and organizational effectiveness. Focus is on theories of worker motivation and on research approaches and results as these apply to the performance of individuals and groups in formal organizations. Readings are predominantly from the field of organizational psychology, supplemented by relevant contributions from experimental and social psychology. Each student will design, execute, and analyze a research study of his or her own.

ILROB 371 Individual Differences and Organizational Behavior
Fall or summer. 4 credits. Recommended: some acquaintance with the substance and methods of behavioral or social science. L. Gruenfeld.
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 is studied through readings and participation in simulation games. Simulations model traditional organizations and cooperatives. Games model executive decision making, running a company, assembly work, and cooperative decision making. Organizational design, decision making, conflict, cooperation, and power are the central topics of discussion. The contrasting bases of power in the organizations permits the study of the assumptions underlying organization structure and process.

ILROB 420 Contemporary Organizational Behavior Applications

Fall or spring. 3 credits. Prerequisites: ILR 170 and 171 (120 and 121).

Introduces students to contemporary applications of organizational behavior theory in work organizations. Will explore the frameworks of common and current organizational and managerial change interventions, review contemporary literature about them, and try to discover existing links between these processes and the theoretical OB literature. Specific topics will vary from year to year. For this year, applications include TQM, re-engineering, team development, learning organizations, world-class manufacturing, competing values frameworks, assessment instruments, and multiculturalism and diversity issues in the workplace.

ILROB 421 Regulating the Corporation

Spring. 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 citizen organizations. Research and case materials focus on the implementation of environmental protection, occupational health and safety, equal opportunity, antitrust, securities, and consumer regulations.

ILROB 422 Organizations and Deviance

Fall. 3 credits. Enrollment limited to 60. 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 became institutionalized, and the processes by which they become defined as deviant organizational actions. Within this context, the course will examine such contemporary cases as Exxon's Valdez oil spill, Iran–Contragate, drug testing, and the federal savings and loan scandal. These events raise troubling questions about what it means to live and work within an organizational society, and they cannot be dismissed as instances of a few individuals gone bad.

ILROB 425 Sociology of Industrial Conflict

Spring. 4 credits. R. Stern.

The course focuses on the social, economic, and political causes of industrial conflict. The nature of work and the employment relationship provide the foundation for understanding both individual and collective expressions of conflict in work settings. Worker background, psychological contracts and authority relations set the stage for studying conflict expressions including strikes, labor turnover, absenteeism, sabotage, accidents, grievance filing, violence and other forms of conflict at work.

ILROB 427 The Professions: Organization and Control

Fall. 3 credits. Prerequisite: permission of the instructor. P. Tolbert.

Focuses on the sources of power and control exercised by professional groups in contemporary society. A number of issues will be examined in this context including: the role of professions in society, processes through which an occupational group becomes defined as a profession, sources of control that professional associations have over their members, relations between professionals and nonprofessionals in organizations, and the relationship between unionization and professionalization of occupations.

ILROB 428 Organizational Change and Intervention

Fall. 3 credits. Limited to 25. Juniors and seniors with permission of instructor. L. Williams.

Seminar will focus on planned and unplanned change in organizations. Topics will include mergers and acquisitions, team building, self management and the role of change agents. Participants will be required to develop and present topics in addition to keeping a weekly journal and participating in exercises.

ILROB 429 Organizational Politics and Institutional Change

Spring. 2 credits. 7 weeks. Limited 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 472 Applied Organizational Behavior

Fall. 3 credits. Prerequisites: ILROB 170 and 171. S. Bacharach.

Introduces students to intermediate theory of organizational behavior. It will specifically concentrate on teaching students to use organizational theories for analytical and applied purposes. Among the issues to be addressed are organizational structure, work processes, organizational politics, organizational design, job design, incentive systems, and quality-of-work-life programs.

ILROB 474 Personality and Organizational Behavior Only

3 credits. Prerequisite: ILROB 170 or permission of instructor. B. Smith.

Will provide an overview of theoretically grounded perspectives on personality assessment. While this is not a class in personality theory, various theories will be discussed. Will cover the historical rise, fall, and rebirth of personality theory. In addition, the course will examine the use of personality theory to understand both the behavior of people in organizations and the "behavior of organizations". Students will be offered the opportunity to participate in a series of personality assessments designed for individual development. These assessments will be used throughout the course as an aid to understanding the relationship between personality and behavior within the world of work.

ILROB 479 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.

Examines how industrial R&D is organized and seeks to impart an appreciation for the practical problems that arise when firms employ a significant number of scientists, engineers, and other technical workers. It is designed for students who have an interest in high-technology firms or who anticipate working for firms in which R&D plays an important role. The course brings relevant theoretical perspectives to bear on pragmatic issues surrounding technical innovation and the employment of scientists and engineers. Representative topics include: the organization of scientific and technical communities, the industrialization of research, the nature of scientific and technical work, strategies for fostering innovation, the careers of scientists and engineers, and the managerial problems characteristic of high-technology firms. Requirements include a take-home midterm and a final paper.

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 Organizational Behavior and Analysis

Fall or spring. 3 credits. Staff.

Survey of concepts, theories, and research from the fields of organizational and social psychology as these relate to the behavior of individuals and groups in organizations. Job attitudes, motivation, performance, leadership and power, group formation, perception, and organizational climate. A preliminary course for advanced work in organizational behavior.

ILROB 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.
Examines the dynamics of individual, structural, and environmental factors operating in organizational change in general, and in the implementation and use of innovations within formal organizations in particular. The role of evaluative research in assessing the effectiveness of the implementation of innovations and in determining organizational effectiveness are analyzed. Several case studies of organizational change in government, unions, and private industry are examined. The emphasis is on conceptual frameworks for analyzing organizational change and mounting evaluative research on innovations. Readings are interdisciplinary and include sociology, psychology, and political science.

ILROB 621 Organizational Diagnosis Intervention and Development
Spring. 4 credits. Prerequisites: undergraduates, ILROB 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 Sociology Of Markets
3 credits. M. Lounsbury.
Since World War II, the diffusion of "markets" in Asia, Eastern Europe and Latin America as well as changes in the structure of Western economies has reinvigorated questions about how markets are socially structured. Drawing on the literature in economic sociology, this course explores the social, cultural, economic and political factors that shape the emergence and dynamics of markets. Among the issues to be addressed are: the social organization of markets, market discrimination, the cooperative aspects of market formation and functioning, the role of government and other institutional arrangements, the relationship of economic change to broader social forces such as social movements, and the shift towards globally market-oriented economies.

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-Macchiavellain, Marxian, 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 in change. 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 requirements 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 conflict resolution. Examines how power relations and power processes affect tactics in bargaining and also when power relations inhibit or promote conflict resolution. "Power" is viewed in the course 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 the motivation to both lead and follow will be discussed. The implications for leadership training, organization development, and action research are explored.

ILROB 628 Cross-Cultural Studies in Organizational Behavior
Spring. 3 credits. Limited. Permission of instructor before registering in course. L. Gruenfeld.
Designed for students interested in social psychological theory and research in international culture comparisons of behavior and experience in organizations. Variables such as power distance, individualism-collectivism, universalism-particularism and attitudes toward authority as well as work motivation will be examined. Upon completion of the readings and discussion of conceptual materials and consideration of several major international comparison studies, each student will prepare and present a paper on a topic of his/her own choice usually related to his/her country of origin (China, Japan, German, USA, etc.).

ILROB 629 Personality in Organization
Fall. 4 credits. Open to undergraduates with permission of instructor. L. Gruenfeld.
This advanced course considers psychodynamic theories of organizational diagnosis at the individual and group levels. Topics include leadership, power, authority, work motivation, intervention, and change. The topics are discussed and applied in small study groups. The professor's role is as a consultant and resource person. Class members study and research their own behavior and present their qualitative and quantitative findings to the class. Students are expected to have background and interest in both research methods and theory.

ILROB 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) organization, management, 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. A course in statistics or research methods would be helpful.
Increasing attention has been devoted to the idea that social structures can be fruitfully investigated as social networks. In particular, organizational and inter-organizational structures may be analyzed as patterned relationships among individuals, groups, and even other organizations. Such networks appear to be strong predictors of a variety of social dynamics including attitude similarity, the diffusion of innovation, turnover, and the allocation of organizational resources. A variety of methods for collecting and analyzing network data including: graph theory, sociometry, clique detection, centrality analysis, blockmodeling, and the quadratic assignment procedures will be used. In addition to reading recent published research, this course will involve work with actual data sets and relevant computer programs.

ILROB 674 The Social Psychology of Behavior and Experience in Organizations
Fall. 3 credits. Prerequisite: ILROB 170 and 171 or ILROB 520. L. Gruenfeld.
Considers theories that seek to explain behavior at the individual, group, and organizational level. Work motivation, leadership, and the member composition and dynamics of groups will be discussed. Harmony, conflict and other aspects of the relationships among groups in the organization will be evaluated.

ILROB 675 Cooperative Strategies for Improving Organizational Performance
Spring. 4 credits.
Will concentrate on presentation and analysis of a series of case studies involving projects using cooperative strategies to improve organizational performance. Emphasis will be

given to cases in which union and management have been working together to enhance productivity and the quality of working life. Cases will be examined against a background of research literature on improving organizational performance. Students will be responsible for a term paper.

ILROB 676 Systems of Labor Participation in Management
Fall. 4 credits. Prerequisites: senior standing and permission of instructor.
Examines the theory and practice of worker participation in systems ranging from informal shop-level participation to self-management. Special emphasis is placed on socio-technical systems of job design and work restructuring that give workers control over the labor process. Attention is also given to legislated programs of participation (codetermination) and to participation in employee-owned firms.

ILROB 679 Methods of Observation and Analysis of Behavior Attitudes and Values in Work Groups and Organizations
Fall or spring. 4 credits. Permission of instructor required.
Considers qualitative and psychometrically precise and systematic research methods for the study of behavior in groups and organizations. Includes a workshop that is designed to improve teamwork with the use of on-line 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 programs, 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—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.
Examines the historical development of psychological theories of organizational behavior 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.
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 set of quantitative and qualitative research tools.

ILROB 724 Behavioral Research Theory, Strategy, and Methods II
Spring. 3 credits. Designed to meet the needs of M.S. and Ph.D. candidates majoring in organizational behavior, but other graduate students may enroll.
Course will cover (a) analysis and interpretation of quantitative data, (b) traditional problems encountered in the assessment of human and organizational characteristics, (c) the use of different methods of data analysis, and (d) an examination of the limitations imposed on data analysis and interpretation by traditional measures. Examples of topics covered in the course: the use of Chi-square, t-tests, ANOVA, simple and multiple correlation and regression, reliability and validity analyses, causal models, factor analysis, scale construction.

ILROB 725 Analysis of Published Research in Organizational Behavior (also SOC 725)
Fall. 3 credits. Prerequisites: ILROB 520 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 permission of instructor.
An advanced proseminar that seeks to develop an interdisciplinary perspective on selected topics in organizational behavior. The topics themselves will change from year to year depending on participants' interests. Course is designed to allow students and the instructor to jointly pursue significant scholarly inquiry into one or more arenas of organizational theory. Emphasis will be placed on exploring the relevance of tradition in related disciplines (anthropology, linguistics, philosophy, sociology, etc.) that may enrich our understanding of organizational life.

ILROB 727 Work and Industrial Conflict
Spring, weeks 7–14. 2 credits.
A concentrated examination of the sociology of industrial conflict. The seminar focuses on classic formulations of conflict theory in sociology, then the social, political, economic causes of industrial conflict. Both individual and collective forms of conflict expression are examined. Some discussion of the implications of various types of worker management of firms for industrial conflict will be included.

ILROB 728 Theories of Motivation and Leadership
Spring. 2 or 4 credits. Prerequisites: ILROB 520.
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 for 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 anthropology perspective, focusing on ideologies as the main ingredient of cultures but emphasizing the role of cultural forms, e.g., myths, stories, sagas, language, rites and ceremonials, and physical settings of meaning. It pays special attention to the place of subcultures and countercultures in the makeup of administrative culture and to occupations as a major source of subcultures. The role of the environment in which organizations are embedded, and its influence on workplace cultures, is also included. Forms of cultural leadership and approaches to reading and changing cultures are also considered.

ILROB 771 Social Science and Social Scientists
3 credits. Grad only. Letter grade only.
L. Williams.
This seven-week course offers a philosophy of science look at social science methods. Discussions will include a comparison of conventional and radical views of theory construction, and the strengths and weaknesses of approaches such as interviewing, surveys, policy capture, laboratory experiments, secondary data analysis, action research and ethnomethodology. Readings will include: *Mismeasurement of Man* (Gould); *Conduct of Inquiry* (Kaplan); *Against Method* (Feuerband); *Servants of Power* (Baritz); and *Encounter with an Interviewer* (Twain).

ILROB 772 The Social Construction Of Economic Life
3 credits. M. Lounsbury.
Drawing on the literature in economic sociology, this course emphasizes how "economic" activities are constituted and shaped by the social, cultural and historical contexts within which they are situated. This course will focus on surveying various empirical and theoretical approaches used to study the genesis and influence of broader scale organizational and institutional arrangements and provide students with an opportunity to formulate and refine their own research questions and perspectives.

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 776 Organizational Implications of World Class Manufacturing
Fall. 4 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) is 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. 3 credits. Not offered 1999–2000. 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.

SOCIAL STATISTICS

A. Hadi, Chair; J. Angellotti, J. Bunge, T. DiCiccio, P. Velleman, M. Wells

ILRST 210 Statistical Reasoning I
Fall, spring and summer 1999–2000. 3 credits. Attendance at weekly discussion section is required. J. Angellotti, P. Velleman.
An introduction to the basic concepts of statistics and data analysis. Descriptive methods, normal theory 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 single population mean and proportion, the difference in two population means and porportions, 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, spring and summer 1999–2000. 3 credits. Prerequisite: ILRST 210 or suitable introductory statistics course. J. Bunge, T. DiCiccio, A. Hadi.
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; logistic regression; and analysis of variance. Computer packages are used throughout the course.

ILRST 310 Statistical Sampling
Spring. 3 credits. Prerequisite: two terms of statistics. J. Bunge.
Theory and application of statistical sampling, especially in regard to sample design, cost, estimation of population quantities, and error estimation. Assessment of nonsampling errors. Discussion of applications to social and biological sciences and to business problems. Course includes an applied project.

ILRST 311 Practical Matrix Algebra
Fall. 3 credits. J. Bunge.
Matrix algebra is a necessary tool for statistics courses such as regression and 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
Fall. 3 credits. Prerequisite: ILRST 211 or equivalent courses. T. DiCiccio.
Matrix algebra necessary to analyze regression models is reviewed. 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.

[ILRST 313 Design and Analysis of Experiments
3 credits. Prerequisite: ILRST 211 or equivalent. Not offered 1999–2000.
The statistical design and analysis of comparative experiments including completely randomized, factorials, randomized block, latin squares, and split-unit designs including crossover and repeated measures. Application of statistical design to research problems. Analyses to compare treatment groups including ANOVA, ANCOVA, contrasts and multiple comparison procedures. Computer packages are used.]

[ILRST 314 Graphical Methods for Data Analysis
3 credits. Prerequisite: ILRST 211 or equivalent. Not offered 1999–2000.
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
Spring. 3 credits. Prerequisite: ILRST 312 or equivalent.
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
3 credits. Prerequisite: two statistics courses or permission of instructor. Not offered 1999–2000. M. Wells.
An advanced undergraduate and beginning graduate course. Includes treatment of association between qualitative variates, contingency tables; log-linear models; binary ordinal, and multinomial regression models; limit dependent variables.]

ILRST 499 Directed Studies
For description, see the section, Collective Bargaining, Labor Law, and Labor History.

ILRST 510 Statistical Methods for the Social Sciences I
Fall, spring and summer 1999–2000.
3 credits. J. Angellotti, P. Velleman.
A first course in statistics for graduate students in the social sciences. Descriptive statistics, probability and sampling distributions, estimation, hypothesis testing, simple linear regression and correlation. Students are instructed on the use of a statistics computer package at the beginning of the term and use it for weekly assignments.

ILRST 511 Statistical Methods for the Social Sciences II
Fall, spring and summer. 3 credits. Prerequisite: ILRST 510 or equivalent introductory statistics course. A. Hadi, P. Velleman.
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. 3 credits. Prerequisite: two statistics courses or permission of instructor. P. Velleman.
An advanced survey of modern data analysis methods. Topics include exploratory data analysis, data re-expression, 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
3 credits. Prerequisites: linear algebra, knowledge of a programming language, and statistics at least through multiple regression. Not offered 1999–2000.
A survey of new aspects of statistical computing. Topics 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 advances. Students may be asked to write programs in a programming language of their choice.]

ILRST 612 Data Mining
Spring. 3 credits. Prerequisite: three coursee in statistcs including multiple regression, computer experience (preferably cross platform), and matrix algebra (may be taken concurrently). J. Bunge.
Data mining is the fastest-growing business application of statistics. The term typically refers to a suite of methods used to estimate or predict a response (e.g., probability that a customer will buy a new product), based on a large set of predictors (5,000 independent variables is not large). Methods include logistic regression, decision trees (CART, CHAID), neural nets, and discriminant analysis; diagnostics and outlier detection are also important. We will use the new SAS software package Enterprise Miner, which gives a point-and-click interface for data cleaning, exploration and analysis via several methods, and we will also use the IBM competitor Intelligent Miner. I will draw on my consulting experience in industry and will hopefully obtain real (sanitized) datasets for us to work on. For more information e-mail John Bunge at jab18@cornell.edu; see also http://www.cornell.edu/Academic/RSF9/RSF9ILRST.html.

[ILRST 613 Bayesian and Conditional Inference
3 credits. Prerequisites: graduate level courses equivalent to OR&IE 670 and OR&IE 651 or permission of instructor. Not offered 1999–2000. M. Wells.
Covers the following topics: loss functions and utility theory, prior information and subjective probability, coherency, basic Bayesian inference, empirical Bayesian inference, robust Bayesian inference, Bayesian computations, ancilliarity, conditional properties of statistical procedures, and Barndorff-Nielsen's exact likelihood theory.]

[ILRST 614 Structural Equations with Latent Variables
3 credits. Prerequisites: ILRST 210, 211 or ILRST 510, 511 or equivalent. Not offered 1999–2000. M. Wells.
Provides a comprehensive introduction to the general structural equation system, commonly known as the "LISREL 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
3 credits. S-U only. Prerequisite: OR&IE 560 or an equivalent course in probability and statistics. Not offered 1999–2000.
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, probability-based expert systems, 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 Robust Regression Diagnostics
3 credits. S-U or letter grade. Prerequisite: ILRST 312 or equivalent or permission of instructor. Not offered in 1999–2000.
Regression models are simplifications of reality; we rarely expect the model to be exactly true. In many applications of regression, however, small changes in a model, a model assumption, or a data point can have very large effects on the results. Regression analysis is viewed in this course as a cyclical process, which takes inputs and produces outputs in an interactive or cyclical way; a way in which the outputs can be used to diagnose, validate, criticize, and possibly alter the inputs. This is an attempt to narrow the gap between the theory and practice of regression analysis. We discuss classical methods as well as a recently developed general framework for assessing the sensitivity of the outputs to small changes in the input. Students are expected to be able to perform through analyses of real-life data using computer packages. Topics to be discussed include: role of variables in a regression equation, regression outliers and influential observations, robuts regression, alternatives to least squares (e.g., LMS, LAV, IRLS) error-in-variables models, and generalized linear models.]

ILRST 712 Theory of Sampling
Fall. 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
3 credits. Prerequisite: a course at the technical level of Math 572 and 574 or permission of instructor. Not offered 1999–2000.
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
3 credits. Prerequisite: courses equivalent to OR&IE 651 or Math 571, and STATS 409 or OR&IE 670. Not offered 1999–2000.
Recent research has revealed vast territories of distribution theory that are unfamiliar to most statisticians. Provides an introduction to three topics underlining this "modern" theory: infinite divisibility, decomposability, and stability; characterization of distributions; extensions of univariate distributions to multivariate distributions.]

[ILRST 715 Likelihood Inference
3 credits. Prerequisite: graduate courses equivalent to OR&IE 670 and OR&IE 670. Not offered in 1999–2000.
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
2 credits. Prerequisites: limited to graduate students. S-U only. Not offered 1999–2000.
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 717 The Analysis of Discrete Data
Spring. 3 credits. Prerequisites: graduate courses equivalent to OR&IE 670 or permission of instructor. T. DiCiccio.
This course concerns statistical models and methods for analyzing categorical data. The key models to be covered are log-linear models for contingency tables and logistic regression models for binary-response and multinomial data. Asymptotic distribution theory necessary for inference in these models will be emphasized. Other topics include conditional inference and connections with generalized linear models. Computer packages will be used for analyses in practical examples.

ILRST 799 Directed Studies
For description, see the section, Collective Bargaining, Labor Law, and Labor History.

ILR EXTENSION

Statewide

The following courses are open to participants in the Extension Division's statewide credit programs in labor studies and management studies. Extension offices are based in Buffalo, Albany, Rochester, Ithaca, New York City, and Long Island. These courses are not open to undergraduate or graduate students matriculated in the Ithaca ILR programs. Courses and course credits earned in Extension Division certificate programs are not automatically accepted as transfer credits or as a basis of admission to the resident ILR undergraduate and graduate programs in Ithaca. Student applications for course transfer are evaluated by the ILR school on an individual basis.

204 Managing Conflict
Fall or spring. 3 credits.
The purpose of this course is to provide students with opportunities to apply conflict resolution theory to specific situations, based on real-life problems that require resolution. Students will examine situations, analyze the facts and perceptions driving the actors, and engage in applying communication, negotiation, and mediation techniques to reduce or eliminate the conflict.

205 Oral Skills for Conflict Management
Fall or spring. 3 credits.
This course emphasizes developing the oral communications skills required to successfully manage conflict both as a party to a dispute, and as a third party who is charged with helping to resolve a dispute. The course presents simulations to help the participants practice their skills.

206 The Nature of Conflict
Fall or spring. 3 credits.
The purpose of the course is to provide students with the conceptual foundation to engage in further study of conflict management and conflict resolution. Having taken the course, the students will 1) be able to identify and describe types of conflict; 2) be able to identify the various sources of conflict; 3) be able to apply a conceptual model of conflict to interpersonal, organizational, and international conflict situations; 4) be able to describe conflict situations in terms of social psychological aspects utilizing a "person perception" or "attribution" theoretical orientation; 5) be able to identify their personal response styles to conflict.

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 resolutions techniques frequently found in this sector. Special emphasis will be given to developing an understanding of the similarities and differences between public and private sector bargaining and how they have affected tactics and strategies employed by the parties.

243 Growth of American Business and Management History
Fall or spring. 3 credits.
The growth and cycles of American business enterprise produced significant changes in education, government, work, the family, the ethnic composition of the population, and the landscape. As business and industry expanded, new methods evolved for managing these enterprises. This course will examine the development of managerial practices, the relationship of management to the work force, and the social ramifications of capitalist expansion.

245 Public Sector Labor Law
3 credits.
A survey and analysis of the New York State Public Employees Fair Employment Act is made as well as a comparison with other state laws covering public employees. The course will examine the extent to which the law protects and regulates concerted actions by employees in the public sector. The intent is to study and understand the law as written, but more importantly how it has been interpreted by the courts of New York State in its application. Major emphasis will be employee and employer rights, including recognition and certification, improper practices, strikes, grievances, and disciplinary procedures of the New York State Public Employment Relations Board.

247 Labor and the American Economy
3 credits.
Will help the student understand how economic theories relate to the economic problems confronting the American citizen in general and the American union member in particular. Emphasis will be placed on contemporary economic theories and how their proponents attempt to solve American economic problems.

248 Employment Practices Law
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, 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. Students will evaluate grievance and arbitration contract clauses, the grievance procedure in practice, the role of the union steward, the role of local and international unions, negotiation of grievances, and preparation for arbitration. Students will analyze the impact of grievance and arbitration procedures on workers, unions, and employers.

254 Labor Law
Fall or spring. 3 credits.
Examines the principles of labor law by looking at social philosophy and the historical context of federal labor legislation from the 1930s. Students will concentrate on major provisions of the National Labor Relations Act, examining how the National Labor Relations Board and the federal courts have interpreted the national labor laws. Discussion will include new directions in labor legislation and interpretation with consideration given to the impact of labor law on workers, unions, and employers.

255 Labor History
Fall or spring. 3 credits.
Reviews American labor history from the prespective of workers' social dimensions of the development of the working class, reform and revolutionary movements, and the emergence of craft, industrial, and public employee unions. Included will be a discussion of the development of trade union institutions and leaders and the evolution of union political activities and collective bargaining. Special attention will be paid to the involvement of women and minority workers with unions.

256 Dispute Resolution
Fall or spring. 3 credits.
Examines third-party participation in dispute resolution in private and public sector collective bargaining. Development of dispute resolution methods in American labor relations; issues and practices in neutral, binding arbitration of grievances and mediation; conciliation; and fact finding procedures will be discussed. We will also look at exclusive labor-management mechanisms to settle industry disputes.

257 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.

262 Project Management
Fall or spring. 3 credits.
Through the process of restructuring, many companies are "flattening out" the hierarchy of management levels. This means that more responsibilities are shifting downward to employees who may not have the status (authority) of supervisor or manager, but who have the enormous responsibility of completing complex, critical projects within well-defined business constraints. In response to the shift in responsibility downward and with much more to be accomplished with limited resources, the demands for employees with effective project management skills are increasing. Employees who can successfully manage projects are and will continue to be the most marketable individuals in the work force because their skills are transferable to all disciplines, organizations, and situations.

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 will be able to accurately 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 The Evolution of Work in America
Fall or spring. 3 credits.
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.

343 Health in the Workplace
Fall or spring. 3 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.

344 Union Strategies for Safety and Health
Fall or spring. 3 credits.
Even with OSHA, the most effective tool for change in the unionized work environment remains the collective bargaining process and collective action. This course explores specific strategies for making the workplace safer through collective bargaining, workers education, safety and health committees, joint labor-management committees, working with COSH groups, union-sponsored medical exams at occupational health clinics, and the OSHA complaint process. Case studies will consider integration of occupational health initiative into broader union strategies such as organizing drives and industrial development planning.

345 Health Hazards Identification and Evaluation in the Workplace
Fall or spring. 3 credits.
Students will learn about the many work site health hazards including toxic chemicals, biological agents, radiation, and electromagnetic fields. Routes of exposure, acute and chronic health effects, and the bases of regulatory exposure limits such as TLV's and OSHA PEL's will be discussed. Basic hazard evaluation and information gathering techniques will familiarize students with available resources for evaluating work site conditions.

346 Introduction to Industrial Hygiene: Hazard Evaluation and Control
Fall or spring. 3 credits.
This course builds on the knowledge acquired in both the safety hazard and health hazard courses to provide students with greater mastery of hazard evaluation and control methods. (Students are encouraged to complete the health hazard and safety hazard courses before taking industrial hygiene.) It will provide practical, hands-on training in evaluating potential worksite hazards.

Students will learn about environmental monitoring methods such as air sampling and become familiar with the commonly used equipment. They will also learn to interpret and evaluate monitoring data provided by professional testers.

347 Safety Hazards Identification and Evaluation in the Workplace
Fall or spring. 3 credits.
Safety hazards (as opposed to health hazards) generally involve harm of an immediate and sometimes violent nature; health effects include burns, electrical shock, broken bones, and the loss of limbs, eyesight, or hearing. With chemicals, the primary concern is their explosive, reactive, or flammable nature rather than with the toxic effects that are the focus of health hazard evaluation. Students will become familiar with site inspection and hazard identification methods and will learn about control techniques appropriate for a variety of work settings.

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.

367 Safety and Health in the Workplace
Fall or spring. 3 credits.
To provide basic education and training in workplace safety and health. The course will focus on applicable federal and state laws, standards for safety and health, industrial hygiene, and such health concerns as asbestos, radon, and AIDS. Practical experience will be provided through workplace walk-through safety and health inspections and in use of industrial hygiene equipment that measure noise, temperature, humidity, airflow, and airborne toxics.

FACULTY ROSTER

Abowd, John M., Ph.D., U. of Chicago. Prof., Labor Economics
Angellotti, Jon E., MS candidate, Cornell U. Social Statistics
Bacharach, Samuel, Ph.D., U. of Wisconsin. Jean McKelvey-Alice Grant Prof. of Labor Management Relations, Organizational Behavior
Batt, Rosemary, Ph.D., Mass. Inst. of Technology. Asst. Prof., Human Resource Studies
Bishop, John H., Ph.D., U. of Michigan. Assoc. Prof., Human Resource Studies
Blau, Francine D., Ph.D., Harvard U. Francis Perkins Prof. of Industrial and Labor Relations, Labor Economics
Boudreau, John W., Ph.D., Purdue U. Assoc. Prof., Human Resource Studies
Boyer, George R., Ph.D., U. of Wisconsin. Prof., Labor Economics
Briggs, Vernon M., Jr., Ph.D., Michigan State U. Prof., Human Resource Studies
Bunge, John A., Ph.D., Ohio State U. Assoc. Prof., Social Statistics
Cavanaugh, Marci A., U. of Minnesota. Asst. Prof., Human Resource Studies
Cook, Maria L., Ph.D., Univ. of Calif., Berkeley. Assoc. Prof., Collective Bargaining, Labor Law, and Labor History
Cowie, Jefferson R., Ph.D., U. of North Carolina—Chapel Hill. Visiting Asst. Prof., Collective Bargaining Labor Law and Labor History
Daniel, Cletus E., Ph.D., U. of Washington. Prof., Collective Bargaining, Labor Law, and Labor History
DeVault, Ileen A., Ph.D., Yale U. Assoc. Prof., Collective Bargaining, Labor Law, and Labor History
DiCiccio, Thomas J., Ph.D., U. of Waterloo. Assoc. Prof., Social Statistics
Dyer, Lee D., Ph.D., U. of Wisconsin. Prof., Human Resource Studies
Ehrenberg, Ronald, Ph.D., Northwestern U. Irving M. Ives Professor of Industrial and Labor Relations and Economics, Labor Economics
Farley, Jennie T., Ph.D., Cornell U. Prof., Extension
Fields, Gary S., Ph.D., U. of Michigan. Prof., Labor Economics
Gold, Michael E., LL.B., Stanford U. Assoc. Prof. Collective Bargaining, Labor Law, and Labor History
Gross, James A., Ph.D., U. of Wisconsin. Prof., Collective Bargaining, Labor Law, and Labor History
Hadi, Ali S., Ph.D., New York U. Prof., Social Statistics
Hammer, Tove H., Ph.D., U. of Maryland. Prof., Organizational Behavior
Hebdon, Robert P., Ph.D., U. of Toronto. Asst. Prof., Collective Bargaining, Labor Law, and Labor History
Hurd, Richard W., Ph.D., Vanderbilt U. Prof., Extension and Public Service
Hutchens, Robert M., Ph.D., U. of Wisconsin. Prof., Labor Economics
Jakubson, George H., Ph.D., U. of Wisconsin. Assoc. Prof., Labor Economics
Kahn, Lawrence M., Ph.D., U. of Calif. at Berkeley. Prof., Collective Bargaining, Labor Law, and Labor History/Labor Economics
Katz, Harry C., Ph.D., U. of California at Berkeley. Jack Sheinkman Professor in Collective Bargaining, Labor Law, and Labor History
Kuruvilla, Sarosh C., Ph.D., U. of Iowa. Assoc. Prof., Collective Bargaining, Labor Law, and Labor History
Lawler, Edward J., Ph.D., U. of Wisconsin at Madison. Prof., Organizational Behavior
Lieberwitz, Risa L., J. D., U. of Florida. Assoc. Prof., Collective Bargaining, Labor Law, and Labor History
Lipsky, David B., Ph.D., Massachusetts Inst. of Technology. Prof., Collective Bargaining, Labor Law, and Labor History
Lounsbury, Michael, Ph.D., Northwestern U. Lecturer, Organizational Behavior
Milkovich, George, Ph.D., U. of Minnesota. Martin P. Catherwood Professor of Industrial and Labor Relations, Human Resource Studies
Ross, Philip, Ph.D., Brown U. Prof., Collective Bargaining, Labor Law, and Labor History
Salvatore, Nicholas, Ph.D., U. of California at Berkeley. Prof., Collective Bargaining, Labor Law, and Labor History
Seeber, Ronald L., Ph.D., U. of Illinois. Assoc. Prof., Extension
Smith, D. Brent, Ph.D., U. of Maryland. Asst. Prof., Organizational Behavior
Smith, Robert S., Ph.D., Stanford U. Prof., Labor Economics
Sonnenstuhl, William J., Ph.D., New York U. Assoc. Prof., Extension and Organizational Behavior
Stern, Robert N., Ph.D., Vanderbilt U. Prof., Organizational Behavior
Stone, Katherine J. D., Harvard U. Prof., Collective Bargaining, Labor Law and Labor History
Tolbert, Pamela S., Ph.D., U. of California. Assoc. Prof., Organizational Behavior
Turner, Lowell R., Ph.D., U. of California. Assoc. Prof., Collective Bargaining, Labor Law and Labor History/International and Comparative Labor Relations
Velleman, Paul F., Ph.D., Princeton U. Assoc. Prof., Social Statistics
Welbourne, Theresa M., Ph.D., U. of Colorado. Asst. Prof., Human Resource Studies
Wells, Martin T., Ph.D., U. of California at Santa Barbara. Assoc. Prof., Social Statistics
Wright, Patrick M., Ph.D., Michigan State U. Assoc. Prof., Human Resource Studies

LAW SCHOOL

ADMINISTRATION

Lee E. Teitelbaum, dean of the law faculty and professor of law

John A. Siliciano, associate dean for academic affairs and professor of law

Gary J. Simson, associate dean for faculty development and professor of law

Anne Lukingbeal, associate dean and dean of students

Richard D. Geiger, associate dean and dean of admissions

Harry B. Ash, assistant dean for development and public affairs

Charles D. Cramton, assistant dean for alumni and international affairs

Gihan S. Fernando, assistant dean for student services

Richard F. Robinson, assistant dean for administration and finance

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." The Law School also offers to a limited number of students an opportunity to earn both a J.D. degree and an LL.M. degree in international and comparative law.

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 LL.M. degree (Master of Laws, Legum Magister) and the J.S.D. degree (Doctor of the Science of Law, Jurisprudentiae Scientiae Doctor) are conferred. A small number of law graduates may also be admitted as special students, to pursue advanced legal studies without 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

LAW 500 Civil Procedure
Fall and spring. 6 credits. K. M. Clermont, B. J. Holden-Smith, J. J. Rachlinski, F. F. Rossi.
An introduction to civil litigation, from commencement of an action through disposition on appeal, studied in the context of the federal procedural system. Also, a detailed consideration of federalism and ascertainment of applicable law; jurisdiction, process, and venue; and former adjudication.

LAW 502 Constitutional Law
Fall. 4 credits. K. A. Abrams, S. L. Johnson, G. J. Simson, I. P. Stotsky.
A study of basic American constitutional law, including judicial review, some structural aspects of the Constitution as developed particularly in light of the passage of the Civil War amendments, and certain of its rights provisions.

LAW 504 Contracts
Fall and spring. 6 credits. R. A. Hillman, R. S. Summers.
An introduction to the nature, functions, and processes of exchange, contract, and contract law. The course focuses on the predominant rules and principles governing contract and related obligation, including the substantive reasons underlying the rules and principles.

LAW 506 Criminal Law
Spring. 4 credits. S. P. Garvey, D. N. Yellen.
An introductory study of the criminal law, including theories of punishment, analysis of the elements of criminal liability and available defenses, and consideration of specific crimes as defined by statute and the common law.

LAW 508 Legal Methods
Fall and spring. 4 credits. P. Anderson, D. A. French, C. Grumbach, T. Harris-Abbott, B. S. Williams.
Legal methods is a full-year skills course designed to introduce first-year students to the techniques of research, analysis, and writing that are necessary in legal practice. Instruction in the fall semester focuses on legal research and the written communication of objective legal analysis. Students complete a series of research and writing assignments that develop and test their skills in these areas. Instruction in the spring semester focuses on written and oral advocacy. In the context of a simulated civil or criminal trial, students complete the necessary research and then draft and rewrite a trial or appellate brief advocating their client's position on one or more legal issues. The spring semester culminates with a moot court exercise designed to introduce the students to the techniques and logistics of oral advocacy in a courtroom setting. Instruction occurs in small sections of approximately 30 students and in individual conferences. Each student receives extensive editorial and evaluative feedback on each written assignment.

LAW 512 Property
Spring. 4 credits. G. S. Alexander, E. Sherwin.
An investigation of the law's protection of ownership, including the beginnings of property, legal and equitable estates, concurrent ownership, and public and private regulation of land use.

LAW 515 Torts
Fall. 4 credits. G. A. Hay, J. A. Henderson, Jr., J. A. Siliciano.
An introduction to the principles of civil liability in the tort field: intentional wrongs, negligence, and strict liability. Attention is also given to the processes by which tort disputes are handled in our legal system.

UPPERCLASS COURSES

LAW 602 Administrative Law: The Law of the Regulatory State
Fall or spring. 3 credits. C. R. Farina, J. J. Rachlinski.
An introduction to the constitutional and other legal issues posed by the modern administrative state. Topics include: procedural due process, separation of powers, procedural modes of administrative policymaking; judicial review of agency action; the oversight and control relationships between agencies and Congress or the President. The course provides a working familiarity with the fundamentals of administrative procedure, as well as a larger inquiry into the role of agencies in our constitutional system—and the effect of legal doctrine on shaping that role.

LAW Advanced Civil Procedure
3 credits. Offered as a seminar in 1999–2000.
A study of complex civil litigation involving multiple parties and multiple claims. Topics include joinder of parties and claims, impleader, interpleader, class actions, and intervention. Consideration of case management, the Civil Justice Reform Act of 1990, multidistrict transfers in the federal courts, and the use of alternative procedures for disposition of cases.

LAW 604 Alternative Dispute Resolution: Mediation as a Nontraditional Approach to Litigation
Fall. 2 credits. Limited enrollment. J. Meyer.
This seminar will emphasize mediation as a nontraditional, cutting-edge alternative to the traditional litigation process. The seminar will introduce students to the spectrum of ADR processes, but will emphasize mediation as both a concept and a set of skills. The process of mediation will be explored through readings, videotapes, simulations, and role-playing exercises.

LAW 608 American Indian Law
Spring. 2 credits. Recommended prerequisite: Administrative Law and Public International Law. J. Tahsuda.
An examination of the primary themes and materials of the federal law concerning Native American tribes and individuals. The course devotes considerable attention to the historical development of law and policy in that area and to the present division of authority over Indian country among federal, state, and tribal governments.

LAW 609 American Legal History: From the Revolution to the Civil War
Fall. 3 credits. A. S. Konefsky.
This course focuses on the development of American law in the century from 1760 to 1860. Transitions in the legal ideology of the period will be examined, including the reception of the common law in America, the influence of the American Revolution on beliefs about the nature of law, shifts in forms of legal reasoning, changes in the legal profession, and the rise of the codification movement. In turn, resulting changes in legal doctrine in areas including contract, tort, and property will be studied for their impact on private and public economic activity.

LAW 610 Antitrust Law
Spring. 2 or 3 credits. Students who have taken an antitrust course in the Paris Program may take this course for 2 credits. G. A. Hay.
A consideration of the basic antitrust rules enacted by Congress and amplified by the courts to protect competitive markets and limit the exercise of monopoly power. Price fixing, boycotts, and market allocation agreements among competitors; agreements between suppliers and customers; joint ventures; attempts to monopolize and monopolization; price discrimination; and mergers.

LAW 611 Arbitration
Spring. 2 credits. Preference given to students to have previously taken Evidence. Limited enrollment. R. K. Hull.
Arbitration is the principal method of resolving disputes between unions and employers, between securities brokers and their clients, and under international business agreements, and is gaining favor in many other areas. This course will familiarize students with arbitration practice in a variety of fields, through the use of simulation exercises, role playing, and discussion of readings and videotapes. Class exercises will focus on practical skills, including case preparation, preliminary hearings, all phases of case presentation, and post-hearing briefs. The practical distinctions between arbitration and traditional litigation will be noted throughout.

[LAW Banking Law and Regulation
3 credits. Not offered 1999–2000.
The course begins by defining the roles that banks and other financial intermediaries play in the economy. It considers the claim that a specialized set of regulations governing the activities of financial intermediaries is justified by the special role banks occupy in society. In that context a variety of theoretical arguments about banking regulation are considered. The course then examines each of the major laws that govern banking activities against the background of the various regulatory theories discussed. Topics addressed include entry restrictions, growth and expansion of bank activities, regulation of the business of banking, expansion through the bank holding–company structure, branch banking, interstate banking, and regulation of failing or failed banks.]

LAW 613 Bankruptcy
Fall. 3 credits. Prerequisite: Students who have taken Debtor-Creditor Law are ineligible for this course. T. Eisenberg.
Selected topics in the law of bankruptcy. An overview of the various bankruptcy chapters and a detailed study of the bankruptcy provisions of most general applicability. The relationship between the rights of an Article 9–secured creditor and the bankruptcy trustee's power to avoid liens. Related topics in the enforcement of money judgments and the law of fraudulent conveyance.

[LAW Business Combinations
2 credits. Not offered 1999–2000.
This course examines the principal business, legal, and accounting issues in the purchase and sale of privately and publicly held businesses. Emphasis is placed on the negotiation, structuring, financing, and documentation of the most common type of combining transaction—the acquisition of assets of a privately held company. Among the legal issues considered are the business and other reasons for selling or buying a business, the forms of business combinations, directors' duties, successor liability, securities regulation, tax, and antitrust. Additional issues surrounding acquisitions of publicly held companies (including hostile takeovers) are studied principally for comparison. The responsibilities of transactional lawyers to persons other than their clients are also assayed.]

LAW 615 Children, Parents, and the State
Spring. 2 credits. L. Teitelbaum.
This course explores legal and social understandings of the rights of children, parents, and the state with respect to issues such as access to and control over the content of education, authority regarding health care, claims to speech and expression, and procreative decisions. The course also examines the operation of rights in connection with juvenile court jurisdiction over neglect and abuse, delinquency, and status offenses.

[LAW Civil Rights Legislation
3 credits. Not offered 1999–2000.
Explores in depth the history and current status of federal civil rights legislation. The course focuses on 42 U.S.C.§1983, the dominant vehicle for vindication of constitutional rights in civil cases, and on Title VII of the Civil Rights Act of 1964, the principal federal statute covering employment discrimination.]

LAW 616 Commercial Law
Spring. 3 credits. W. F. Taylor.
Examines a variety of commercial dealings and focuses on Articles 2 and 3 of the Uniform Commercial Code, with some coverage of other Articles and the Convention on Contracts for the International Sale of Goods. The course is designed to give students an understanding of commercial statutes and to inform them about many of the underlying commercial transactions to which the law relates.

LAW 617 Comparative Labor Law
Fall. 3 credits. X. Blanc-Jouvan.
This course compares labor and employment law in France and the United States and surveys more briefly labor-market regulation in Canada, Germany, Japan, and the European Union. It provides an overview of the labor- and employment-law systems of each country and then examines selected topics from a comparative perspective. Specific topics that receive comparative treatment include unjust dismissal, employment discrimination, the right to organize labor unions, the right to strike, and worker voice through collective bargaining and other mechanisms.

LAW 618 Comparative Law
Fall. 3 credits. Prerequisite: basic common law. B. A. Rudden.
The course tackles first the sources, structures, and assumptions common to the legal systems of continental Europe, Latin America, and some countries of the Far East, and then examines the enduring divisions of their private law. Particular examples are then studied and may be grouped under a topic (e.g., the liability of the post office or the problem of the injured rescuer) or by country (e.g., French contract law, Roman and German tort law). The course aims to demonstrate the utility of the comparative method by encouraging students to rethink their own law in the light of other approaches. This enables students to see how problems may sometimes be solved by breaking the categories in which they are embedded in a given system, and thus to gain a better understanding of the reasons for the rules.

LAW 619 Conflict of Laws
Fall. 2 credits. G. J. Simson.
A study of the methods used by courts to decide the applicable law in cases that, in their parties or events, involve more than one state or country. Attention to the due-process limitations on jurisdiction, a state's obligation under the full-faith-and-credit clause to respect sister-state judgments, and conflicts between federal and state law.

LAW 620 Constitutional Law II: The First Amendment
Spring. 3 credits. S. H. Shiffrin.
A comprehensive discussion of freedom of speech, press, and association. The free-exercise-of-religion clause and the establishment clause of the First Amendment are treated less extensively.

[LAW Constitutional Remedies
2 credits. Not available to students who have taken Civil Rights Legislation. Not offered 1999–2000.
Explores in depth the history and current status of 42 U.S.C.§1983, the major statutory vehicle for vindication of constitutional rights in civil cases.]

LAW 622 Copyright
Fall. 3 credits. P. W. Martin.
Copyright law has become increasingly important as the American economy has shifted from a predominantly manufacturing economy to an information economy. This course provides students with a comprehensive overview of the U.S. copyright law. It begins with coverage of the substantive and procedural requirements for qualifying for copyright protection, then provides an in-depth study of the rights granted to authors under this law, the standards for judging copyright infringement, public policy

limitations on the scope of copyright interest (such as the fair use defense), and remedies available to successful litigants. Issues raised by new information technologies and recent amendments addressing them receive special attention. Partly as an aid for understanding United States law better and partly because copyright law is of increasing international importance, the course also provides some comparative and international copyright law components. In addition, it touches on issues of trademark and right of publicity law as they overlap or complement copyright.

LAW 625 Corporations
Fall or spring. 4 credits. F. S. Kahn, J. R. Macey.
An introduction to the business corporation laws affecting the rights and roles of corporate boards of directors, senior executive officers and shareholders, with an emphasis on large, publicly traded firms. Shareholders' economic interests are examined from the perspective of limited liability and dividend standards, expectations of liquidity or transferability of shares and the use of debt capital as a mode of financing corporate activity. Shareholders' limited participation rights in corporate decision making are examined from the perspective of state and federal rules governing shareholder voting and the disclosure of corporate information and the notion of managerial expertise (e.g., as evidenced by judicial application of the "business judgment rule"). The latter part of the course focuses on directors' and officers' fiduciary obligations to shareholders, examining the operation of these duties in a variety of settings and transactions. Issues relating to the roles and functions assumed by corporate attorneys (with respect to their clients) and the role of business corporations within society are also addressed. No previous business knowledge is assumed.

LAW 627 Criminal Procedure
Fall. 3 credits. J. H. Blume.
This course surveys the law of criminal procedure, with emphasis on the constitutional constraints that regulate the pretrial stage of the criminal process. More specifically, the course focuses on the law of interrogations and confessions, the admissibility of evidence, and on the right to counsel throughout all stages of the criminal process.

[LAW Current Topics at the Crossroads of Law and Finance [also NBA 551]
3 credits. Not offered 1999–2000.
Financial institutions of all kinds, whether they are formally known as insurance companies, banks, investment banks, mutual funds, or pension funds, invest money on behalf of clients in a wide variety of investment vehicles. This course will look at the way that these financial institutions are treated from both a legal and an economic perspective. Emphasis will be placed on the intersections between modern financial theory and legal analysis. Topics to be covered include insurance, bank regulation and reform, securities markets, investment banking, and pensions.]

[LAW Death Penalty in America: A Survey
1 credit. Not offered 1999–2000.
The course will survey the law relating to the administration of the death penalty.]

[LAW Debtor-Creditor Game
3 credits. Prerequisite: Prior enrollment in Secured Transactions or Debtor-Creditor Law or concurrent enrollment in one of those courses and permission of the instructor. Limited enrollment. Not offered 1999–2000.
Advanced debtor-creditor law including Chapter 11 of the Bankruptcy Code, bankruptcy procedure, negotiation techniques, and case strategy.]

LAW 630 Directed Reading
Fall or spring. 1 or 2 credits. A two-credit directed reading may also fulfill the second writing requirement. Arrange directly with instructor. See Law School Registrar.
An examination of a topic through readings selected by arrangement between the instructor and an individual student or group of students (not exceeding eight).

LAW 633 Employment Law
Fall. 3 credits. D. Avery.
Survey of major statutory schemes, constitutional principles, and common law doctrines that affect the employer-employee relationship in the public and private sectors, other than laws regulating union formation and collective bargaining which are covered in Labor Law. Topics covered include unjust dismissal, drug testing, free speech, privacy, and antidiscrimination laws. In addition, the course will provide an overview of major statutory schemes affecting the terms and conditions of employment, such as workers' compensation, the Fair Labor Standards Act, and the Occupational Safety and Health Act.

[LAW Entertainment Law
2 credits. Not offered 1999–2000.
This course explores several areas within the broad field of entertainment law. Topics include contract law, labor, antitrust, the role of agents, personal and privacy rights, literary and music publishing, sound recordings, films, and television.]

LAW 636 Environmental Law
Spring. 3 credits. J. J. Rachlinski.
The course surveys the major environmental law with a primary focus on federal statutes (CERCLA, RCRA, NEPA, the Clean Water Act, the Clean Air Act, and the Endangered Species Act). The course lays out the various governmental tools used to address the problems of environmental degradation and discusses the value of these tools. Special attention is paid to the economic, social, and political obstacles to efficient regulation of the environment.

[LAW Estate and Gift Taxation
3 credits. Prerequisite: Federal Income Taxation. Not offered 1999–2000.
This course surveys the three federal taxes imposed on wealth transfers: the estate tax, the gift tax, and the generation-skipping tax. The course uses a problem-oriented approach, with emphasis on the Internal Revenue Code, regulations, and other tax materials.]

LAW 640 Evidence
Fall or spring. 3 credits. S. D. Clymer, F. F. Rossi.
The rules of evidence in civil and criminal cases with emphasis on relevance, authentication, witnesses, experts, and hearsay. The course focuses on the Federal Rules of Evidence, with some attention to how they diverge from the common law.

LAW 641 Family Law
3 credits. M. A. Fineman.
Broadly understood, family law is the study of state imposed rules regulating intimacy and intimate relationships in society. Consideration of the legal regulation of intimate relations collapses traditional law school distinctions such as those drawn between "civil" and "criminal" or "public" and "private" mechanisms for control of behavior. The laws that effect family formation and dissolution are many and varied. They reach deep into our lives, influencing as well as being influenced by our assumptions and beliefs about what is "natural" and "normal." In this course we will use scientific and social scientific information to explicitly evaluate some of those assumptions and beliefs, and to call into question the appropriateness of a number of current state laws regulating families. We will examine the evolution of our society's understanding of and expectations for marriage, as well as shifts over the past several decades in the nature of and justification for state regulation of that institution. Substantial attention also will be paid to the social and legal consequences of marriage dissolution, including an examination of the imposition of a gender neutrality-gender equality model in the divorce context. The imposition of this model has resulted in a transformation of the legal rules governing distribution of property and allocation of custody and control over children with some problematic consequences. Topics to be considered include: definitions, policy and trends in American family law, the regulation of marriage, the legal significance of marriage: rights and obligations, private ordering within the marital context, nonmarital relationships - rights and obligations, divorce and divorce substitutes, spousal and child support obligations, marital property and theories of marital equality, rights to children.

LAW 643 Federal Courts
Spring. 4 credits. Prerequisite: Constitutional Law and second semester of Civil Procedure. Students without such background should consult with instructor. C. R. Farina.
An intensive examination of the federal courts and their constitutional and statutory role in the federal system. The relationship of the federal courts with the other branches of the federal government and with the states, and the relationship between state and federal law. Case-or-controversy problems, the allocation of jurisdiction between state and federal courts, federal question and diversity jurisdiction of the district courts, and limitations thereon. The course is strongly recommended for anyone planning a judicial clerkship.

LAW 644 Federal Income Taxation
Fall or spring. 4 credits. Limited enrollment. T. Eisenberg, E. M. Jensen.
A basic course designed to develop understanding of tax concepts and ability to work effectively with the Internal Revenue Code, regulations, cases, and other tax materials.

LAW 646 Feminist Legal Theory
Fall. 3 credits. M. A. Fineman.
This course provides an introduction to feminist legal theory. During the semester we will consider the historical stages, as well as current and emerging contours, of feminist theory in law. There will be some comparison of feminist legal theory with allied intellectual movements such as critical race theory. The last part of the course will look at

applied feminist legal scholarship in the areas of (1) the economic subordination of women, (2) the sexual subordination of women, and (3) motherhood and reproduction.

LAW 647 Health Law
Fall. 3 credits. L. I. Palmer.
This course examines the role of law and policy in the health care industry. Students will be invited to take a "systems approach" to the study of the role of law in arriving at coherent policy solutions for a host of dilemmas facing a rapidly evolving industry. Students will be asked to consider if a particular statute, regulation, or judicially crafted legal doctrine is consistent with new developments or any public policy towards health care. Topics covered include: access to health care; purchasing health care; commercialism vs. professionalism; the antitrust challenge to professional dominance; changing institutional providers; and public and industry-sponsored quality control.

LAW 648 Injunctions
Fall. 3 credits. Prerequisite: Two semesters of Civil Procedure. Students without such background should consult with instructor. Limited enrollment. Satisfies the first or second writing requirement. C. R. Farina.
The course integrates theory and practice in focusing on the availability and use of the injunction, an increasingly important remedial tool in both public-interest and private-section litigation. Coverage includes the substantive and procedural prerequisites for obtaining interlocutory and permanent injunctions, permissible scope and timing, the types and incidents of contempt, and the duties of those enjoined. Special consideration is given to the use of the injunction as a remedial tool for federal courts in public law litigation. The substantial writing component involves several drafting exercises based on real case studies of recent injunctions requests.

LAW 650 Insurance
Spring. 3 credits. J. A. Henderson, Jr.
Insurance is an increasingly important tool for the management of risk by both private and public enterprises. This course provides a working knowledge of basic insurance law governing insurance regulation; risk classification; property, commercial, and liability insurance; and claims processes. The emphasis throughout the course is on the link between traditional insurance law doctrine and modern ideas about the function of private law.

[LAW Intellectual Property
3 credits. Not offered 1999–2000.
An introduction to the domestic and international context of intellectual property law with a review of state and federal law relating to intellectual property, principally copyright, patent, and trademark law. Intellectual property issues raised by new information technologies are emphasized throughout the course.]

LAW 652 International Business Transactions
3 credits. J. J. Barceló III.
An examination of the unique legal features of business transactions across national boundaries. The first half of the course deals with the private law of international transactions. The topics covered include: choice of law in the U.S. and Europe concerning international sales; the U.N. Convention on the International Sale of Goods; financing international transactions through letters of credit; and international dispute settlement (litigation and arbitration). The second half of the course deals with public regulatory law, including an overview of the World Trade Organization (WTO/GATT) with some attention to the trade-environment conflict; fair and unfair trade rules (escape clause, subsidies and countervailing duties, and antidumping); the trade consequences of intellectual property rights; and international antitrust.

LAW 653 International Commercial Arbitration
Fall. 3 credits. J. J. Barceló III, D. Ridgway.
A study of arbitration as a dispute resolution process for international trade and business disputes. The course analyzes ad hoc and institutional arbitration, the authority of arbitral panels, enforcement of agreements to arbitrate, challenging arbitrators, procedure and choice of law in arbitral proceedings, and enforcement of international arbitral awards. The course gives special attention to the international convention on the recognition and enforcement of international arbitral agreements and awards (New York Convention) and the UNCITRAL (U.N. Commission of International Trade Law) arbitral rules and model law. It will focus on commercial arbitration as an international phenomenon and not on arbitration under any particular national system.

LAW 655 International Human Rights
Spring. 3 credits. D. Wippman.
This course explores the development and effectiveness of international legal rules governing the conduct of a state toward people within its jurisdiction. Topics include the substantive norms of human rights, and their philosophic basis; the mechanisms for the protection of human rights, such as the United Nations, specialized agencies, international humah rights commissions, and domestic courts; and current issues such as the doctrine of humanitarian intervention, the status of indigenous peoples, and human rights during armed conflicts, illustrated where possible through case studies of current situations.

[LAW International Protection of Intellectual Property
2 credits. Recommended prerequisite: Intellectual Property. Not offered 1999–2000.
This course studies intellectual property rights in the international legal system. A general introduction reviews the international protection of patents, trademarks, industrial design, and copyright. The starting and focal point is the Agreement on Trade Related Aspects of Intellectual Property (TRIPS) adopted in the framework of the World Trade Organization (WTO). The international protection of intellectual property is studied through consideration of the TRIPS agreement and the several international conventions the observation of which is made mandatory for WTO Members by TRIPS. Also examined are issues of international court jurisdiction and applicable law in the area of intellectual property.]

LAW 656 Introductory Jurisprudence
Fall. 3 credits. Not available to students who have taken Legal Process. S. P. Garvey.
An introduction to contemporary schools of legal and political theory. The schools of legal theory examined include positivism, natural law, legal realism, legal process, and critical legal studies. The schools of political theory examined include liberalism, libertarianism, communitarianism, feminism, and critical race theory.

LAW 657 Issues in Professional and Organizational Ethics: Secrecy and Whistle Blowing
Fall. 3 credits. K. Clark.
This course explores the obligations facing persons who possess confidential information in a variety of legal contexts (e.g., lawyer-client relationships; government and corporate employment; trade secrets; and military information). It also examines the extent of and limitations on whistle blowing options available to lawyers and other professionals.

[LAW International Taxation
3 credits. Prerequisite: Federal Income Taxation. Not offered 1999–2000.
This course examines the U.S. income tax treatment of foreign investment and business operations in the United States, as well as the treatment of U.S. investment and business operations abroad. The course focuses on international tax jurisdiction and on the methods by which the United States relieves international double taxation, both by statute and through income tax treaties.]

LAW 660 Labor Law
Spring. 3 credits. D. Avery.
A study of collective bargaining, including the process of union formation, legal regulation of strikes and other economic weapons, negotiation and enforcement of collective agreements, the duty of fair representation, the application of antitrust law to union activity, and the relationship between federal labor law and local laws regulating the employment contract.

[LAW Law and Medicine
3 credits. Not offered 1999–2000.
This course considers legal issues related to medical care and biomedical science. Topics include constraints on access to health care, organization and financing of health services, promoting quality of care in hospitals and outpatient sites, fraud and abuse in clinical practice and biomedical research, dilemmas engendered by therapeutic applications of new technologies, and pathways to reform of the U.S. health care system. Teaching materials will comprise a law and medicine casebook, and scientific literature.]

LAW 668 Lawyers and Clients
3 credits. Satisfies the professional responsibility requirement. R. C. Cramton.
A survey and critique of (1) the law governing the practice of law and the legal profession's norms concerning the lawyer-client relationship; (2) the social functions of lawyers; (3) the modes and patterns in which legal services are or are not made available to the public; and (4) ethical theory relating to lawyer role and conduct.

LAW 669 Legal Aspects of Foreign Investment in Developing Countries
Fall. 3 credits. M. B. Ndulo.
This course will study legal aspects of foreign investments in developing countries. It will seek to identify legal problems that are likely to affect a commercial investment in a developing country. Inter alia, it will deal with the public international law principles and rules governing the establishment by foreign businesses of various factors of production (persons and capital) on the territory of other states and the protection of such investments. Thus, the course includes a discussion of the following topics: economic development and foreign capital; obstacles to the flow of investments to developing countries; guarantees to investors and investment codes; bilateral treaties; nationalization; joint ventures; transfer of technology; arbitration; investment insurance; unification of trade law; and the settlement of investment disputes.

LAW 670 Legislation
Spring. 3 credits. L. I. Palmer.
This course explores various theories of legislation by studying how statutes become a source of public policy, how judges interpret them, and how lawyers draft them. Drafting exercises are used throughout the course to determine to what degree legislation can be used to reform law or to remedy particular social problems.

LAW 671 Mergers and Acquisitions
Fall. 2 credits. R. F. Balotti.
This course examines the principal business and legal issues in the purchase and sale of publicly held businesses. Emphasis is placed on the duties of directors in the acquisitions of publicly held companies (including hostile takeovers).

[LAW Negotiation
2 credits. Limited enrollment. Not offered 1999–2000.
This course is intended to develop methods and skills required for negotiation practice. Approaches to negotiation strategy formation, preparation, and conduct will be explored through discussion of selected readings and through class exercises. Students will engage in four or more mock negotiations in situations that typically involve lawyers.]

LAW 672 Negotiating the Ethical Minefield: A Young Lawyer's Guide to Safe Travel
Fall. 3 credits. L. Fox.
Virtually all law school courses teach us how to represent our clients more effectively. Only professional responsibility courses provide would-be lawyers with guidance on our own conduct. This course will attempt to answer such knotty questions as: Why lawyers have to worry more about their own clients than they do about judges, the party or lawyers on the other side? What limits are placed on our obligations of zealous advocacy? How do lawyers resolve the competing pressures from clients, society, their own consciences, and their pocketbooks? What does professional independence really mean, and can it be preserved in the twenty-first century?

LAW 675 Patent and Trademark Law
3 credits. D. Bordewieck.
This course examines federal patent and trademark law. For patent law, particular attention is given to the nonobviousness and novelty requirements; the interpretation of patent claims, the extent to which patent issues are resolved by courts rather than by juries; the doctrine of equivalents; remedies for patent infringement; and defenses to patent infringement claims. For trademark law, the course examines the various kinds of marks, symbols, product configurations, and packagings for which trademark and trade dress protection can be obtained; the need to establish secondary meaning; what constitutes likelihood of confusion; types of trademark infringement; remedies for trademark infringement; and defenses to trademark infringement claims. The course also briefly examines state trade secrets and unfair competition law. Approximately 60% of the class will be devoted to trademark law. We will not consider international issues.

[LAW Private Justice: Arbitration and Other Forms of Alternative Dispute Resolution
4 credits. Limited enrollment. Not offered 1999–2000.
Arbitration has become a major aspect of legal practice in such fields as labor law, commercial law, securities law, family law, and other areas. This course will examine the developing law of arbitration and the relationship between private arbitration and the judicial system. It will examine issues such as the enforceability of arbitration agreements, arbitral due process, judicial review of arbitration awards, and the effect of arbitration on statutory rights. It also examines other forms of alternative dispute resolution, including mediation, small claims courts, and the new mandatory arbitration requirements of some federal and state judicial systems. The course focuses on the law of alternative dispute mechanisms and includes six simulation and problem solving sessions.]

LAW 678 Products Liability
Spring. 3 credits. J. A. Henderson, Jr.
Applications of products-liability doctrine and theory to a variety of problems drawn from or closely approximating actual litigation. An overview of the relevant case law, statutes, and administrative regulations, including the new *Restatement, Third, of Torts: Products Liability.*

LAW 680 Public International Law
Fall. 3 credits. D. Wippman.
An introduction to the legal rules governing the conduct of states vis-á-vis other states, individuals, and international organizations, with reference to major current events and issues. Topics include the nature, sources, and effectiveness of international law; the establishment and recognition of states; principles concerning state sovereignty, territory, and jurisdiction; the law of treaties; state responsibility; international environmental law; and human rights. Special attention will be given to the law governing the use of force.

LAW 682 Remedies
Fall. 3 credits. E. Sherwin.
This is an overview of legal remedies and their origins, including equitable remedies, restitution, and damages. The emphasis is on private rather than public law. A considerable amount of the course is spent on the nature and history of equity.

[LAW Roman Law and Modern Civil Law Systems
2 credits. Not offered 1999–2000.
Roman law has been the most influential legal system in Western legal history. The course focuses on selected areas of Roman property, contract, and tort law in order to demonstrate two basic aspects: (1) the distinctive characteristics of classical Roman law, which was largely jurists' law that was shaped by legal experts similar to modern law professors (as opposed to statutory or judge-made law); and (2) the continuing substantive and methodological influence of Roman law in modern civil law systems, including the major impact of Roman law on the unification process of European law. Roman case law is studied in English translation and compared with legal reasoning and solutions in contemporary European (e.g., German and French) legal systems. The course also demonstrates a number of direct and indirect influences of Roman law on Anglo-American law.]

[LAW Secured Transactions
3 credits. Not offered 1999–2000.
The course explores the use of security in commercial and consumer transactions. Specific subjects include creditor remedies, default, acceleration and cure, the creation and perfection of security interests, and priority among security interests and liens. The objective is to see secured credit as a system for lending and recovering money.]

[LAW Securities Regulation
2 credits. Not offered 1999–2000.
This course examines the federal system of regulation of the offering, sale and distribution of securities, including the Securities Act of 1933 and the Securities Exchange Act of 1934. Emphasis is placed on the structure, negotiation and consummation of securities transactions as part of the capital-raising process. The responsibilities of securities professionals are also reviewed.]

LAW 683 Securities Regulation and the Regulation of Financial Intermediaries
Fall. 2 credits. J. R. Macey.
This course covers the federal rules relating to the public offering of securities, secondary market trading of securities, and the regulation of commercial banking, investment banking, and investment companies (mutual funds). Emphasis is placed on the relationship between the various forms of financial intermediation and capital formation, and on the role of these activities in corporate governance. The increasing internationalization of the capital markets, and the public policy issues related to globalization, also will be discussed.

[LAW Social and Cognitive Psychology for Lawyers
3 credits. Not offered 1999–2000.
In their short history, cognitive and social psychology have produced a rich understanding of how human beings think and how they interact with each other. It should therefore come as no surprise that these two fields have a number of applications to law. This course will explore those applications. Examples include: what effect common errors in judgment have on tort and contract law; how the perception of risk affects societal demand for regulation in environmental law; how organizational and group decision-making processes affect corporate governance; how social norms about fairness impede or

facilitate negotiation and dispute resolution; how biases in judgment influence litigation strategies; and what studies of conformity mean for the development of international human rights law. The goal of this course is to introduce students with interests in different areas of law to some general principles of human thought and social interaction that will be valuable to them in their future practice.]

LAW 684 Social Security Law: Work, Families, and Administrative Justice
Spring. 3 credits. P. W. Martin.
The course will focus especially on how social security's benefit rules relate to employment, families and household composition and how its procedures address the challenge of adjudicating the massive numbers of benefit claims that arise each year. It will introduce the general features of the Social Security Act's entitlement, benefit formulae, and procedural rules; highlight those that pose the greatest difficulty to administrators and advocates; and survey current proposals for change.

LAW 685 Sports Law
Spring. 2 credits. Recommended prerequisite: Antitrust Law and Labor Law. W. B. Briggs.
The course traces the development of sports law in the United States. Particular attention is given to the relationship of sports with antitrust and labor law. Contemporary issues involving arbitration, collective bargaining, amateur athletics, agents, torts, criminal law, and constitutional law are addressed.

LAW 687 Supervised Teaching
Fall or spring. 1 or 2 credits. Arrange directly with instructor. See Law School Registrar.

LAW 688 Supervised Writing
Fall or spring. 1, 2, or 3 credits. A two- or three-credit supervised writing program may also fulfill the second writing requirement. Arrange directly with instructor. See Law School Registrar.

LAW 689 Taxation of Corporations and Shareholders
Fall. 3 credits. Prerequisite: Federal Income Taxation. E. M. Jensen.
This course examines the federal income taxation of corporate structure and transactions involving alterations in structure, including the rules governing incorporation, dividends, redemptions, liquidations, divisions, and reorganizations.

LAW 692 Trial Advocacy
Spring. 4 credits. Prerequisite: Evidence. Limited enrollment. G. G. Galbreath.
This course is devoted to the study of the trial. Fundamental skills are taught in the context of challenging procedural and substantive law problems. Each stage of the trial is examined: jury selection, opening, objections, direct examination, cross-examination, impeachment, expert witnesses, child witnesses, summation, and pretrial. In addition to exercises every week on a particular segment of a trial, the student also does a full-day jury trial at the completion of the course. Video equipment is used to teach and critique student performances. There are a few written assignments.

LAW 694 Trusts and Estates
Fall. 4 credits. G. S. Alexander.
The course examines the process of gratuitous transfers of wealth and introduces the practice of estate planning. It surveys the basic law of property succession, including wills and intestate succession, the law of trusts, powers of appointment, federal transfer taxation, and trust investment. Certain recurrent policy problems are emphasized, including the problem of form of legal norms and the problem of collective constraints on private intention.

PROBLEM COURSES AND SEMINARS

All problem courses and seminars satisfy the first or second writing requirement. Limited enrollment.

LAW 700 Advanced Civil Procedure
Spring. 3 credits. B. J. Holden-Smith.
A study of complex civil litigation involving multiple parties and multiple claims. Topics include joinder of parties and claims, impleader, interpleader, class actions, and intervention. There will be consideration of case management, the Civil Justice Reform Act of 1990, multidistrict transfers in the federal courts, and the use of alternative procedures for disposition of cases.

LAW 701 Advanced Criminal Procedure Seminar: Post-Conviction Remedies
Fall. 3 credits. J. H. Blume.
This seminar will explore various post-conviction remedies available to state and federal prisoners, including motions for new trial, state post-conviction proceedings, federal habeas corpus, and other extraordinary writs.

[LAW Advanced Criminal Procedure Seminar: Pre-Conviction
3 credits. Recommended prerequisite: Criminal Procedure. Not offered 1999–2000.
This seminar starts where the course, criminal procedure, ends. Topics may include double jeopardy, restraints on the decision to prosecute, pretrial detention and release, preindictment and pretrial delay, discovery and the obligation to disclose exculpatory evidence, the right to an impartial jury, jury selection, the right to confront witnesses and to present a defense, and sentencing.]

[LAW African Americans and the Supreme Court
3 credits. Not offered 1999–2000.
Beginning with its first decisions related to the slavery question, the Supreme Court has at times aided and at other times hindered efforts to afford African Americans full citizenship. This seminar explores the relationship between blacks and the Supreme Court by examining the major Court decisions affecting African Americans and attempting to understand those decisions in their historical contexts. The course begins with a review of the background and meaning of the constitutional provisions pertaining to the status of blacks in the new nation and ends with an intensive look at *Brown v. Board of Education*.]

LAW 703 Advanced Legal Research
Spring. 3 credits. C. M. Germain and staff.
Teaches cutting-edge research techniques to prepare students for practice in the law office of the future. Focuses on desktop electronic legal research, and covers U.S., international, and foreign law, as well as multidisciplinary research. The course is designed to teach students, whose careers will begin in a period of information transition, how to handle traditional and electronic sources and formats and make efficient choices.

[LAW Advanced Legal Writing and Analysis
3 credits. Not offered 1999–2000.
This seminar will explore in some detail the principles of legal analysis and writing through the medium of various documents produced in representing a hypothetical client in civil or criminal litigation. Students will conduct the necessary research on an assigned legal issue and then prepare a series of documents in preparation of the client's case. Those documents will include an office memorandum, a client letter, and a trial brief or memorandum in support of a motion. Students rewrite each document after receiving written comments from Professor Williams and other students through collaborative editing exercises.]

LAW 707 American Legal Theory
Fall. 3 credits. R. S. Summers.
The fall 1999 topic for this seminar is the formality of basic types of legal phenomena such as criteria of valid law (for both publicly and privately made law), statutory rules, accepted methods of statutory interpretation, the principle of stare decisis and common law rules, adjudicative processes, limitations on judicial power to modify rules, and the formal characteristics of the legal system viewed as a whole. American law lacks appropriate formality in many important ways and a heavy price is paid for this. However, legal formality and its distinctive underlying rationales (general legal values) profoundly affect the overall content of law and its practice by lawyers in the American as well as other legal systems. Such formality and its rationales have as much or more of a claim to primacy as the essence of law than do problem-specific policies that also inform the law's content. In this seminar, there is about equal emphasis on practical skills and theory.

[LAW Appellate Advocacy
Fall and spring. 3 credits. Prerequisite: Legal Methods or Practice Training 1 and 2. Year-long course. Not offered 1999–2000.
This course is designed to teach students the intricacies and nuances of appellate brief writing. Using the transcript of a criminal trial, students will write and rewrite an appellate brief for either the defense or prosecution. Students will read and digest the transcript and choose issues to research and potentially brief. After discussing the potential issues and research and basic appellate principles such as preservation, harmless error, and standards of review, we will turn our attention to the art of persuasion. Beginning with the first word of the first Question Presented, and ending with the last word of the Argument, appellate lawyers painstakingly choose each word to advance their arguments. The class will discuss in detail and practice writing each part of the appellate brief to see how each part can best meet this goal of persuasion. For instance, the Statement of Facts, perhaps the most important part of an appellate brief, will be treated as a story with a plot and sympathetic and unsympathetic characters. The class will discuss language and style and look at such details as word choice, sentence length and placement of "bad facts." The class will similarly dissect the Question Presented, Point Headings, and last, but certainly not least, the Argument.]

LAW 709 Biblical Law
Spring. 3 credits. C. M. Carmichael.
Analysis of law and narrative in the Bible from the perspective of ancient law and legal history. Topics include the nature of the law codes (e.g., hypothetical formulation versus statutory law), legal issues in the narratives (e.g., law of adultery and women's rights), law and morality (e.g., Ten Commandments), law and religion (e.g., institutions guaranteed by the law but condemned by religious authority), the transformation of extralegal relations into legal ones (e.g., with the introduction of money), legal interpretation in antiquity (e.g., Sermon on the Mount), social factors in legal development (e.g., shame and guilt), and aspects of criminal, family, and private law (e.g., eye for an eye, incest rules, and unjust enrichment).

[LAW Civil Rights in Housing: Theory and Practice
3 credits. Not offered 1999–2000.
Students will explore federal fair housing laws, history, and policies, while learning practical litigation skills. The seminar includes reading materials, class discussion, legal writing, and litigation exercises. The seminar materials include cases and statutes, as well as literature about policies underlying fair housing rights in the United States. The policy literature will be selected from a broad political spectrum, and will be designed to provoke thought and encourage classroom debate. The legal writing assignments and the litigation exercises simulate work assignments common in a civil litigation practice. Students will draft three briefs on different issues at various procedural postures (injunction, summary judgment, and appeal). Additionally, students will complete six short litigation exercises, including developing a proof schema and discovery plan, designing a fair housing test, drafting an affidavit and correspondence in support of a motion, writing jury instructions and a special verdict, and planning a trial notebook.]

LAW 711 The Common Law and African Legal Systems
Spring. 3 credits. M. Ndulo.
This seminar will study legal systems in post colonial Africa. It will concentrate on the former British colonies. During the colonial period, the common law was imported into British Africa. As a result, these countries are now common law jurisdictions. The description is supported by the history of the countries as well as by current statutory guidelines. African countries, however, also retained African customary law as part of the legal system. The two systems of law operated alongside one another and interacted at various points. During the colonial period, the common law was considered superior to African customary law and became the dominant system of law. In today's Africa, the two systems continue to operate side by side in very much the same as they did in colonial times. Conflicts between them have generated considerable interest among legal scholars. This seminar will consider the following issues: the introduction of the common law in Africa; nature of the customary judicial process; the nature of the plural system; areas of conflict between customary law and the common law in such areas as succession, land tenure, marriage laws, and gender. It will also examine issues relating to constitutional law and governance. Contemporary Africa is engaged in efforts aimed at building democratic political systems that are responsive to the needs of African communities. In this regard, we will examine such issues as constitutional arrangements in post-independence Africa, and conditionality, good governance, and development aid.

LAW 712 Comparative Legal Methods
Fall. 2 credits. Limited to LL.M. students. B. S. Williams.
This course will provided an introduction to the U.S. legal system and an opportunity for international LL.M. students to develop their legal analysis and writing skills through the completion of a series of writing assignments designed to teach the forms and content of legal analysis and expression common to American legal practice. The course will begin with an introduction to the structure of the U.S. legal system, including information on the nature and function of the state and federal governments and the structure of the American court system. The course will also introduce the methods that guide American attorneys in case analysis and application, and statutory interpretation. Finally, the course will provide extensive instruction in legal writing and analysis skills, including an introduction to basic legal research tools and strategies. The course grade will be based on writing assignments.

LAW 713 Constitutional Law and Political Theory
Spring. 3 credits. S. H. Shiffrin.
The purpose of the seminar is to explore theories of freedom of speech and theories of equality. How are the ideas of freedom, equality, association, and community linked in doctrine, and how should they be linked? Neoconservative, liberal, radical, feminist, and Marxist writings are considered.

[LAW Corruption Control
3 credits. Not offered 1999–2000.
This seminar examines the factors that facilitate and inhibit public or private corruption and analyzes the wide variety of criminal, civil, and nontraditional approaches designed to control corruption and to promote governmental and commercial integrity.]

[LAW Critical Race Theory
3 credits. Not offered 1999–2000.
This seminar will explore the relationship between critical understandings of the significance of race and legal interpretation. Of particular importance is the examination of how societal values and customs, expressed in legal rules purporting to address racial issues, inhibit critical approaches to the concerns of justice for disadvantaged groups.]

[LAW Dispute Resolution Techniques
3 credits. Not offered 1999–2000.
A course offering students an opportunity to learn conflict management and dispute resolution techniques in negotiation, mediation, and arbitration of commercial disputes, usually in the intellectual property context. The course will be scheduled to take place on certain full weekends to be announced.]

LAW 715 Emerging Problems of Health Law
Spring. 3 credits. L. I. Palmer.
The delivery of health care presents problems on the frontiers of both law and medicine. These include whether legislatures should authorize physicians to assist the death of dying patients, prohibit the cloning of humans beings, or modify the regulations concerning the administration of pain medication. In addition, new knowledge about reducing risks has emerged in policy discussions about how to improve the "quality" of health care during an era of managed care. There are now new questions about whether law inhibits the health care system's ability to make the system "safe" for patients. Students will study selected problems on the frontiers of law and medicine and prepare a seminar paper on a topic related to one of the emerging issues in health law or bioethics.

LAW 716 Empirical Studies of the Legal System
Fall. 3 credits. T. Eisenberg.
This seminar guides students in their own empirical studies of the legal process. Students derive research topics from a variety of empirical sources and design and run their own computer programs. Sample topics may include evaluating patterns of punitive damages awards, studying jurors' perceptions in death penalty cases, evaluating the success rates and burden of Title VII cases, and studying products liability cases.

LAW 717 Employment Discrimination
Spring. 3 credits. W. F. Taylor.
This seminar explores contemporary problems in equal-employment law. It focuses on legal issues involving Title VII, comparable worth, wrongful discharge, disability discrimination, age discrimination, and equal pay. Students are required to submit a paper as partial fulfillment of the requirements of the course.

[LAW Ethnic Conflict and International Law
3 credits. Recommended prerequisite: International Human Rights or Public International Law. Not offered 1999–2000.
This seminar examines the status and rights of ethnic, racial, religious, and national groups under international law, and considers the role of international law in developing an adequate response to intercommunal conflicts in Europe, Asia, and Africa. Topics include the sources of nationalism and ethnic conflict, pertinent individual and group rights, principles of humanitarian law and humanitarian intervention, the relationship between group identity and democracy, the role of international organizations in responding to ethnic conflict, and possible solutions to ethnic conflict, including secession, autonomy, and federalism.]

LAW 720 European Union Law
Spring. 3 credits. J. J. Barceló III.
The course studies the EU treaty, institutions, and lawmaking processes; the direct effect, supremacy, and reception of EU law in the member states, the development of the four freedoms (goods, services, persons, and capital) fundamental rights doctrine, protection of the environment, and the EU antitrust law.

[LAW Family Law Seminar
3 credits. Not offered 1999–2000.
This course is designed to familiarize the student with the practical problems facing the practitioner in family law cases. Students participate in negotiating separation agreements, presenting oral arguments of motions, preparing a memorandum of law, and developing interviewing skills and client relationships. The philosophy of the family law practitioner and methods of dealing with clients involved in divorce, custody, and the

like are covered. The emphasis is on method rather than substantive law.]

LAW 722 Family Wealth Transfers
Spring. 3 credits. D. Avery.
This seminar explores the development of the laws relating to property transfers in the context of both traditional and nontraditional family relationships. Readings from history, legal history, political theory, feminist legal theory, psychology, anthropology, sociology, and comparative law will provide a framework for evaluating the ways in which modern American laws of property, contacts, divorce, gratuitous transfers, taxation, and bankruptcy shape and are shaped by the formation, perpetuation, and disintegration of the family. Topics include community property, the Uniform Marital Property Act, constructive trust doctrine, common law concurrent interests, equitable distribution laws, and the laws affecting property settlements, cohabitation agreements, and premarital contracts.

LAW 726 Federal Litigation Seminar
3 credits. D. Bordewieck.
This seminar is designed for students genuinely interested in being litigators. It explores the "real world" of civil litigation in federal court, from commencement of a lawsuit through termination by some means other than trial. Particular attention is given to local rules; complaints; answers; document requests; removal issues; venue motions; preliminary injunction motions; summary judgment motions; nonparty discovery; sanctions; FRCP 26 disclosures and requirements; attorney-client privilege issues; and case-management procedures and orders. Throughout the course, the seminar endeavors to determine how one rationally litigates before frequently disinterested judges pursuing their own agendas and against counsel evidencing little regard for the rules or the law. This seminar entails a very substantial quantity of written work.

[LAW Feminism and Gender Discrimination
3 credits. Not offered 1999–2000.
The seminar provides an introduction to feminist theory as it has emerged in legal scholarship and the social sciences. Several feminist legal theories are then used as a framework for analyzing a series of legal problems implicating gender. Among the problems discussed are sexual harassment, work-family conflict, divorce and child custody, surrogacy, abortion, rape, spousal abuse, and pornography.]

LAW 728 Foundations of Criminal Law
Fall. 3 credits. Prerequisite: Criminal Law. S. P. Garvey.
This seminar examines various theoretical issues in the substantive criminal law. Among the topics to be discussed are the justification (if any) for punishment; the relationship between theories of punishment and political theory; the moral limits on the authority of the state to criminalize conduct; theories of excuse and justification in the criminal law; and the role of emotion and reason in the criminal law.

[LAW Foundations of Employment Law
3 credits. Prerequisite: Labor Law or Employment Law. Not offered 1999–2000.
This seminar studies labor markets to catalog ways they succeed and ways they fail, and assesses ways that labor market regulation attempts to correct market failure. Both labor law (regulation of unions) and employment law (regulation of the nonunion workplace) topics are covered. Specific topics include: internal labor markets and contingent workers; the decline of unions; policies underlying the National Labor Relations Act; the erosion of the employment-at-will doctrine; and regulation of health care and pensions. To add perspective, the seminar will attempt a comparative examination of the legal systems of Canada, Japan, Germany, France, New Zealand, and Macedonia.]

[LAW Health Care Reform
3 credits. Not offered 1999–2000.
This seminar addresses the role of law in structuring efforts to resolve problems of access, quality, and costs in health care. The focus is on the U.S. health care system but approaches of some other nations to comparable problems are briefly explored. Materials will include a health law casebook and selected readings from medical and health policy sources. During the later sessions of the semester students present their seminar papers to the class.]

LAW 731 Immigration and Refugee Law
Fall. 3 credits. Prerequisite: Constitutional Law. S. W. Yale-Loehr.
This seminar explores the evolving relationship between U.S. immigration policy and our national purposes. Immigration plays a central role in contemporary American life, significantly affecting our foreign relations, human rights posture, ethnic group relations, labor market conditions, welfare programs, public services, and domestic politics. It also raises in acute form some of the most basic problems that our legal system must address, including the rights of insular minorities, the concepts of nationhood and sovereignty, fair treatment of competing claimants for scarce resources, the imperatives of mass administrative justice, and pervasive discrimination. In approaching these questions, the course draws on diverse historical, judicial, administrative, and policy materials.

LAW 732 The Independence of Lawyers
Fall. 3 credits. L. J. Fox.
No area of the law is in more ferment than professional responsibility. Traditional models for the provision of legal services are being attacked by others from accountants to real estate brokers who wish to enter the field and who are asking, even demanding, that we dispense with many of our basic ethics rules. The standard litigation model is being attacked as too slow and too expensive and being usurped by alterative methods of dispute resolution. Old fashioned notions of loyalty to clients are being undermined by the economics of the practice of law. Traditional principles of confidentiality are being questioned as interfering with the search for the truth and the demands of effective law enforcement. Insurance companies are aggressively controlling the way legal services are delivered to their insureds. Our ethics rules are being asked to respond to such knotty issues as hate speech, discrimination, and pay-to-play. This seminar will give students an opportunity to explore in depth these and other "hot" topics which, one can predict, will simultaneously be the subject of headline- grabbing news stories (at least in the National Law Journal) as the course proceeds.

LAW 733 International Criminal Law
Spring. 3 credits. D. Wippman.
This seminar will examine the evolution of modern international criminal law, from Nuremberg to the new International Criminal Court. Topics will include the nature and sources of international criminal law, jurisdiction, individual and state responsibility, penalties and deterrence, and alternatives to criminal trials, such as truth commissions and amnesties. The seminar will emphasize recent developments, such as the Pinochet extradition proceedings and efforts to try senior Khmer Rouge leaders.

LAW 734 Introduction to French Law
Spring. 3 credits. Prerequisite: Not available to students with significant knowledge of civil law system.
C. M. Germain.
Introduction to the French legal system from a comparative law perspective, with a focus on civil law methodology and French legal institutions. Topics studied include French law sources and authorities, such as legislation, court decisions, and scholarly writings; the relationship between French law and the European Union; the French court structure in civil, criminal, and administrative law matters and its major procedural features; and the organization of the legal profession.

LAW 735 Issues In Tort Law
Spring. 2 credits. J. A. Siliciano.
The course explores some of the major theoretical and practical questions surrounding the tort system. The central inquiry focuses on the purported goals of tort law, their compatibility with each other, and the degree to which they are realized in practice. The course also examines a variety of substantive areas and considers various proposals to restructure tort law.

LAW 736 Juvenile Justice Seminar
Spring. 3 credits. D. N. Yellen.
This seminar examines the history, philosophy, and current issues concerning the separate juvenile justice system. Among the issues that may be considered are the constitutional protections applicable to the juvenile justice process, the treatment of noncriminal misconduct, waiver to adult court, confidentiality, the roles of police, lawyers and social workers, and sanctions.

[LAW Labor Law Theory and Policy Seminar (also ILR 608)
3 credits. Prerequisite: Labor Law. Not offered 1999–2000.
The U.S. collective bargaining system, which had 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 are: the theory of regulation embodied in the National Labor Relations Act and its critique; alternative conceptions of labor markets and their policy ramifications; and the emerging 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.]

[LAW Law and Economics Seminar
3 credits. Not offered 1999–2000.
Selected analysis of ways in which the law has incorporated, wittingly or unwittingly, an economic perspective. A major topic is the Coase Theorem and whether the common law promotes efficiency; a second theme is whether such a common law is ethically appropriate; a third theme contrasts the efficiency of the common law with the marketplace for legislation. Prior study of economics is neither required nor disqualifying.]

LAW 741 Law and Higher Education
Spring. 3 credits. Prerequisite: Constitutional Law or Administrative Law.
J. J. Mingle.
Higher education is a complex, idiosyncratic institution. Universities and colleges have a unique mission—teaching, research, and public service—and a uniquely challenging task of accommodating the various constituencies and organizations both internal (governing boards, faculty, students) and external (alumni, legislatures, courts, government agencies), that influence how they are managed and how policies are shaped. This seminar will explore the dynamic tensions, high expectations, and complex legal policy issues universities face in fulfilling their mission.

LAW 743 Law and Mental Health Seminar
Fall. 3 credits. H. R. Beresford.
The seminar explores issues at the interface of law and psychiatry. After an introduction to clinical and scientific aspects of mental illness, the seminar will address issues of autonomy, liberty, competency, coercion, and criminal responsibility as they relate to persons with disorders of behavior, cognition, or mood. Students write and present seminar papers on self-selected topics.

LAW 744 Law, Science, and Technology
Fall. 3 credits. Y. M. Cripps.
An examination of the interaction between legal principles and procedures and scientific research and development. Topics include the role of the law in regulating cloning, recombinant DNA research, surrogacy, and in vitro fertilization; plant breeders' rights and the patentability of organic matter; judicial assessment of expert scientific evidence; and compensation for damage caused by scientific experiments and new technologies.

LAW 745 Law Through Literature
Fall. 3 credits. N. L. Cook.
In this seminar, students use literature, supplemented by law texts, as a basis for understanding operations of law and the impact of legal process on people's lives. An explicit goal of the course is the acquisition of literary skills that can be cross-utilized in law practice. Students thus not only analyze legal principles in the context of stories, but also learn how to apply such literary concepts as metaphor, imagery, plot and character development, perspective, and point of view in their legal work.

LAW 746 Lawyers and the Legal Profession
3 credits. Satisfies the professional responsibility requirement. R. C. Cramton.
This seminar is divided into roughly two parts. First, a survey of the law of lawyering in a small class setting during the first one-half of the course; and second, more detailed consideration of a number of current issues after the spring break. Members of the seminar actively participate throughout, but their writing and presentations generally are concentrated on the topics considered during the latter half. Special topics for Spring 1999 included the following: client fraud in business transactions, the Whitewater prosecutors and the O. J. Simpson defense team; counseling regulatory compliance (the Kaye-Scholer affair); the Lindsey-Clinton attorney-client privilege cases; and the ethics issues raised by A Civil Action. Distinguished practitioners participate in a number of seminar sessions.

LAW 756 Legal Aspects of Commercial Real Estate Development
Spring. 3 credits. J. E. Blyth.
Through the use of several written memoranda and one oral presentation, this seminar addresses considerations basic to commercial real estate development. It focuses on purchase agreements, options, rights of refusal, memoranda thereof, representations, and warranties; disclosure required of brokers and sellers, attorneys as brokers, notarial misconduct; conveyancing and surveys; commercial leases; conventional financing; conflicts between commercial tenants and institutional lenders; alternatives to conventional financing; title insurance; attorney opinion letters; and choice of real estate entity. About one-half of the course is devoted to commercial leases; conventional financing, and alternative to conventional financing (such as tax exempt financing and synthetic leases).

[LAW Legal Information Systems
3 credits. Not offered 1999–2000.
The seminar will address those qualities and effects of legal information databases which courses in legal research and the formal study of information retrieval do not. Whereas such courses and the disciplines from which they arise would see legal information systems as either research tools or as corpora that form a backdrop for the study of computer science techniques, we will be interested in such systems as economic entities with particular importance to lawyers and their clients, and as phenomena that have a role in defining the activities and boundaries of lawyering. Why is one such database better than another, and what does such a functional analysis say about what lawyers do and think? What are the practice (and malpractice) implications of an array of differentially priced sources for legal information? What happens to the role of the lawyer when clients have equal or better access to the letter of the law? What is the boundary between legal information and legal advice? What combination of private and public actors provides the "best" system for distributing legal information? These questions, and others, will define our area of work. Such a discussion is particularly relevant at a time of major upheaval in the way these primary tools of the profession are defined, bought, and sold.]

[LAW Managed Care Seminar
3 credits. Not offered 1999–2000.
Traditional fee-for-service indemnity insurance plans are being replaced by "managed care" as the dominant mode of financing health care in this country. This seminar examines the role of law in resolving the ethical, social, and economic debate that managed care has generated. Opponents of the trend have called for legislation to set standards for what insurers must provide. For instance, in response to "drive-through deliveries," legislation has been proposed to increase the minimum number of hospital days for which a patient can be reimbursed after the birth of a child. On the other hand, proponents argue that health care providers, insurers, and even patients benefit from cost-containment measures. Meanwhile, lawyers for health care insurers, providers, employers, governments, and patients must cope with this changing environment by using existing legal doctrines or creating new ones. Each student will prepare a paper on some aspect of the role of law in managed care. These papers might involve, for example, a critique of a piece of legislation or examination of the various legal concepts used to adjust to the changing environment of health care in this and other industrialized countries.]

LAW 758 Melville and the Law
Spring. 3 credits. A. Konefsky.
This seminar will explore Herman Melville's views on law, lawyers, and legal systems as developed in three of his works of fiction: Benito Cereno, Bartleby, and Billy Budd. Melville's ideas about slavery, free labor, and the nature of justice will be explored through (1) an examination of the historical and legal historical events that may have influenced Melville's fictional narratives, (2) a discussion of the stories themselves, and (3) an analysis of literary criticism focusing on the relationship between law and Melville's work.

LAW 759 National Security Law Seminar
Fall. 3 credits. K. Clark.
This course will examine the struggle between the executive and legislative branches in the areas of national security and foreign affairs; the federal government's authority to pursue covert and overt wars; limitations on civil liberties during war-time and other emergencies; the government's regulation of personnel with security clearances; and the public's access to national security information through the Freedom of Information Act and other means.

LAW 760 Organized-Crime Control
Fall. 3 credits. Prerequisite: Criminal Procedure. R. C. Goldstock.
This seminar discusses selected aspects of criminal procedure and civil remedies that are used to control sophisticated illegal syndicated activity. Constitutional, statutory, and practical concerns in the use of electronic surveillance and RICO are a particular focus.

LAW 766 Origins of English and American Law
Spring. 3 credits. E. Sherwin.
This course provides an overview of Anglo-American legal history, including Roman law origins, early English law, early American law, and modern social and intellectual legal debates. Approximately one half the course will be spent on foundational reading; the second half will consist of presentation of student papers.

LAW 770 Reproductive Issues Seminar
Spring. 3 credits. M. A. Fineman.
This seminar will consider various reproductive dilemmas, paradoxes, and policies in modern American society. Birth control and abortion will be addressed, but the emphasis will be on placing the reproductive process within a broad sociolegal context. To this end, we explore issues such as eugenics, the

use and regulation of medical technology, lesbian mothering, the relationship between reproduction and poverty programs, and a variety of other contemporary issues.

LAW 774 Selected Business Transactions Seminar
Fall. 3 credits. Recommended prerequisites: Corporations. Z. J. Shulman.
An in-depth look at initial public offerings and acquisitions from a practitioner's point of view. With respect to initial public offerings, the course will cover: the applicable statutory framework, pre-offering corporate preparations (such as the implementation of poison pills and stock option plans), the due diligence process, the implementation of corporate governance policies appropriate for a public company, the offering registration process, liability under federal securities laws, the Securities and Exchange Commission review process, underwriting arrangements, selection of a trading forum (i.e., NYSE, NASDAQ, or AMEX) and the transaction closing. Regarding mergers and acquisitions, the course will explore: financing alternatives, accounting treatment, due diligence, choosing an appropriate transaction structure (i.e., stock versus asset sale), public company transaction issues i.e., antitakeover matters and fiduciary concerns, fiduciary duties, and crucial legal aspects of the acquisition, such as letters of intent, successor liability, continuity of employees and non-competition agreements.

[LAW Separation of Powers
3 credits. Not offered 1999–2000.
The last fifteen years have witnessed more debate about the nature and consequences of "separation of powers" than we have seen since the Founding Era. This seminar examines the ways this concept is understood and used by modern judges, legislators, executive officials, and scholars to justify, or to attempt to modify, the distribution of power within contemporary American government.]

[LAW The Supreme Court and the Death Penalty
3 credits. Not offered 1999–2000.
This seminar examines the role of the Supreme Court in modern capital punishment jurisprudence focusing on how, and to what extent, the Court's view of death penalty cases has changed in the last thirty years. Students will have the option of writing a paper or assisting in the research for and drafting of a petition for writ of certiorari or brief filed in the Supreme Court.]

[LAW Tax Policy Seminar
3 credits. Prerequisite: Federal Income Taxation. Not offered 1999–2000.
This seminar analyzes the tax policy goals of fairness, simplicity, and economic efficiency, and examines how well the present tax system satisfies these goals. Specific topics include: progressivity of the tax rate structure; use of the tax system to advance social policies; tax legislative process; taxation of the family; comparison of income and consumption taxes.]

[LAW The Religion Clauses of the First Amendment
3 credits. Prerequisite: Constitutional Law. Course not available to students who have already taken Civil Liberties Clinic. Not offered 1999–2000.
This course examines various issues relating to the First Amendment's establishment and free-exercise clauses. In the early part of the semester the seminar meets to discuss assigned readings. The later part is devoted to the presentation of seminar papers. Each student must submit a substantial paper on an approved topic and brief written critiques of two other students' papers.]

LAW 777 Theories of Property
Fall. 3 credits. Prerequisite: Property. G. S. Alexander.
This seminar explores the various ways that people have conceived of, or understood, property. The materials studied are eclectic and interdisciplinary. They include readings on slavery and property, women and property, community interests in property, as well as classical theories (libertarian, utilitarian, Marxian).

LAW 778 Transition to Democracy
Fall. 3 credits. I. P. Stotzky.
The closing decades of the twentieth century can rightly be characterized as the era of democracy. During the 1970s, several southern European nations abandoned longstanding dictatorships and adopted democratic regimes. During the early 1980s, most Latin American nations repudiated their aged military dictatorships and instituted democracies. In the 1990s, another wave of democratization swept Eastern Europe and the Soviet Union, destroying the "Communist Empire." In nations undergoing this transition, economic, political, and social stability has not yet been fully achieved. The corporatist political and social structures have not yet been transformed to allow the vast, underprivileged majority access to the basic necessities that ensure a dignified life. Institutional structures of public life, such as a representative legislative branch, a competent judiciary, and an executive branch that adheres to its constitutionally imposed boundaries, must be developed and stabilized. The rule of law—and thus the fundamental guarantees of due process—has to become an accepted, basic requirement of public life and private social interaction. In this seminar, we will examine the very complicated issues involved in the transition process. For example, we will look at the relationship among constitutionalism, democracy, human rights, and law. We will also discuss the role in the democratization process of cultural norms, human rights trials, economic development, and the international community.

LAW 779 United Nations, Elections, and Human Rights
Fall. 3 credits. M. B. Ndulo.
The seminar provides a wide range examination of the current status of the international protection of human rights with special emphasis on civil and political rights relating to elections and governance. Taking part in the conduct of public affairs is a basic human right increasingly prized by people throughout the world. Universally, the right to take part in government is proclaimed and guaranteed by the Universal Declaration of Human Rights and the International Covenant on Civil and Political Rights and is recognized in many other international treaties and declarations. At times free and fair elections necessitate international assistance to countries to aid them in fulfilling international human rights standards, and cooperation in establishing and strengthening the legal, technical and physical infrastructure necessary to carry out elections. The seminar will further examine: self determination, truth commissions and the role of non-governmental organizations with regard to standard setting and monitoring of human rights.

[LAW Voting and Political Participation
3 credits. Recommended prerequisite: some previous experience with legal materials (case studies, statutes) will be helpful, but is not required. Not offered 1999–2000.
This course explores the meanings assigned to political participation in the American political system and examines a series of instances in which the law has been used to enhance, equalize, or otherwise regulate voting and other forms of political participation. The course begins by investigating the problematic rationality of political participation, examining several arguments for participation notwithstanding the low probability that any participant's vote will have an effect on electoral outcomes. A brief survey of historical and contemporary denials of the franchise is then used to shed further light on the meaning(s) of political participation. The second part of the course turns to the question of legal regulation of the vote, examining the merits and proper scope of plebiscitary democracy; the problem of apportionment resolved and created by the "one persons, one vote" rule; and efforts to facilitate minority political participation under the Constitution and the Voting Rights Act.]

CLINICAL COURSES AND EXTERNSHIPS

All clinic courses and externships satisfy the second writing requirement. Limited enrollment.

LAW 781 Capital Punishment Clinic: Post-Conviction Litigation
Spring. 4 credits. Prerequisite: permission of instructor, Criminal Procedure or Criminal Law experience preferred. J. H. Blume, S. L. Johnson.
Death penalty post-conviction litigation: investigation and the preparation of petitions, memorandums, and briefs. This course is taught as a clinic. Two or possibly three South Carolina Death Row cases will be worked on by students. Case selection will depend on both pedagogical factors and litigation needs of the inmates. Students will read the record and research legal issues. Some students will be involved in investigation, while others will assist in the preparation of papers. All students will be included in discussions regarding the necessary investigation and strategy for the cases.

LAW 782 Capital Trial Clinic
Spring. 4 credits. Prerequisite: permission of instructor, Criminal Procedure or Criminal Law experience preferred. J. Blume, S. L. Johnson.
The issues that are unique to a capital trial, with a focus on a specific capital trial and the issues it presents.

LAW 784 Government Benefits Clinic
Spring. 6 credits. Requires simultaneous enrollment in Legal Aid Clinic 1 or Legal Aid Clinic 3 (6 hours combined credit for both courses when combined with LA1 or LA3). B. Strom.
The course has both a substantive component, in which a broad conceptual understanding of

a complex and controversial area of law and public policy is developed, and a live client clinical experience, in which those concepts can be applied in solving actual client problems. The substantive component of the course provides an introduction to government benefits law by examining various need-based benefit programs including Social Security, Unemployment Insurance, Temporary Assistance to Needy Families (TANF), Supplemental Security Income (SSI), and Food Stamps. Case handling involves the representation of clients in government benefits cases (social security, public assistance, food stamps, unemployment insurance, Medicaid, SSI, etc.) involving both the Tompkins County Department of Social Services, the N.Y.S. Department of Labor and the Social Security Administration. The course also includes a lawyering skills classroom component because students are simultaneously enrolled in Legal Aid 1 or 3 (see the descriptions below).

LAW 785 Government Benefits Clinic/ Neighborhood Legal Services Externship

Spring. 6 credits. This course is a combination of government benefits and the Neighborhood Legal Services Externship and either Legal Aid Clinic 1 or Legal Aid Clinic 3 (6 hours combined credit for both courses when combined with LA1 or LA3). B. Strom.

The course is the same as government benefits except that the case-handling component involves handling cases for the Ithaca office of Neighborhood Legal Services. See that description for additional details.

LAW 786 Judicial Externship

Fall or spring. 4 credits. G. G. Galbreath. Students work with a trial court judge. Work involves courtroom observation, conferences with the judge, research and writing memoranda, drafting decisions. The emphasis is on learning about judges, judicial decision-making process, and trials. There are weekly class meetings with readings and discussions of topics related to the externship experience. While the primary focus is the student's work at the placement, each student will also do the class presentations, a final project, and will meet individually with the faculty member.

LAW 790 Law Guardian Externship

Fall or spring. 4 credits. J. M. Miner. Students will learn about the representation of children in abuse and neglect cases, juvenile delinquency proceedings, and PINS (Persons in Need of Supervision) cases through their placement at the Tompkins County Law Guardian office. Duties may include interviewing, investigating, drafting memoranda and motions, and assisting in trial preparation. Participants are required to attend the classroom component of Legal Aid 1, Legal Aid 2, or 3 (see descriptions below).

LAW 791 Legal Aid Clinic 1

Fall or spring. 4 credits. During the second and third week there may be a couple accelerated class sessions. Classes are mandatory for all Legal Aid Clinic 1 students and all students in courses which include the Legal Aid 1 classroom component. N. L. Cook, G. G. Galbreath, K. Hessler, J. M. Miner, B. Strom.

Participants handle civil cases for low-income clients of the Legal Aid Clinic under the supervision of the clinic faculty. Students interview and counsel; investigate and analyze facts; interrelate substantive and procedural law with facts in the context of actual representation; develop a strategy to handle clients' problems; identify and resolve professional responsibility issues; do legal writing; negotiate and settle cases; and represent clients at administrative hearings. Seminar classes seek to develop interviewing, counseling, negotiation, and advocacy skills through the use of readings, videotapes, discussions, demonstrations, and simulation exercises.

LAW 792 Legal Aid Clinic 2

Fall. 4 credits. Prerequisite: Legal Aid Clinic 1 or a clinic course that includes the Legal Aid 1 classroom component. N. A. Cook, G. G. Galbreath, K. Hessler, J. M. Miner, B. Strom.

Students handle legal aid cases, participate in a classroom component, and help supervise participants in Legal Aid Clinic 1. Cases are handled as described in the course description for Legal Aid 1. Students represent the clinic's clients in both federal and state courts.

LAW 793 Legal Aid Clinic 3

Spring. 4 credits. Prerequisite: Legal Aid Clinic 1 or a clinic course that includes the Legal Aid Clinic 1 classroom component. N. A. Cook, G. G. Galbreath, K. Hessler, J. M. Miner, B. Strom.

Students handle legal aid cases, participate in a classroom component, and help supervise participants in Legal Aid Clinic 1. Cases are handled as described in the course description for Legal Aid 1. Students represent the clinic's clients in both federal and state courts.

LAW 794 Legislative Externship

Fall or spring. 3 credits. J. M. Miner, B. Strom.

The students work with the local New York State Member of Assembly. Work involves drafting legislation, tracking legislation for constituents, legal research and writing, responding to constituent requests that particularly require legal research or an explanation of law. The emphasis is on learning about legislative process, drafting of legislation, understanding the reasons for statutory ambiguity, and developing various skills. There are several informal meetings with the faculty supervisor during the semester with readings and group discussions related to the externship experience.

LAW 795 Neighborhood Legal Services Externship

Fall or spring. 4 credits. Requires simultaneous enrollment with Legal Aid Clinic 1, Legal Aid Clinic 2, or Legal Aid Clinic 3. (4 hours combined credit for both courses when combined with LA1 or LA2). G. G. Galbreath, B. Strom.

Along with case handling it includes a classroom component. (See Legal Aid 1, 2, and 3 course descriptions.) The classes are devoted to the development of lawyering skills and issues related to professional responsibility and the role of an attorney. Cases involve the representation of clients of a legal services office, the Ithaca office of Neighborhood Legal Services (NLS). In addition, each student will meet periodically with the faculty supervisor for review of the placement experience.

[LAW Public International Law Clinic

3 credits. Prerequisites: Public International Law or International Human Rights. Not offered 1999–2000.

Students will prepare legal memoranda and policy proposals for foreign governments and international organizations. The memoranda will be prepared in coordination with the Public International Law and Policy Group, a nonprofit organization that provides *pro bono* advice on issues of public international law to governments, NGOs, and international organizations. Possible subject areas include minority rights, border treaties, citizenship and nationality disputes, state succession issues, and war crimes.]

[LAW Religious Liberties Clinic

4 credits. Year-long offering. Not offered 1999–2000.

Students work in teams on cases provided by organizations that handle Establishment and Free Exercise Clause cases. All students do substantial research and memoranda writing, and some may draft portions of briefs. To help ensure that students have the opportunity to take a case to completion (or at least to the next stage of litigation), this is a full-year course, with students required to register for both semesters for a total of four credit hours and a grade at the end. Given the nature of litigation, demands on student time may be sporadic, and students should be prepared to do some work over intersession if court deadlines so require.]

LAW 796 Small Business Clinic

Fall or spring. 5 credits. W. A. Kell. Students will learn and apply a broad range of knowledge in business-related law, through participating in interdisciplinary teams of students assisting microenterprise entrepreneurs with legal and business needs, specifically child care programs. Faculty from the Law School, the Johnson School of Management, and College of Human Ecology will supervise teams of students from each of the above colleges and provide classroom teaching. Under such supervision, student teams will work autonomously to consult with and provide technical assistance to the child care entrepreneur. Critical questions include: what are the needs of small businesses for legal consultation in order to survive and thrive? How can professionals of different disciplines work together most effectively to assist small businesses, given the often interconnected nature of legal and business problems? What practices are most conducive to the creation of viable small businesses, enabling entrepreneurs to respond to often-conflicting consumer needs for high quality (but affordable) services? Readings will be drawn from areas of contract, tort, property, employment, and administrative law, as well as areas of business planning, entrepreneurship, and consumer issues. There will be weekly classroom sessions focused on substantive areas of knowledge, the development of client relationships, and ethical issues. Weekly team meetings will also be required for supervision. Guest speakers from each of the colleges will offer additional experiences for learning and discussion. Writing and research requirements will be met through student work on behalf of the client entrepreneurs, including the development of contracts, procedures, articles of incorporation, and other documents, as well as internal legal memoranda and business plans.

LAW 797 Women and the Law Clinic
Spring. 6 credits. Requires simultaneous enrollment in Legal Aid Clinic 1, Legal Aid Clinic 3 (6 hours combined credit). J. M. Miner.
Students will represent women clients who have legal matters primarily in the family law area (divorce, custody, support, domestic violence). Students will also participate in the lawyering skills classroom component of Legal Aid 1 or 3. An additional class will focus on such issues as the impact of substantive law on women, the impact of legal institutions on women, professional role development, feminist lawyering methods, and other topics related to women and the law.

LAW 798 Youth Law Clinic
Spring. 6 credits. Requires simultaneous enrollment in Legal Aid Clinic 1 or 3 (6 hours combined credit). N. L. Cook.
Students will work with groups of youth and service providers in a multifaceted approach to identifying and resolving problems of a legal nature. Under the supervision of faculty and community experts, clinic students will both handle individual representation cases and participate in nonlitigation project work such as community education, legislative advocacy, and meditative training. The emphasis of the course is on planning, communication, policy development, and nonadversarial problem solving.

NONPROFESSIONAL COURSE

GOVERNMENT 313 The Nature, Functions, and Limits of Law
Spring. 4 credits. Undergraduates only. R. A. Hillman.
A general-education course for students at the sophomore and higher levels. Law is presented not as a body of rules but as a set of techniques for resolving conflicts and dealing with social problems. The course analyzes the roles of courts, legislatures, and administrative agencies in the legal process, considering also constitutional limits on their power and practical limits on their effectiveness. Assigned readings consist mainly of judicial and administrative decisions, statutes and rules, and commentaries on the legal process.

FACULTY ROSTER

Abrams, Kathryn, J.D., Yale U. Prof.
Alexander, Gregory S., J.D., Northwestern U. Prof.
Avery, Dianne, J.D., Buffalo U. Visiting Prof.
Barceló, John J. III, S.J.D., Harvard U. William Nelson Cromwell Professor of International and Comparative Law
Blanc-Joavan, Xavier, Doct. Laws, U. of Grenoble.
Blume, John H., J.D., Yale U. Visiting Prof.
Clark, Kathleen, J.D., Yale U. Visiting Prof.
Clermont, Kevin M., J.D., Harvard U. James and Mark Flanagan Professor of Law
Clymer, Steven D., J.D., Cornell U. Assoc. Prof.
Cramton, Roger C., J.D., U. of Chicago. Robert S. Stevens Professor of Law
Cripps, Yvonne M., Ph.D., U. of Cambridge. Visiting Prof.
Eisenberg, Theodore, J.D. U. of Pennsylvania. Henry Allen Mark Professor of Law
Farina, Cynthia R., J.D., Boston U. Prof.
Fineman, Martha A., J.D., U. of Chicago. Doreatha S. Clarke Professor of Feminist Jurisprudence
Fox, Lawrence, J., LL.B., U. of Pennsylvania. Visiting Prof.
Garvey, Stephen P., J.D., Yale U. Assoc. Prof.
Germain, Claire M., M.L.L., U. of Denver. Edward Cornell Law Librarian and Professor of Law
Green, Robert A., J.D., Georgetown U. Assoc. Prof.
Hay, George A., Ph.D., Northwestern U. Edward Cornell Professor of Law and Professor of Economics in the College of Arts and Sciences
Henderson, James A., Jr., LL.M., Harvard U. Frank B. Ingersoll Professor of Law
Hillman, Robert A., J.D., Cornell U. Edwin H. Woodruff Professor of Law
Holden-Smith, Barbara J., J.D., U. of Chicago. Assoc. Prof.
Jensen, Erik. L., J.D., Cornell U. Visiting Prof.
Johnson, Sheri L., J.D., Yale U. Prof.
Kahn, Faith Stevelman, J.D., New York U. Visiting Prof.
Kahng, Lily, J.D., Columbia U. Assoc. Prof.
Konefsky, Alfred S., J.D., Boston C. Visiting Prof.
Macey, Jonathan R., J.D., Yale U. J. DuPratt White Professor of Law
Martin, Peter W., LL.B., Harvard U. Jane M. G. Foster Professor of Law
Ndulo, Muna B., D. Phil., Trinity C. Visiting Prof.
Palmer, Larry I., LL.B., Yale U. Prof.
Rachlinski, Jeffrey J., Ph.D., Stanford U. Assoc. Prof.
Rossi, Faust F., J.D., Cornell U. Samuel S. Leibowitz Professor of Trial Techniques
Rudden, Bernard, D.C.L., Oxford U. Visiting Prof.
Schwab, Stewart J., Ph.D., U. of Michigan. Prof.
Sherwin, Emily L., J.D., Boston U. Visiting Prof.
Shiffrin, Steven H., J.D. Loyola U. of Los Angeles. Prof.
Siliciano, John A., J.D., Columbia U. Prof.
Simson, Gary J., J.D. Yale U. Prof.
Stone, Katherine V. W., J.D., Harvard U. Prof.
Stotzky, Irwin P., J.D., U. of Chicago. Visiting Prof.
Summers, Robert S., LL.B., Harvard U. William G. McRoberts Research Professor in Administration of the Law
Taylor, Winnie F., LL.M., U. of Wisconsin. Prof.
Teitelbaum Lee E., LL.M., Northwestern U. Prof.
Wippman, David, J.D., Yale U. Assoc. Prof.
Yellen, David N., J.D., Cornell U. Visiting Prof.

Legal Aid Clinic

Cook, Nancy L., J.D., Georgetown U. Senior Lecturer
Galbreath, Glenn G., J.D., Case Western Reserve U. Senior Lecturer and Director, Cornell Legal Aid Clinic
Hessler, Katherine M., J.D., C. of William and Mary. Visiting Senior Lecturer
Miner, JoAnne M., J.D., U. of Connecticut. Senior Lecturer
Strom, Barry, J.D., Cornell U. Senior Lecturer

Academic Library Staff

Germain, Claire M., LL.B., U. of Paris. Edward Cornell Law Librarian and Professor of Law
Bynum, Charlotte L., J.D., Tulane U. Reference Librarian
Court, Patrica G., J.D. Hamline U. Asst. Director for Administration and Public Affairs
Gillespie, Janet M., M.S., Cornell U. Adminsitrative Supervisor/Access Service
Luke, Joseph, J.P., U. of Michigan. Reference Librarian
Pajerek, Jean M., M.L.S., SUNY-Albany. Head of cataloging
Smith, Daniel L., J.D., U. of Iowa. Reference Librarian and Curator of Rare Books

Members of Other Faculties Associated with the Law School

Carmichael, Calum M., B. Litt., Oxford U. Prof. College of Arts and Sciences

Adjunct Faculty Members

Balotti, R. Franklin, LL.B., Cornell U. Adjunct Prof.
Beresford, H. Richard, M.D., U. of Colorado. Adjunct Prof.
Blyth, John E., Dr.jur., Goethe U. Adjunct Prof.
Bordewieck, Douglas, J.D., Harvard U. Adjunct Prof.
Briggs, W. Buckley, J.D., Georgetown U. Adjunct Prof.
Goldstock, Ronald G., J.D., Harvard U. Adjunct Prof.
Hull, Robert K., LL.M., Harvard U. Adjunct Prof.
Kell, William A., J.D., Wayne State U. Adjunct Prof.
Meyer, Judith, J.D., Cornell U. Adjunct Prof.
Mingle, James J., J.D., U. of Virginia. Adjunct Prof.
Ridgway, Delissa, J.D., Northwestern U. Adjunct Prof.
Shulman, Zachary, J.D., Cornell U. Adjunct Prof.
Tahsuda John, J.D., Cornell U. Adjunct Prof.
Yale-Loehr, Stephen W., J.D., Cornell U. Adjunct Prof.

Legal Methods Program

Anderson, Paige S., J.D. Cornell U. Academic Support Coordinator, Lecturer
French, David A., J.D., Harvard U. Lecturer
Grumbach, Carol, J.D., Cornell U. Co-director of Legal Methods Prog. and Senior Lecturer
Harris-Abbott, Troy L., J.D., U. of Michigan. Lecturer
Williams, Brian S., J. D., Indiana U. Co-director of Legal Methods Prog. and Senior Lecturer

JOHNSON GRADUATE SCHOOL OF MANAGEMENT

ADMINISTRATION

Robert J. Swieringa, dean

John A. Elliott, associate dean for academic affairs

Michael J. Hostetler, associate dean for executive education

Richard A. Highfield, associate dean for MBA Program and operations

Richard A. Shafer, associate dean for corporate relations

Susan K. Salton, executive director of marketing and corporate communications

Steven J. Sharratt, executive director of development

Natalie M. Grinblatt, director of admissions

Stephen F. Johansson, director of career services

Harriet Peters, director of advising and student activities

Rhonda Velazquez, assistant to the dean

Ann W. Richards, financial aid, registration and admissions operations director

The Johnson Graduate School of Management prepares men and women for managerial careers in business. The school offers course work in many disciplines to provide potential managers with an understanding of the complexities of the professional world in which they will operate and of the organizations of which they will become a part.

A bachelor's degree or its equivalent is required for admission to the two-year program leading to the Master of Business Administration (M.B.A.) degree. Nearly half of the students have a background of undergraduate studies in arts and sciences, and about one-quarter in engineering. Five percent of the students begin their graduate training immediately after receiving their bachelor's degrees and the remaining 95 percent following work experience.

Combined degree programs allow highly qualified Cornell students to co-register in the school during their senior year, thereby earning a master's degree in less than the usual time.

The doctoral program, administered through the Graduate School, provides an advanced level of education in business for those who seek careers in teaching and research at leading universities.

More detailed information about these programs is available from the Office of Admissions and Student Affairs, Johnson Graduate School of Management, Room 111 Sage 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
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 workouts, 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 401 Entrepreneurship for Scientists and Engineers
Fall, spring. 3 credits. J. Nesheim.
This course is intended to introduce students to the new business startup process. Small teams will be formed to come up with an idea for a startup and create a business plan that can attract venture capital or other funding for the new enterprise. Guest lecturers are from successful high-technology companies. The course is led by instructors from Silicon Valley and Ithaca who created high-technology businesses.

COURSES FOR NON-JOHNSON SCHOOL STUDENTS

NCC 550 Financial Accounting
Fall, spring. 3 credits. Course intended for non-Johnson School students only. Staff.
An introductory accounting course that examines the subject from the viewpoint of users external to the organization. Topics include transaction analysis; the accounting cycle; financial-statement preparation, use, and analysis; revenue recognition and cost measurement; present value; and problems in financial-accounting disclosure. This course is similar in content to the MBA core course: NCC 500.

[NCC 553 Marketing Management
Fall, spring. 3 credits. Course intended for non–Johnson School students only. May not be offered 1999–2000. Staff.
The course addresses controllable and uncontrollable marketing variables that managers in multi-product firms face in today's business environment. Topics include customer behavior, product planning, distribution, advertising and promotion, pricing, and competitive strategy. This course is similar in content to the MBA core course NCC 503.]

NCC 554 Management and Organizations
Fall. 3 credits. Course intended for non–Johnson School students only. Staff.
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 re-architecture and re-engineering, 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. This course is similar in content to the MBA core course: NCC 504.

NCC 556 Managerial Finance
Fall, spring. 3 credits. Course intended for non–Johnson School students only. Staff.
An introduction to business finance through theory and case studies. Topics include stock and bond valuation, the capital-budgeting decision, portfolio theory, the asset-pricing models, raising capital, capital structure, mergers and acquisitions, costs of capital, option pricing, and risk management. International applications are considered within each topic area. Letter grade only, based on exam, group case reports, homework and class participation. This course is similar in content to the MBA core course: NCC 506.

NCC 558 Production and Operations Management
Spring. 3 credits. Course intended for non–Johnson School students only. Prerequisites: NCC 501 or permission of the instructor. Staff.
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

these problems and others 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. This course is similar in content to the MBA core course NCC 508.

[NBA 553 Accounting and Finance for Engineers
Spring. 3 credits. Course intended for non-Johnson School students only. May not be offered 1999–2000. R. Hilton.
This course focuses on basic financial and managerial accounting and the economic and financial concepts that have a bearing on managerial decisions. 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 managerial accounting and the application of cost information to pricing and operating decisions, 3) and to promote an understanding of the use of economic theory in the evaluation of capital investment projects. The teaching methods consist of lectures and cases. Students are evaluated on the basis of exams.]

NCC COMMON CORE COURSES

NCC 500 Financial Accounting
Fall. 2.5 credits. Johnson School core course. Enrollment limited. J. D'Souza, R. Libby.
An introductory accounting course that examines the subject from the viewpoint of users external to the organization. Topics include transaction 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 Statistics for Management
Fall. 2.5 credits. Johnson School core course. Enrollment limited. J. McClain, J. Thomas.
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. Applications in finance, marketing and operations management are discussed.

NCC 502 Microeconomics for Management
Fall. 2.5 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 contracts. The class employs a lecture format and emphasizes problem solving. Grading is based on a midterm and a final exam.

NCC 503 Marketing Management
Fall. 2.5 credits. Johnson School core course. Enrollment limited. D. Stayman, A. Ainslie.
The course is designed to convey the key concepts of marketing and how they fit into the larger context of management strategy and decisions. Both the practical "how" and the fundamental "why" of marketing activities are presented in the light of contributions from behavioral science, economics and statistics. The goals are to provide sufficient understanding for those who will need only to interact with the marketing function, as well as communication concepts and developing processes that can provide the foundation for further course work and future experience in marketing. The course makes extensive use of case materials.

NCC 504 Management and Organizations
Fall. 2.5 credits. Johnson School core course. Enrollment limited. D. Sally.
If you think about it, stories are central to how we know and remember events, people, and facts, and to how we communicate knowledge and history. Most of the jobs you aspire to involve a particular form of story-telling—the CEO's vision, the analyst's report, the planner's strategy, the salesperson's pitch, the consultant's analysis, and the manager's brand. What distinguishes these as business stories is that they are often analytical (based on a set of objective facts and statistics) and reflect a deep understanding of the complex interactions of individuals and organizations. This course has two goals: 1) to make you appreciate the complexity of the issues that often arise in organizations, and 2) to develop and refine your analytical story-telling abilities. To achieve these goals, the course will be taught by the case-study method. Cases are an efficient way to expand your experience base with respect to such issues as motivation, power, leadership, ethics, structure, design, and change. We hope to teach you how to make good inferences about what will and won't work in particular situations, and how to learn from your own experiences and those of others.

NCC 506 Managerial Finance
Fall. 2.5 credits. Johnson School core course. Enrollment limited. R. Michaely.
The course objective is to introduce students to the basic concepts of finance. In particular, we address the issue of what type of investments should firms and individuals take on, and how these investments should be financed. Understanding these concepts are essential to financial managers and professional investors, and have important applications to many aspects of financial decisions all of us have to make on a daily basis (e.g., is getting an MBA a good investment?). These issues involve capital budgeting decisions, stock and bond valuation, how to assess and account for risk through the capital asset pricing model (CAPM), option pricing, capital structure and cost of capital, and market efficiency. Letter grade only, based on examinations, quizzes, group case reports, homework and class participation.

NCC 508 Managing Operations
Spring. 2.5 credits. Johnson School core course. Enrollment limited. Prerequisite: NCC 501 or permission of instructor. M. Lojo, L. Robinson.
This course focuses on managing processes: actions that convert inputs into outputs. Almost any business function can be modeled as a network of processes. The first part of the course examines processes, both individually and as part of a larger system; we see that good process design reflects both the volume and the variety of the product. A common course theme is the deleterious effect of variability (in demand, supply, quality, or capacity) in complex systems. Queuing theory and simulation are particularly helpful for analyzing process capabilities. The second part of the course analyzes how goods and services are produced. After describing the strategic role of operations, we examine forecasting systems, inventory management and just-in-time, and logistic management. Constrained optimization models provide information about managing with finite resources. The final part of the course examines process improvement through quality and productivity management and corporate learning.

NCC 509 Strategy
Spring. 2.5 credits. Johnson School core course. Enrollment limited. B. Hermalin, V. Kadiyali.
Among the critical tasks facing any senior manager are the creation, implementation, and evaluation of a business unit's strategy. This course seeks to provide the management student with the tools and frameworks essential to carrying out these tasks. Many of these tools and frameworks will be based on recent advances in game theory, industrial organization, and organization theory, although the course will also draw from the older business policy tradition as well. Students who successfully complete this course will be able to analyze industries, identify areas of strategy advantage and disadvantage, and to devise strategies that exploit advantages and remedy disadvantages.

NBA MANAGEMENT ELECTIVE COURSES

Accounting

NBA 500 Intermediate Accounting
Fall, spring. 3 credits. Prerequisite: NCC 500 or the equivalent. B. Sanjur, 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. May not be offered 1999–2000. R. Libby.
The course focuses on accounting problems related to equity financing, including leveraged restructuring, intercorporate investments, leveraged buyouts, 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 closed book exams. Course continues in NBA 508, Advanced Accounting, offered second half of semester.]

NBA 502 Managerial Cost Accounting
Fall, spring. 3 credits. Prerequisites: NCC 500, NCC 501, and NCC 502, or the equivalent. R. Hilton.
The course is designed both for those responsible for internal accounting information 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, non-manufacturing cost analysis, cost allocation, and transfer pricing. Instruction will be a mixture of lecture and case discussion. Student evaluation will be based on a midterm exam, a final exam, a project, and class participation.

[NBA 503 Strategic Cost Management
1.5 credits. Not offered 1999–2000. R. Hilton.
This course focuses on the role of cost management and related issues in helping a firm compete successfully in the global market. Topics considered include activity-based costing, activity-based management, value chain analysis, the lean enterprise, confronting competition in an industry dominated by lean enterprises, re-engineering, process value analysis, identification of non-value-added activities and costs, target costing, Kaizen costing, continuous improvement, time-based competition, cost versus quality, and benchmarking. The course is almost entirely based on cases, many of them lean enterprises in Japan.]

NBA 504 Taxation Affecting Business and Personal Decision Making
Spring, first half of semester. 1.5 credits. Prerequisite: NCC 500 or permission of the instructor. R. Bloomfield.
This course introduces students to the fundamental concepts and techniques of tax planning for individuals and businesses. Planning opportunities considered include changing the timing and nature of income, investments, and expenses; choosing an organizational form; constructing transactions that allow two or more parties to engage in tax arbitrage. The course also introduces tax research techniques and issues regarding tax compliance. Course continues with NBA 507.

NBA 505 Auditing
Spring. 3 credits. Prerequisite: NCC 500 or permission of the instructor. M. Nelson.
The course examines the process by which financial-accounting 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 Statement Analysis
Spring, first half of semester. 1.5 credits. Prerequisite: NCC 506, NBA 500 (or concurrent enrollment) or permission of the instructor. S. Tasker.
This course develops a set of core skills essential to financial statement analysis. We will cover strategic ratio analysis, cash flow analysis, pro forma financial statements, financial modeling, credit analysis, bond rating and bankruptcy predictions, and firm valuation using discounted cash flow techniques. Emphasis is on practical applications. The course format is a combination of case studies and lectures. The lectures communicate subtler aspects of the material while the cases provide hands-on experience. There will be an exam.

Note: Students who have completed the 3-credit version of NBA 506 cannot enroll in this course.

NBA 507 Tax Implication of Mergers and Acquisitions and Other Special Topics
Spring, second half of semester. 1.5 credits. Prerequisite: NBA 504 or permission of instructor. R. Bloomfield.
This course examines special topics in tax planning for businesses, with particular emphasis on capital structure choices and reorganizations (mergers and acquisitions), and intra-entity transactions (transfer pricing issues). Readings include many current research papers examining how large corporations exploit their tax planning opportunities.

NBA 508 Advanced and International Accounting
Spring, second half of semester. 1.5 credits. Prerequisites: NBA 501 or permission of the instructor. J. D'Souza.
The course examines advanced topics in accounting for international transactions and international subsidiaries, including foreign currency translation, price level adjustments and international variation in accounting principles. The method of instruction is lectures mixed with cases. Grading will be based on two exams and some written cases. Continuation of NBA 501, Accounting for Mergers & Consol. (offered first half of semester).

NBA 509 Advanced Financial Analysis
Fall, second half of semester. 1.5 credits. Prerequisites: NBA 506, a finance immersion course, or permission of the instructor. C. Lee.
This course builds on the core financial analysis skills developed in NBA 506. Topics covered include equity valuation, residual income models, quality of earnings assessments, earnings manipulation detection, market efficiency issues, fairness opinions in MBO's, and large sample stock screening strategies. The overall focus is on using accounting-based information to make investment decisions. Emphasis is on practical applications and special attention is given to cultivating analytical and communication skills. The course features both lectures and cases. There will be a group term project, but no final exam.

Note: Students who have completed the 3-credit version of NBA 506 cannot enroll in this course.

[NBA 510 Cornell Equity Research
Fall, spring. 1.5 credits. S-U grading only. Prerequisites: NCC 500 and NCC 506 or equivalent, and be taking (or have completed) NBA 506 or have permission of the instructor. S-U grades only. May not be offered 1999–2000. R. Bloomfield.
Students write and revise equity research reports on companies that are neglected by analysts and preferably undervalued. Class work includes lectures and cases on equity research and valuation, presentations by guest visitors, and presentations by students who must persuade the class to approve their stock recommendations.]

NBA 511 Financial Modeling
Fall, spring, second half of the semester. 1.5 credits. Prerequisites: NBA 506 or permission of the instructor, and mastery of basic EXCEL skills. S. Tasker.
Financial modeling is the art and science of constructing spreadsheet models of firms' future financial statements. In this class, we build on the brief introduction to financial modeling in NBA 506 by modeling the effect on the income statement, balance sheet, and statement of cash flows of more complicated financial transactions such as leveraged buyouts, mergers & acquisitions, and corporate reorganizations. The class meets in the state-of-the-art Parker Center computer lab, and active student participation is emphasized.

NBA 512 Applied Portfolio Management
Fall, spring. 3 credits. Restricted. C. Lee.
An accounting/finance elective course that focuses on the management of an investment fund (see Charles Lee for a full course description). Students enrolled in this course must commit to taking the course for fall and spring semesters. They will receive three credit hours for each semester's work. Strong preference is given to second year MBA students who have successfully completed either NBA 506 or one of the finance immersions. Students need to apply formally. If the number of applicants exceeds 12, admission will be competitive and merit-based.

Economics

NBA 523 Business and Economic Forecasting
Spring, second half of the semester. 1.5 credits. S-U grading only. Prerequisite: NCC 501 or the equivalent. R. Highfield.
This course will focus on statistical and econometric approaches to forecasting business and economic data series that have a time dimension (time series). The course provides students with a toolbox of time series forecasting methods and teaches them how to choose the appropriate one. Topics will include the relationship of forecasting to decision making, univariate methods such as ARIMA modeling, and some multivariate methods such as transfer function, regression, vector autoregression and neural networks. Applications will usually involve the forecasting of business and economic data. Although statistical theory will be covered as necessary with lecture and supplemental class notes, the emphasis will be on applications and learning by doing. Passing the course requires participation in class discussions and satisfactory performance on both individual and group projects. There are no exams. There is no text for the course but students will be required to use the student version of a sophisticated econometric software package.

NBA 524 Macroeconomics and International Trade
Fall. 3 credits. Prerequisite: NCC 502 or equivalent or permission of the instructor. R. Lind.
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 527 Applied Economic Analysis (also ECON 616)
Spring. 4 credits. Letter/S-U optional grading. Not offered 1999–2000. R. Frank.

This course will emphasize how economics analysis can help firms and individuals make the most of their opportunities. Of special interest to managers and consultants will be the course's focus on examples that illustrate how faulty economic reasoning leads to inefficient outcomes. The course will also emphasize strategic thinking, and will instruct students in the art of "economic naturalism"—the use of economic reasoning to understand and explain patterns of individual and firm behavior.]

[NBA 529 Economics of Imperfect Information (also ECON 757).
4 credits. Prerequisites: ECON 609–610 and 619. Not offered 1999–2000.
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, signaling theory, sequential choice theory, and search theory will be discussed.]

Finance

NBA 540 Advanced Corporate Finance (Theory and Practice)
Fall, spring. 3 credits. Prerequisite: NCC 506 or the equivalent. Students who took NBA 540 and/or NBA 548, 1.5 credit version, can not enroll in this course. H. Bierman.
This course is relevant for both investment banking and the treasurer's activities of an operating corporation. Most class sessions are lecture-discussion, but there are several corporate finance cases. The topics include common stock, preferred stock, debt securities (duration, convexity, inverse floaters, bond refunding, term structure, swaps), hybrids, security design, weighted average cost of capital, basic capital structure issues, cash distribution policy, and the buy versus lease decision. The use of debt to add value, mergers and acquisitions, corporate restructuring, LBO's and MBO's and Merchant Banking are also covered.

NBA 541 Economic Evaluation of Capital Investment Projects
Spring. 3 credits. Prerequisite: NCC 506 or permission of the instructor. B. Swaminathan.
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 taxes, and the use of single factor and multi-factor 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 discussion, spreadsheet exercises, statistical exercises, and seminars by practitioners. Students are evaluated on the basis of mid-term and final examinations, cases, and homework assignments.

NBA 542 Investments and Portfolio Analysis
Fall, spring. 3 credits. Prerequisites: NCC 501, 502, and 506, comfort with quantitative methods. H. Li.
This course deals with several important issues pertaining to investments in securities markets. First, it deals with portfolio diversification theory, asset allocation, asset pricing models such as CAPM, APT, etc. and empirical anomalies such as size effect, January effect, etc. Second, the course deals with the issue of evaluating portfolio performance, mutual fund performance, etc. Third, it deals with investment strategies based on patterns in historical security returns. This may be loosely considered as similar to technical analysis. In addition, the course deals with investment strategies based on publicly available information related to accounting and other market statistics, the use of earnings forecasts, etc. This may be considered as falling under fundamental analysis. Finally, the course deals with frictions to trading imposed by the institutional structure of securities markets. The goal of this course is to train the students in the latest tools and techniques in portfolio theory, and familiarize them with the latest developments in securities market research and applications. This is a highly quantitative course involving extensive analysis of security market data using regression analysis and other statistical tools. Grades in this course will be based on mid-term and final exams, cases, a project, and a trading game.

NBA 543 Financial Markets and Institutions
Fall, spring. 3 credits. Prerequisite: NCC 506 (Finance core). M. O'Hara, W. Bailey.
This course applies principles of finance in order to understand modern financial markets. Central themes are the structure of financial markets, their pricing function, the interaction between financial markets and macroeconomic conditions, and the processes of innovation and regulation in these markets. We look at the workings of a variety of markets and develop an understanding of the different problems which different types of markets address. We study the question of market efficiency and the interaction between government policies and financial markets. We analyze issues in innovation and regulation with basic principles of financial economics. Throughout the course, we consider the relevance of these issues for the practical corporate, portfolio, or public sector decision-maker. The course includes ideas and evidence from academic research along with historical, institutional, and international perspectives. Recent events are used to illustrate concepts and develop analytic skills. Spreadsheet assignments and a term project requiring data analysis develop research skills and illustrate academic concepts. Exams consist of computational, short answer, and short essay questions.

[NBA 544 Bank Management
3 credits. Prerequisite: NBA 543. May not be offered 1999–2000. 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 Finance
Fall, first half of semester. Spring, second half of semester. 1.5 credits. Prerequisite: NCC 506. J. Zender.
This half-semester course will cover some of the more advanced topics in the area of corporate finance, including executive compensation, corporate governance, and bankruptcy law. The course will include lecture/discussion sessions in which the main ideas and the existing evidence (i.e., the theory and the empirics) will be presented and discussed. Cases will be used to illustrate the importance and applicability of these ideas and to provide "hands on" understanding of the material.

NBA 546 Introduction to Derivative Securities
Fall, spring. 3 credits. Prerequisite: NCC 506 (Finance Core) or permission of the instructor. C. Gukhal, H. Li.
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 and class participation. The course is a prerequisite for NBA 550, Advanced Topics in Derivative Securities.

NBA 547 Applied Financial Engineering (also OR&IE 565)
Spring. 4 credits. Prerequisites: NCC 506, NBA 546, NBA 555, NBA 542, OR&IE 523, OR&IE 523, COMS 211, permission of instructor. F. Diz.
This course is designed to integrate the students' course work in engineering (computing, stochastic modeling) and finance (options/futures and investment theory) through the completion of a project. The course project will be undertaken via student groups. It will involve the implementation of a financial model to a real world problem. Problems will come from the real issues facing the financial industry. The implementation will include model formulation, computer programming, data collection, and data analysis. The course format will be a mixture of lectures by faculty, industry professionals and students (project presentations).

NBA 549 Managerial Finance Immersion
Spring. 10 credits. H. Bierman, B. Hermalin, R. Hilton, L. Robinson, S. Smidt, S. Tasker.
This is a unique immersion course specifically designed for students planning to pursue finance careers in non-financial companies. Some students interested in non-finance careers (including consulting) may wish to consider this course, but they should recognize that it is not specifically designed for this purpose. A major objective of this course is to help students make more informed choices about how to launch their finance careers. The course will provide a high level of interaction with executives who work in the finance function in a diverse collection of non-financial corporations. These interactions will take place on campus, and in the facilities of the participating companies. A conscious effort will be made to have a very diverse sample of industries

and company sizes so that students can appreciate how the financial functions of a company are affected by the size of the company, its internal culture, and the economics and technology of the industries within which it operates.

NBA 550 Risk Management with Derivatives

Spring. 3 credits. Prerequisites: NBA 546 and NBA 555 (NBA 555 can be taken concurrently). R. Gukhal.

This course studies advanced topics in derivatives and risk management. The first part of the course covers topics in derivatives and develops the tools necessary for analysis and the seconnd part is their application to risk management. This course is intensive and demanding—about 50% more demanding than the Fall NBA 546 course.

[NBA 551 Current Topics at the Crossroads of Law and Finance

Spring. 3 credits. May not be offered 1999–2000. M. O'Hara.

This course explores a series of selected topics that involve important issues in law and finance. The premise of the course is that financial institutions of all kinds, whether they are known as insurance companies, banks, investments banks, or pension funds, invest money and advise clients in a wide variety of settings. This agency relationship introduces a number of important dimensions to the intermediary-client relationship and this course will look at these issues from both an economic and legal perspective. Emphasis will be placed on the intersections between modern finance theory and legal analysis.]

NBA 552 Cases in Corporate Finance

Spring. 3 credits. Prerequisites: NCC 506 or the equivalent. Recommended: NBA 540. Course is limited to second-year MBA's and Twelve-Month Option Students. Students who took NBA 535 and/or NBA 536, 1.5 credit version, can not enroll in this course. H. Bierman.

This course consists of discussions of corporate finance cases dealing with corporate financing. Students will form groups and formally present one case and critique a second. This is in addition to the normal class sessions. The cases in this course deal with mergers, acquisitions, valuation, corporate restructuring, LBO's, MBO's, Merchant Banking and the financing of corporations. The material applies equally to careers in investment banking and managerial finance. The course does not deal with sales trading or the details of managing an investment banking firm. Several executives working in corporate finance will present cases.

NBA 554 International Finance

Spring. 3 credits. Prerequisite: NCC 506 (Finance core) or permission of instructor. 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 to understand the ideas and research results of international finance and to adapt what they learn to the practical problems of the increasingly globalized business world beyond the classroom. The first part of the class outlines three basic themes: exchange rate volatility, barriers to international capital flows, and the value of international diversification. The second part of the class presents a variety of problems, examples, and applications from the three basic themes. These range from corporate finance applications of capital budgeting to portfolio management strategies. Spreadsheet assignments and a term project requiring data analysis develop research skills and illustrate academic concepts. Exams consist of computational, short answer, and short essay questions.

NBA 555 Fixed Income Securities and Interest Rate Derivatives

Fall, spring. 3 credits. Prerequisites: NCC 506 (Finance core), NCC 501 (Quantitative Methods core). R. Jarrow.

This course is designed to study the pricing, hedging, and risk management of fixed income securities and interest rate derivatives. Topics to be studied include: the term structure of interest rates, interest rate swaps (caps, floors, collars), the risk structure of interest rates, credit risk spreads, and corporate bond valuation. The method of instruction is lectures and discussion, with computer illustrations an integral part of the class content.

NBA 556 Immersion in Investment Banking

Spring. 10 credits. Prerequisite: NCC 506. T. Dyckman, J. Hass, B. Hermalin, H. Li, L. Robinson, B. Swaminathon, S. Tasker.

This course is specifically designed for those students planning to pursue careers in investment banking. The course is inappropriate for students interested in following a finance career in non-financial industry or non-finance careers (including consulting).

This course is designed to meld the practical and the theoretical aspects of the field. We will be expecting a great deal of interaction and discussion between students, the participating faculty, and visiting practitioners. While the course is designed to make its students more attractive as candidates for employment in the investment banking profession, and we expect that some of the participating firms will be using their visits to identify candidates for summer internships, obtaining relevant summer internships remains the responsibility of the students.

NBA 557 Case Studies in Venture Investment and Management

Fall. 2 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 on the subsequent management of such ventures. The primary perspective is that of the venture capitalist in assembling 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, 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.

NBA 558 Corporate Financial Policy

Fall, second half of semester. Spring, first half of semester. 1.5 credits. Prerequisite: NCC 506 (Finance core). J. Zender.

The course will deal with frontier topics in corporate finance and investment strategy. The financial world is changing at an increasing pace. New financial products are coming to the markets, and the financial structure of many corporations is becoming more and more complicated. Corporate financial officers and investors (such as money managers) need to know the driving forces behind the financial products (debt, equity, and more complicated products) to understand the products themselves. Understanding these issues will enable us to estimate firm values more precisely. The course objective is to enable you to better analyze financial situations you may encounter in the future, as well as firms' valuation techniques.

General Management

NBA 530 Entrepreneurship Lab

Fall, spring. 3 credits. Prerequisites: NBA 564 Entrepreneurship, or concurrent enrollment, or permission of the instructor. MBA students only. Letter/S-U optional grading. P. Sears.

Students will team up with entrepreneurs in the greater Ithaca area on defined projects, which will be integral to the companies' operations, such as production planning, new product launches, or assessing organizational structure. The goal of the course is for students to gain first-hand exposure to the application of functional knowledge in a start-up setting, while bringing real value to the host company.

NBA 531 Startup Forum: Cornell Technologies with New Venture Potential

Fall, spring. 1 credit. S-U grading only. R. Holsten.

The course will focus on research at Cornell, which may be a basis for new business ventures. It will address the fundamental ways in which university-based research differs from industrial research. Students will explore and critique the business potential of each concept.

NBA 532 Venture Partnerships—the Corporate Business Development Role, Big Company vs. Emerging Company

Spring. 1.5 credits. Letter/S-U optional grading. P. Sears.

In an era when large corporations are 'downsizing' and 'outsourcing' in order to save on fixed costs, and emerging companies are dependent upon strategic partnerships with large companies as part of their financing strategies, the business development executive can be found at the vortex of this activity. Priorities for the business development executive are distinctly different depending upon the size and history of the enterprise. This course, taught by a venture capitalist who has also served as a Corporate Development Vice President for a Fortune 100 Company, examines the multitude of roles played by managers in business development jobs. A significant amount of attention will be paid to

planning and managing the merger and acquisition process, as well as key elements in negotiation of the strategic partnership. There will be several guest speakers, each an acknowledged expert in the field. Students will be assigned deal-making tasks in the context of a case study that will be the centerpiece of the course. Class dates will be announced. Students will be expected to have read the Big Pharm case study prior to the first class.

NBA 559 The Venture Capital Industry and Private Equity Market

Spring. .5 credit. S-U grading only. D. BenDaniel, J. Reyes.

This course focuses on the industry from the practitioners' perspective. Topics include (1) an introduction to the private equity market focusing on the transactions that define the industry, its structure, participants, history and trends, (2) institutional private equity investing—now an increasingly important and dynamic part of the asset allocation mix, and (3) issues in private equity investing such as concentration in fewer, larger funds and the critical role of a new class of gatekeeper/consultants for limited partners. The course will involve four lectures and a final paper. The course is given jointly by Professor David BenDaniel and Jesse Reyes, Director of Research of Venture Economics Information Services.

NBA 560 Business Law I (also ARME 320)

Fall. 3 credits. Limited to juniors, seniors, and graduate students. D. Grossman.

The course introduces the 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 intending 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: NBA 560 or permission of the instructor. D. 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, such as employment discrimination, secured transactions, product liability, unfair competition, and international business law.

NBA 562 Estate Planning (also ARME 422)

Fall. 1 credit. S-U grading only. Limited to juniors, seniors, and graduate students. 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 563 Initial Public Offerings and Acquisitions

Spring. 3 credits. Letter/S-U optional grading. J. Shulman.

An in-depth look at initial public offerings (IPOs) and acquisitions from a practitioner's point of view. With respect to IPOs the course will cover: the applicable statutory framework, pre-offering corporate preparation (such as implementation of poison pills and stock option plans), the due diligence process, the implementation of corporate governance policies appropriate for a public company, the offering registration process, liability under federal securities laws, the Securities and Exchange Commission review prócess, underwriting arrangements, pricing, selection of a trading forum (i.e., NYSE, NASDAQ or AMEX) and the consequences of going public. Regarding acquisitions, the course will explore: financing alternatives, accounting treatment, due diligence, choosing an appropriate transaction structure (i.e., stock versus asset sale) and crucial aspects of acquisitions, such as letters of intent, continuity of employees, anti-takeover strategies, and non-competition agreements. Mr. Shulman is an attorney with experience in IPOs and acquisitions, and an adjunct professor at the Cornell Law School where he teaches a seminar course on this topic.

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 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, C. Rosen.

Students learn to write clearly and effectively by focusing on the writing process as well as the finished product. Course topics include audience perspective, style, organization, strategy, and persuasion. There is a writing assignment every week. Students receive instructor and peer feedback. Priority given to MBA students. Open to other graduate students and employee degree candidates if there is room.

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, C. Rosen.

This 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. Student speeches constitute the bulk of class time, with each student presenting seven or eight speeches in the seven-week session. The small class size allows for significant individual attention. Students receive feedback from classmates and the instructor, and have the opportunity to review in tutorials the videotapes of most of their presentations. Priority given to MBA students. Open to other graduate students and employee degree candidates if there is room.

NBA 569 Management Consulting

Fall, spring. 3 credits. A. McAdams.

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 in making group presentations and evaluating them. In addition, students are required to write a comprehensive analytic term paper.

NBA 570 Leadership in Management

Spring (meets during winter break). 1.5 credits. MBA students only. S-U grades only. R. Peterson, RPW Executive Development and other Johnson School faculty.

This course is a partnership with RPW Executive Development to provide MBA students with the self-awareness and interpersonal skills required to be effective leaders (the general principles of leadership course is NBA 668). RPW has partnered extensively with the Johnson School Executive Education Department in the past. The course consists of five full-day training sessions. Staff from RPW and Johnson School faculty will provide training. The first two days will focus on self-awareness and employ several experiential exercises and self-assessment instruments including, the Campbell Leadership Index (CLI), Meyers-Briggs Type Indicator (MBTI), the Fundamental Interpersonal Relations Orientation-Behavior (FIRO-B), the Kirton Adaptation/Innovation inventory (KAI), and the Ambiguity Preference Scale (APS). Class members will also be trained in giving and receiving feedback from team members and faculty. Mid-week activities will include various leadership and team challenges, including a business simulation. Attendance is required each day of the course to receive credit. NOTE: most of the self-assessment instruments listed above will need to be completed prior to the first day of class to allow for scoring and analysis.

NBA 571 Cornell Management Simulation

Fall, spring. 1.5 credits. Restricted to second-year MBA students. J. Hass, S. Smidt.

This computer-based simulation is played by self-selected teams of four 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 periodic decisions (meeting at their own convenience). At the beginning 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 grading 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. Students who have completed NBA

549 cannot take this course. Open to MBA IIs only. Meetings will be periodic throughout the semester.

NBA 572 Environment, Economics, and Management Policy

Fall.. 3 credits. Enrollment preference to Johnson School and other graduate students, others by permission. D. Chapman.

Environmental protection and pollution controls are of major importance in the U.S. and OECD countries, and are growing in importance in developing countries. This course analyzes the economic rationale affecting business and public decision making. It investigates the success achieved in the U.S., and the important role that business has played in that success. Case studies review government-business cooperation, methods of analysis, and management strategy. The course concludes with business leaders presenting their past experiences and current challenges for analysis by the class. The general goal of the course is to introduce future managers to the realistic process of successful environmental decision making.

NBA 573 Seminar in Sustainable Development

Spring, first half of semester. S-U grading only. 1–3 variable credits. A. McAdams.

This seminar-style course will involve readings and discussion of issues in environmental management, and will also feature four significant outside speakers on the subject of environmental management. (Students interested in doing consulting projects in environmental management will be accommodated in NBA 575, Advanced Consulting.)

NBA 575 Field Projects

Fall. 3 variable credits. J. Russo.

The course teaches how to frame unstructured business problems through a hands-on team project. Teams must identify what the central issues are, and then determine the most appropriate tools and concepts to provide insight into these issues. Students also learn to approach business problems from a cross-functional perspective. Specific conceptual content includes: project management; power, politics, and personalities in work groups; managing in for-profit versus not-for-profit organizations; and organizational change. Field Projects is not classroom-based. Although there will be a few class sessions early in the semester, the course structure will revolve around (a) periodic reviews and (b) coaching sessions as needed. The instructor team will contain one regular member of the Johnson School's faculty, an experienced executive, and an administator.

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 Exxon to the Exxon Valdez oil spill and Union Carbide to the Bhopal, India, gas leak and the decision of AT&T to accept the division of its company in response to an antitrust suit filed by the United States government). Environmental and waste-management concerns are leading to new laws and regulations that will affect many aspects of business well into the next century, creating opportunities as well as posing problems. The course begins with a discussion of the political and economic foundations of business regulation. Students examine different areas of application, including economic regulation, environmental regulation, antitrust, and product liability. Guest speakers include leading scholars from throughout the university and business and government leaders.

[NBA 578 Business Ethics

Fall. 3 credits. Not offered 1999–2000. 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 Business Strategy

Fall, first half of semester. 1.5 credits. Enrollment limited to second-year MBA students only. J. Suwinski.

A well defined strategy is essential for business success—describing where the business is going, how it's going to get there, and then providing a framework for making decisions along the way. Strategy is the responsibility of top executives of a company/business, and the ability to formulate effective strategy is one of the key skills that distinguishes General Managers from functional managers. This course will focus on the process of effective strategy formulation from the perspective of the general manager of a business unit. This perspective also applies to consultants working for clients on business unit strategy. Corporate strategy and its interaction with business unit strategies will be discussed, as well as tools useful for industry and company analysis. Situational analysis will also be covered. This course will compliment the core strategy course, with emphasis on understanding and practicing frameworks that are useful in case-based interviews. The course will draw heavily on the instructor's experience developing strategy for numerous businesses at Corning Incorporated. Guest speakers from industry and strategy consulting firms and also from industry will present their approaches to strategy, and the analytical tools they find most effective in working on business strategy. Students will gain experience, via assigned cases, in analyzing business problems/opportunities, using the strategic process to formulate effective business strategies, and in presenting their recommendations in written form and orally in class. A major case write-up and presentation in a mock board environment at the end of the course gives students an opportunity to play the role of strategy consultants working on a real case.

NBA 653 Strategic Alliances: Lessons from Experience

Spring. 1 credit. S-U grading only. J. Suwinski.

A wide variety of strategic alliances are being used today as companies try to leverage their resources for competitive advantage. This course will overview the spectrum of alliances, examining the strategic rationale and pros and cons of each major type of alliance. The primary focus of the course will be on joint ventures as a specific form of strategic alliance, where the success rate is less than 50%. The course will develop a set of principles that have contributed to success for Corning Incorporated. The course will be taught from the perspective of the general manager of a major business unit.

NBA 665 Managing Technology and Innovation

Spring. 3 credits. M. Lojo.

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 guest lectures.

International Management

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, the institution 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 environment of business. 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 and the Middle East 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 580 Strategies for Global Competitiveness

Spring. 3 credits. A. McAdams.

Initially, students explore the role of government in several private-market industrialized nations—Japan, France, Germany, the United Kingdom, and Italy—for lessons the United States might learn and use. They investigate the impact in each of those countries of government policies on the global competitiveness of the country's firms. Special emphasis is given to differential policies appropriate to each of a range of industries, from the mature to the high tech (including computers, telecommunications, and electronics), and to stages of development in each economy. Possible lessons are then tested for less developed countries that might include Venezuela and Malaysia and newly emergent countries such as Singapore. Classes are run in a discussion format. This

course can be used to fulfill the strategy requirement.

[NBA 581 Special Topics—Contemporary Development of Southeast Asian Economies
Spring. 3 credits. Not offered 1999–2000. I. Aziz.
This course will analyze the patterns and processes of Southeast Asian economic development during the last three decades. The five plus two countries in the region that will be the focus of the course include Thailand, Indonesia, Malaysia, Singapore, the Philippines, Brunei and Vietnam. The topics will be divided into the following categories: Southeast Asian economic development, regional economic cooperation in Southeast Asia, and the financial crisis of the 1990's. The course will assess important factors and consequences of the region's development patterns and use international comparative analysis to explicate the relative position and uniqueness of the region's performance. Evaluation will be based equally on the student's participation in class discussions and debates and on a term paper.]

NBA 584 International Competitive Strategy
Fall and spring, first half of semester. 1.5 credits. Letter/S-U optional grading. This course can be used to fulfill the strategy requirement. J. Katz.
Focuses on the development of competitive strategies in the global environment—including the identification of internationally relevant strengths and weaknesses, the movement and use of resources to gain competitive advantage, and strategies to confront competitors, both domestic and multinational.

NBA 585 Cross-National Management
Fall, second half of semester. 1.5 credits. Letter/S-U optional grading. J. Katz.
Focuses on the differences in managerial style across countries and develops skills to deal with these differences. Most of the material will be applicable to all countries, though two specific countries will be highlighted each semester.

NBA 586 Global Management Structures
Spring, second half of semester. 1.5 credits. Prerequisites: the new version of NBA 584. Letter/S-U optional grading. J. Katz.
Focuses on the control, communication and coordination systems within multinational corporations. Design and development of appropriate systems, to ensure enactment of corporate strategy will be addressed.

NBA 587 International Mergers & Acquisitions
Spring. 1.5 credits. J. Hanks.
This course covers issues relating to mergers and acquisitions in an international context. Topics include business due diligence, pricing and negotiation and other important topics from both the buy and sell side. The course will use both lecture and case formats. Students will be evaluated on the basis of group and individual written assignments. The instructor for the course, Mr. Arthur Rosenbloom, is special partner and former chairman of the board of Patricof & Co. Capital Corp, a New York City–based firm specializing in mergers and acquisitions, private placements, and valuations of going concern businesses for tax and corporate purposes. Patricof has offices in New York and Palo Alto, affiliates in London, Paris, Zurich, Madrid, and Munich and is part of Apax Partners, which includes Patricof & Co. Ventures, Inc., one of the world's largest international venture capital firms. He holds a bachelor's degree from Bucknell University, a master's degree from Columbia University, and a law degree from Cornell. He has taught a similar course at Columbia.

Beginning with the third meeting of the course, Mr. Rosenbloom will conduct the course via a video-teleconferencing link from New York City.

NBA 590 Managing in Developing Countries
Fall, first half of semester. 1.5 credits. Letter/S-U optional grading. J. Katz.
This class centers on the unique features of industrialized and newly industrializing countries as hosts for multinational business operations. It is a case-based course; each class 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. Grading is based on the country update presentation, a final case write-up, and class participation.

NBA 592 Experience in International Management
Spring. 1.5 credits. S-U grades only. J. Katz.
The objective of this course is to combine classroom sessions and international experience to increase awareness of business environments outside the U.S. NOTE: participation in a faculty approved study trip is required to complete this course (fee charged). On trips, students will visit local businesses, subsidiaries of foreign multinationals, government officials, local business school students, and others. Students must also attend two pre-trip meetings (1 1/4 hours each) and two Saturday meetings during spring semester (2 1/2 hours each). Those meetings will be used to present information on international business conditions, industrial structures, management styles and also, to develop cross-cultural skills. A final paper, integrating the material learned in the classroom with their experiences, will be required.

Management Information Systems

[NBA 600 Database Management
3 credits. May not be offered 1999–2000. L. Orman.
Database technology is the principal tool of bookkeeping, reporting, and auditing. It is also the primary infrastructure technology for all information systems. Not only is it critical to managing the information flow in modern organizations, but also in building systems to support managerial decisions. The course introduces the basic principles of management, design, and use of databases in organizations. Topics include: data storage and organization, efficiency and optimization, retrieval and end-user languages, reporting and auditing, and the impact on the organization. Students design, create and use databases using various database management systems.]

NBA 601 Electronic Commerce
Spring. 2 credits. Letter/S-U optional grading. Course will meet for the first nine weeks of the semester. L. Orman.
Electronic commerce is the use of information technology in conducting economic transactions and managing businesses over computer networks. It is a phenomenon that has captured the public attention because of its wide-ranging implications for businesses, markets, public institutions, and the general public. Electronic commerce involves a wide variety of cooperating technologies such as communications, networks, databases, expert systems, and multimedia. It also impacts a wide variety of managerial issues. Electronic commerce created a new emphasis on information technologies and systems in management. It led to the development of new technologies and new combinations of existing technologies to support management. On occasion, it radically altered business practices and the role of management.

The students in this course will learn to conduct economic transactions and manage businesses on the Internet. All major technical and managerial issues will be covered through computer exercises on the Internet, and case studies and examples of businesses on the Internet.

NBA 612 Imaging and the Electronic Age
Fall. 3 credits. D. Greenberg.
The advances of computer graphics, computer processing power, network bandwidths and video compression technologies are forcing the merger of the telephone, television and computer industries. The influence of these technologies has created paradigm shifts that will drastically change the way we communicate, how we are educated, the way we work, design, and in essence, how we will live in the next century. We are just beginning to fathom how these changes will influence our modus operandi and greatly modify our traditional patterns of behavior, both personal and organizational. Clearly, business and industry management will have to understand the implications of the advanced technology. This course will start by presenting historical technological advances that created major paradigm shifts for communications. Advances in computer technology emphasizing the fundamentals behind the increases in processing power, video and computer graphics capabilities, and network transmission will be presented. The latter half of the course will cover the effect of these scientific advances on many discipline-specific areas including photography, the film industry, the entertainment and animation industry, television broadcasting, publishing, as well as the computer industry itself. Sessions will be devoted to the social and legal issues rising from the rapid advances in electronic communication. In attempting to predict the disruptive changes of the future, it is best to understand the technologies themselves. Thus, students with technology or science backgrounds are preferred. Although no computer programming will be required, a working knowledge of computers is necessary. The course will be especially tailored to a business school and industrial concerns and will have interactive live demonstrations at the state-of-the-art laboratory of the Program of Computer Graphics. No prior knowledge in computer science is required.

[NBA 614 Managing in the Information Age

Fall, first half of semester. 1.5 credits. Not offered 1999–2000. A. McAdams.

In this course we explore a topic that is just beginning to emerge: the implications of the explosion of the Internet and interactive multimedia communications for the way managers think and manage. We examine the origins of the Internet and some of the forces that have let to its rapid development, noting along the way, why and how it has "blindsided us" as Andy Grove of Intel and Bill Gates of Microsoft candidly stated. We then look at how information is being used today in pioneering applications in organizations of various kinds based, in part, on original case studies and on guest lecturers. Throughout the semester the student will be asked to identify new and innovative use of modern information technologies. The course itself will evolve—even in real time—with the developments in the field.]

NBA 615 Information Technology to Manage Business

Fall. 1.5 credits (variable). S-U grades only. A. McAdams.

This course will rely on visiting speakers from several technology-based firms. The speakers will address how to manage the information technology function as a business and how to use IT to deal with business problems. Speakers will come from hardware companies, software companies, and other organizations dealing with large issues of managing the information resource. There will be assignments, with student groups interacting with speakers, and a short paper at the end of the course. The course will meet approximately 10 times during the semester for up to two hours. H-P, Intel, and other firms have indicated an interest in being involved.

Marketing

[NBA 520 Pricing and Strategy

Spring, second half of semester. 3 credits. Prerequisite: NCC 502. May not be offered 1999–2000. V. Rao.

This course extends material introduced in the core microeconomics 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 lectures and problem sets that utilize the ideas contained in the lectures. One difference is that some understanding of calculus is required. The grading for the course is based on a midterm exam, a final exam, and a paper. Specific topics covered include price discrimination, peak-load pricing, product line pricing, and pricing when information is asymmetric.]

[NBA 620 Marketing Research

Fall. 3 credits. Prerequisites: NCC 501 and NCC 503, or the equivalent. Not offered 1999–2000. V. Rao.

This course deals with marketing research as a critical support function in corporations. The broad objective is to provide a fundamental understanding of marketing research methods employed by better managed firms or proposed by leading academicians. The course is aimed at the manager, the ultimate user of marketing information, who is responsible for the scope and direction of research activities involved in obtaining, analyzing, and interpreting results of research. The course will cover the use of secondary sources of marketing information as well as designing studies for collecting primary date. Students will be exposed to up-to-date methods in research design, qualitative research, measurement, data collection and analysis. The emphasis will be on evaluating research methods and on interpretation and use of results rather than on mathematical derivations. Students will also be exposed to the practical side of marketing research through case studies, problem sets and projects.]

NBA 621 Advertising Management

Fall. 1.5 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 how recent social-science findings and theory can 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 current 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. They employ computer-assisted market strategy simulations to evaluate the effects of competing strategies. Guest speakers from industry provide a view of the operational aspects of marketing strategy.

[NBA 623 Customer-Based New Product Development

Fall, spring, first half of semester. 1.5 credits. Prerequisites: NCC 501 and NCC 503. Not offered 1999–2000.

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 (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 624 Immersion in Brand Management

Spring. 15 credits. Prerequisites: NCC 500, 501, 502, 503 and 506. Restricted enrollment permission of the instructor required. G. Babbes.

This is a full-time program for the semester; students will not be able to take other courses concurrently. The course objective is to begin training students to think and act like brand managers, some of the best-trained and most upwardly mobile professionals in industry. It will provide students with a unique opportunity to begin internalizing the concepts, principles, and tools necessary to achieve success in brand management. While the course will focus on managing traditional consumer brands, high-tech products, services, and global branding will also be addressed. In-class methods will consist of: (1) academic and industry lecturers; (2) on-site visits with marketing and manufacturing professionals; (3) case and project discussions and presentations; and (4) a brand management simulation. Course requirements will consist of (1) extensive readings; (2) individual case write-ups and presentations; (3) group projects and presentations (including a capstone business plan development project); and (4) in-class exams. There will be considerable off-campus travel for field study. Note that this course is an approved substitute for both core courses, NCC 508 and NCC 504.

NBA 625 International Marketing

Spring, second half of semester. 1.5 credits. Letter/S-U optional grading. 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 market 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. Each class includes cases, 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. A. Isen.

Topics include factors that influence response to advertising of various kinds, purchase decisions, product perceptions, response to promotion, consumer satisfaction, and the basic methodologies for understanding consumer behavior.

NBA 627 Affect, Brand Equity, and Internet Marketing

Spring. 3 credits. A. Isen.

The course will focus on concepts central to brand equity, including brand association, brand perceptions, brand loyalty, relationship marketing and brand extensions and revitalization, with a special focus on the role of affect (feelings) in decision-making and thought processes that are fundamental to these and other concepts central to brand equity establishment, maintenance, and management. Additionally we'll cover the emerging area of internet marketing from the consumer perspective relative to brand equity, including consumer response to the internet as a medium and marketing channel.

[NBA 630 Policies for Marketing Channels
Spring. 3 credits. Prerequisite: NCC 503. Not offered 1999–2000. 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 various aspects of these relationships, such as efficiency, conflict, incentives and government intervention. Instruction consists of lectures, cases and guest speakers. Evaluation is based on cases and a final project (presentation and write up) and on class participation.]

NBA 631 MARKSTRAT Simulation
Fall, second half of semester. 1.5 credits. Prerequisite: NCC 503. V. Rao.
MARKSTRAT Simulation offers an opportunity for students to make various marketing strategy decisions in a realistic, dynamic, simulated, competitive environment. Students, working in teams, will manage a portfolio of a firm's products for several years (periods). They will learn how to make long term decisions (introduction of new products) and will deal with various cross-functional issues related to marketing management (e.g., research and development, product design, and budgeting). A major portion of the course will be devoted to an understanding of the basic concepts (e.g., competitive positioning, resource allocation, market segmentation and product design) on which the game is based and to a discussion of suitable methods of analysis of data generated in the game. Students will develop an initial strategy statement and strategic marketing plan for their firm. This game has become quite popular in various schools of management that are perceived to be competitive to the Johnson School. Students will develop an initial strategy statement and strategic marketing plan for their firm.

NBA 633 Internet Marketing
Spring, first half of semester. 1.5 credits. S-U grades only. V. Rao, D. Stayman, V. Kadiyali.
This class explores the effect of the internet on marketing. The topics include an overview of the on-line industry, business models for the internet, advertising and promotions on the internet, marketing research on the internet, loyalty programs for internet marketing, and disintermediation or channel conflict resulting from internet distribution. The course will comprise industry speakers from Cendant, CSC, Netcentives, H-P, 1st USA, Catalina marketing, and Bausch and Lomb and others. Course requirements include write-ups on a subset of speakers, and a final report and presentation on an internet marketing issue of your choice. NBA 638 is restricted to MBA II's because the same information is available for MBA I's in the strategy core.

[NBA 635 Marketing Models
Fall. 3 credits. Prerequisite: NCC 503. Not offered 1999–2000. V. Kadiyali.
Students learn how to use mathematical models to solve marketing problems. The objective is to develop students' skills in evaluating marketing models and implementing them in management practice.]

[NBA 637 Direct Marketing
1.5 credits. Prerequisite: NCC 503 Marketing Management, or equivalent. Not offered 1999–2000. 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 providing an overview of the direct marketing industry and trends in database technology, the course will address major strategic and tactical issues in the management of direct marketing. The discussion will mainly consider the perspective of a marketer interested in employing the opportunities in direct marketing as an integral element of the marketing mix for a product/service. It will also address appropriate ethical concerns with direct marketing. To acquire a flavor of various practices in the industry, students will visit one or two direct marketing firms in New York City or its vicinity toward the end of the course.]

NBA 638 Analysis of Competitive Decision Making
Spring. 3 credits. Prerequisite: NCC 502 (Microeconomics core course). V. Kadiyali.
This course brings methods of micro-economics analysis to competitive decision making. Specifically, we will address issues relating to optimal competitive decisions for a firm interacting with current and potential rivals. We discuss how firms can, by their choice of appropriate decisions, best signal to rivals their intentions and their 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 and adverse selection, and how these issues affect firm choices of strategies (e.g., pricing, choice of channel partners, etc.). Instruction includes lectures and cases. Student evaluation is based on cases, class participation and a final project. This course can be used to fulfill the strategy requirement.

NBA 639 Data-Driven Marketing
Fall. 3 credits. A. Ainslie.
Data-Driven Marketing will introduce the future brand manager or marketing consultant to the use of market data to evaluate and construct pricing and promotional strategies. The course will introduce new sources of data available on product purchases and consumers' reactions to the marketing environment. The course focuses on the practical use of popular data sources. Approximately 70 percent of the course will cover panel data on high-volume consumer packaged goods, and 30 percent will be devoted to direct or "database" marketing. The goal of this course is to introduce these new data sources and provide a solid foundation for the development of analytic tools. Examples are drawn from the consumer packaged goods industry. This course makes intensive use of EXCEL and the WINDOWS computing environment. The data has been extracted and organized for use in EXCEL; this allows the student to concentrate on learning modeling tools without a large investment in computing or data manipulation methods.

Operations Management

NBA 641 Logistics and Manufacturing Strategy
Spring. 3 credits. Letter/S-U optional grading. Prerequisite: NCC 508, OR&IE 410, or permission of the instructor. L. J. Thomas.
The course is about supply-chain integration, which involves strategic management of the values chain, from materials to customer. Students discuss operations strategy issues that are important to both manufacturing and service. The course emphasizes written and oral communication skills. About a fourth 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 644 Quality Management
Fall. 3 credits. Prerequisite: NCC 508 or permission of the instructor. Not offered 1999–2000. L. Robinson.
The theme of this course will be the design and improvement of products and processes. The topics to be covered within this survey course include: (1) principles of process improvement (the formal 7-step improvement process, quality tools); (2) process monitoring (statistical process control, process capability, Motorola's '6 sigma' program); (3) product design (the Kano model, customer satisfaction and delight, issues in survey design, quality function deployment (QFD), design and manufacturability); (4) product delivery and support (quality in service and administration, satisfaction guarantees, and customer loyalty); (5) process design and improvement (kaizen vs. business process reengineering, benchmarking, design of experiments); and (6) issues in implementing quality improvements. The structure of the course will emphasize 'hands-on' applications of the principles and learning's from the course. The guest speakers and local plant tour will be supplemented with Harvard cases, several exercises (e.g., assuming the role of a Baldridge Examiner, finding and correcting the root causes of problems in a process) and homework assignments (to allow you to work through quantitative problems without any time pressure). A sizeable component of this course will be a group project, which applies the formal quality improvement process at a local firm.]

[NBA 645 Product Development Practicum
Spring. 3 credits. Not offered 1999–2000. J. Thomas.
This course centers on developing a major new product for firms. It will involve training in creativity by a consulting firm and readings in product development. This course will provide the opportunity to learn from many different sources, consultants, faculty, and executives.]

NBA 646 Managing Knowledge-Based Services
Spring. 3 credits. Prerequisite: NCC 508. M. Lojo.
This course is designed for students who plan to manage technical and high-skill service enterprises. We discuss the pros and cons of the "service economy" and examine the unique aspects of producing service products, focusing on high-end, high value-added services. Although some consumer service examples will be included, the primary emphasis is on corporate and industrial services that occur between large firms, including technical, financial and expert services. We will explore the use of traditional operations management tools in the context of service industries, as well as concepts from other disciplines such as sociology, psychology, and economics. In addition to managing the efficient provision of services, we will address service design, marketing, evaluation, and improvement. The course uses a combination of case analyses, discussion, student projects and presentations, guest lectures, and readings.

NBA 650 Semester in Manufacturing Management
Spring. 15 credits. Enrollment limited; permission of instructor required. J. Bradley, D. Conway, J. Suwinski.
This is a full-time program for the semester; students will not be able to take other courses concurrently. The course is concerned with the integration of technological, human-resource, logistical, and financial considerations to produce a manufacturing enterprise that can respond quickly and effectively to market requirements. It will be taught by a team of faculty and industrial practitioners, and much of the student work will be team-oriented. There will be considerable off-campus travel for field study to a variety of manufacturing plants. Note that this course is an approved substitute for both the Managing Operations and Management and Organizational core courses, i.e., NCC 504 and NCC 508. Johnson School students should complete NCC 506 before taking this course.

[NBA 651 Employment Relations
Spring. 1 credit. Not offered 1999–2000.
The course will be offered over two full days and will consist of three parts: (1) an overview of U.S. labor and employment law and its effect on today's management, (2) a case analysis of what can lead a workforce to seek union representation to be able to bargain collectively over wages and conditions of employment, and (3) an examination of union-management productivity partnership.]

[NBA 652 Integrating Product Design, Marketing, and Manufacturing
Spring. 1 credit. Not offered 1999–2000. J. Bradley, J. Thomas.
The course will make the necessity of integrating product design, marketing and manufacturing for a firm's success apparent. Managerial tools and useful concepts that facilitate this integration will be introduced. Students will have the opportunity, through homework assignments or projects, to make a more in-depth foray into the course topics.]

Organizational Behavior

NBA 663 Managerial Decision Making
Fall. 3 credits. J. Russo.
This course presents practical concepts from the behavioral sciences that can serve as guides to managerial action. Lectures, cases, and exercises are used to acquaint students with new perspectives on decision making, critical thinking, problem solving, and group processes. Taken together, these perspectives offer a trouble-shooter's guide to the uncertainty, complexity, and conflict in the business world.

NBA 666 Judgment and Negotiations
Fall, spring. 3 credits. K. O'Connor.
Judgment is the art and science of transforming perception into thought or opinion. 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 array of negotiation skills is 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 presented in the assigned readings and course discussions.

NBA 667 Managing Intellectual Capital
Fall, first half of the semester. 1.5 credits. B. Nelsen.
As the twentieth century draws to a close, economies long based on manufacturing are giving way to those based on the management of information, the production of knowledge, and the provision of services. Hence, organizational profits will increasingly flow from intellectual rather than material capital. A firm's success will hinge upon the manager's ability to recognize and adapt to the unique challenges presented by managing intellectual capital. This course examines this shift in the business environment and its practical implications for managers. Topics addressed include (1) motivating and managing knowledge workers; (2) employee empowerment and self-managing teams; (3) organizational learning; and (4) leadership for innovation and creativity.

NBA 668 Leading Teams and Organizations
Fall. 3 credits. R. Peterson.
This course focuses on general principles for successfully leading teams and organizations (the personal development course is NBA 570). The course draws on the latest research in team decision making and organizational leadership to address questions such as, (1) what is the difference between leadership and management, (2) how does a leader establish trust and commitment to an organization (e.g., David Kearns at Xerox), and (3) how do leaders transform organizations (e.g., Jack Welch at GE)? The course consists primarily of case studies of leaders, but also includes some experiential and group activities. Course grading is based on class participation, group case analyses, and a final individual case analysis. Priority is given to MBAs.

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 advisers and of the faculty members involved in the research.

NMI 510 Multi-Cultural Work Environments
Spring. 1 credit. S-U grading only. Restricted to Johnson School students. C. Rosen, B. Mink.
NMI 510 is a 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 the 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 (Sage 304) for further details about the academic and immigration requirements for NMI 510.

DOCTORAL SEMINARS

NRE 502 Doctoral Seminar In Marketing
3 credits. A. Ainslie.
This class is intended to introduce students to empirical research in marketing. There will be a strong focus on the historical development of econometric specifications of consumer choice models (with an emphasis on heterogeneity and issues of dynamic consumption patterns), and Bayesian methods in marketing. However, by the very nature of the class, the content will to some extent be driven by the participants in the course. Teaching will be interactive, and each participant will be expected to present one of the papers studied to the rest of the class. Furthermore, each participant will be expected to replicate the results of one of the papers, requiring the participant to write the necessary code and briefly discuss their findings.

Enrollment is by consent of the instructor. Students are required to have taken a graduate level course in either mathematical statistics or econometrics, although this restriction may be waived in special cases. Students are welcome to sit in on parts of the class; for example, the section on Bayesian Methods will be broad enough that students from other areas may find the presentation useful.

NRE 504 Doctoral Seminar in Accounting
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
Fall. 3 credits. Prerequisites: courses in statistics and experimental design. 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.

[NRE 509 Doctoral Seminar in Research Methods
3 credits. May not be offered 1999–2000. Staff.
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 mathematical models); and 3) the structure of research papers and the review process.]

[NRE 510 Ethnography in Organizations
3 credits. May not be offered 1999–2000. B. Nelsen.
This course is a comprehensive introduction to the philosophy and practice of fieldwork in an ethnographic tradition, with particular emphasis on conducting fieldwork in organizational settings. The course has four primary objectives: (1) to acquaint students with various philosophies and techniques for doing field research in organizational settings; (2) to provide students with an opportunity to engage in field research; (3) to provide students with an opportunity to develop unique insights into an organizational setting(s) and contribute to the theoretical understanding of social phenomena in their field of study; (4) to provide a climate of social support throughout the student's field experience.]

NRE 511 Doctoral Seminar in Finance—Corporate Finance
1.5 credits. Staff.
This course will cover topics in corporate finance and empirical asset pricing.

[NRE 513 Doctoral Seminar in Finance—Market Microstructure
3 credits. May not be offered 1999–2000. Staff.
The course examines recent research in market microstructure, particularly as it relates to theoretical issues. Topics covered include asymmetric information in securities markets, market behavior, and market structure.]

[NRE 514 Doctoral Seminar in Finance—Asset Pricing Theory
1.5 credits. Permission of instructor required. May not be offered 1999–2000. Staff.
This 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 515 Doctoral Seminar in Behavioral Decision Research
Spring. 3 credits. May not be offered 1999–2000. J. Russo.
This seminar focuses on decision making. The first topic is competing paradigms for research in decision making. A central question of this topic is, "Which paradigms have been most successful or show promise in being most productive in the future?" Other topics will be guided by the interest of participants. They include connectionist approaches, dynamical systems, the interpretation (and distortion) of information, consistency-based theories, biased allocation of attention, and memory—all as applied to the theories and phenomena of decision and judgment.]

[NRE 517 Doctoral Seminar in Information, Incentives, Games, and Contracts
3 credits. May not be offered 1999–2000. Staff.
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.]

FACULTY ROSTER

Ainslie, Andrew, Ph.D., U. of Chicago. Asst. Prof., Marketing
Babbes, George, Ph.D., U. of California at Berkeley. Asst. Prof.. Marketing
Bailey, Warren B., Ph.D., U. of California at Los Angeles. Assoc. Prof., Finance
BenDaniel, David J., Ph.D., Massachusetts Inst. of Technology. Don and Margi Berens Professor of Entrepreneurship
Bierman, Harold, Jr., Ph.D., U. of Michigan. Nicholas H. Noyes Professor of Business Administration
Bloomfield, Robert J., Ph.D., U. of Michigan. Assoc. Prof., Accounting
Bradley, James R., Ph.D., Stanford U. Asst. Prof., Production and Operations Management
Conway, Richard W., Ph.D., Cornell U. Emerson Electric Co. Professor of Manufacturing Management, Prof., Management Information Systems, Director, Semester in Manufacturing
D'Souza, Julia, Ph.D., Northwestern U. Asst. Prof., Accounting
Dyckman, Thomas R., Ph.D., U. of Michigan. Ann Whitney Olin Professor of Accounting
Elliott, John A., Ph.D., Cornell U. Prof., Accounting, Associate Dean for Academic Affairs
Frank, Robert, Ph.D., U. of California at Berkeley. Professor of Economics
Greenberg, Donald P., Ph.D., Cornell U. Prof., Management Information Systems
Gukhal, Reddy, Ph.D., Columbia U. Asst. Prof., Finance
Hass, Jerome E., Ph.D., Carnegie-Mellon U. Prof., Finance and Business Strategy
Haveman, Heather A., Ph.D., U. of California at Berkeley. Prof., Organizational Behavior
Hermalin, Benjamin E., Ph.D., Massachusetts Inst. of Technology. Prof., Economics
Hilton, Ronald W., Ph.D., Ohio State U. Prof., Accounting
Isen, Alice M., Ph.D., Stanford U. S. C. Johnson Prof., Marketing
Jarrow, Robert A., Ph.D., Massachusetts Inst. of Technology. Ronald P. and Susan E. Lynch Professor of Investment Management, Prof., Finance and Economics
Kadiyali, Vrinda, Ph.D., Northwestern U. Asst. Prof., Marketing and Economics
Lee, Charles M. C., Ph.D., Cornell U. Prof., Accounting and Finance, Henrietta Johnson Louis Professor of Management, Director, The Park Center for Investment Research
Li, Haitao, Ph.D, Yale U. Asst. Prof., Finance
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
Lojo, Maureen P., Ph.D., Massachusetts Inst. of Technology. Asst. Prof., Production and Operations Management
McAdams, Alan K., Ph.D., Stanford U. Assoc. Prof., Managerial Economics
McClain, John O., Ph.D., Yale U. Prof., Quantitative Analysis
Michaely, Roni, Ph.D., New York U. Assoc. Prof., Finance
Nelsen, Bonalyn, Ph.D., Cornell U. Asst. Prof., Organizational Behavior
Nelson, Mark W., Ph.D., Ohio State U. Assoc. Prof., Accounting
O'Connor, Kathleen, Ph.D., U. of Illinois. Asst. Prof., Organizational Behavior
O'Hara, Maureen, Ph.D., Northwestern U. Robert W. Purcell Prof., Management, Prof., Finance
Orman, Levent V., Ph.D., Northwestern U. Assoc. Prof., Management Information Systems
Peterson, Randall S., Ph.D., U. of California at Berkeley. Asst. Prof., Organizational Behavior
Rao, Vithala R., Ph.D., U. of Pennsylvania. Deane W. Malott Professor of Management, Prof., Marketing and Quantitative Methods
Robinson, Lawrence W., Ph.D., U. of Chicago. Assoc. Prof., Operations Management
Russo, J. Edward, Ph.D., U. of Michigan. S. C. Johnson Family Prof., Management, 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, Director, Leadership Skills Program
Stayman, Douglas M., Ph.D., U. of California at Berkeley. Assoc. Prof., Marketing
Suwinski, Jan H., MBA, Cornell U. Prof., Business Operations
Swaminathan, Bhaskaran, Ph.D., U. of California at Los Angeles. Asst. Prof., Finance
Tasker, Sarah, Ph.D., MIT. Asst. Prof., Accounting
Thomas, L. Joseph, Ph.D., Yale U. Nicholas H. Noyes Professor of Manufacturing, Director, Executive Development Program
Waldman, Michael, Ph.D., U. of Pennsylvania. Prof., Economics, Charles H. Dyson Prof., Management
Wittink, Dick R., Ph.D., Purdue U. Henrietta Johnson Louis Prof., Management, Prof., Marketing and Quantitative Methods

Lecturers

Highfield, Richard A., Ph.D., U. of Chicago. Sr. Lec. Economics, Associate Dean for MBA Programs and Operations
Katz, Jan, Ph.D., Massachusetts Inst. of Technology. Sr. Lec., International Business and Marketing
Matthews, Ronald W., Sr. Lec., Operations Management
Mink, Barbara E., M.A., Cornell U. Sr. Lec., Management Communications
Pike, Alan S., M.A., Cornell U. Sr. Lec., Management Communications
Rosen, Charlotte, Ph.D., Cornell U. Sr. Lec., Coordinator, Management Communications

Adjunct and Visiting Faculty

Grossman, Dale A., J.D., American U. Sr. Lec., Tax and Business Law
Nesheim, John L., MBA, Cornell U. Visiting Lecturer, President, Aladdin Systems, Inc.
Schuler, Richard E., Ph.D., Brown U. Prof. Economics, Prof. Civil & Environmental Engineering
Sears, Peter A., J.D., Harvard U. Visiting Lecturer, Vice President, Business Investments, Smith Kline Beecham Corporation
Thomas, William, MBA, Harvard. Lec., Management, President, Capital Southwest
Zender, Jaime F., Ph.D., Yale U. Prof., Finance

DIVISION OF NUTRITIONAL SCIENCES

ADMINISTRATION

Jere Haas, director

Carole Bisogni, associate director for academic affairs

Noa Noy, director of graduate studies, Field of Nutrition

THE DIVISION

Nutritional Science draws upon the chemical, biological, and social sciences to understand the complex relationships between 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 throughout the life span, role of diet in reducing risk of chronic disease, nutritional quality of foods, and interventions and policies designed to promote the 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. The undergraduate program, Nutrition, Food, and Agriculture, is offered in the College of Agriculture and Life Sciences. In 1997 a new undergraduate program in Human Biology, Health, and Society was established within the College of Human Ecology. Graduate study in the Field of Nutrition, is administered by faculty members throughout the university.

FACILITIES

Most of the faculty members of the division work in Savage Hall, Kinzelberg 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 division's Learning Resource Center in Martha Van Rensselaer Hall is used by students for individual study and for small group discussions. In addition to printed and audiovisual materials, the Learning Resource Center contains two computers which give students access to specialized software. Savage Hall also has a graduate reading room.

UNDERGRADUATE PROGRAMS

The Division of Nutritional Sciences offers three programs leading to a B.S. degree:

Nutritional Sciences, College of Human Ecology: this program provides students with a strong foundation in the broad field of nutritional sciences as well as thorough training in chemistry and biology. Students may prepare for a variety of career interests including medicine and other health careers, fitness and sports nutrition, nutrition counseling, clinical nutrition, dietetics, nutritional biochemistry, community nutrition, and nutrition education.

Nutrition, Food, and Agriculture, College of Agriculture and Life Sciences: this program is for students who want strong training in human nutrition combined with supportive course work in the agriculture and the life sciences. Strong preparation in biology, chemistry, and math is required. Students in the Nutrition, Food, and Agriculture Program supplement the nutrition curriculum with courses in areas such as food science, animal science, plant science, advanced biology, business and economics, education, and communication. This program prepares students for variety of career interests.

Human Biology, Health, and Society, College of Human Ecology: established in 1997, this program gives students a strong foundation in biology and then explores human health issues from the perspectives of both biology and the social sciences. Students complete a rigorous curriculum in the natural sciences and then, choosing from a wide array of courses offered in the College of Human Ecology, focus their studies on health issues of their choice. Students can explore such topics as gene expression and metabolism related to disease states; biological and social aspects of growth and development; and policies and programs influencing health.

THE CURRICULUM

Undergraduate students in these three programs complete the requirements of their colleges as well as the courses required by the program of their specific interests.

All three undergraduate programs offered by the division require a strong foundation in chemistry and biology; including introductory chemistry and biology, organic chemistry, biochemistry, and physiology. A minimum competency in college algebra is required with additional math and/or statistics requirement for some programs and career paths. Students in the Human Biology, Health, and Society major also complete a course in physics and two additional courses in advanced biology.

All students complete the introductory course, Nutrition and Health: Concepts and Controversies (NS 115). The Nutritional Sciences major and the Nutrition, Food, and Agriculture Program require the completion of four other core courses: Nutrition and Health: Concepts and Controversies (NS 115); Social Science Perspectives on Food and Nutrition (NS 245); Nutritional and Physicochemical Aspects of Foods (NS 345); Physiological and Biochemical Bases of Nutrition (NS 331); and Methods in Nutritional Sciences (NS 332). Students in these programs also must select a minimum of nine credits in advanced courses in the nutritional sciences.

The Human Biology, Health, and Society major requires a minimum of six credits from courses that integrate biology and the social sciences as they examine health issues. In addition, students must also complete nine credits of advanced electives in courses focused on human biology, health, and society.

Undergraduate students in these three programs have a faculty adviser in the Division of Nutritional Sciences. Student-adviser conferences are required at least twice a year. Advisers help students plan their course schedules and can suggest opportunities for individual study or experience outside the classroom.

In all three undergraduate programs the correct sequencing of biology, chemistry, and/or nutrition courses is very important. Students considering these programs should get detailed information about course requirements from the division's Academic Affairs Office, 309/335 MVR.

CAREER OPTIONS AND COURSE PLANNING

Requirements for the three programs are the minimum set of courses necessary for a bachelor's degree in these fields. Students should supplement their requirements with elective courses and other learning experiences that will prepare them for entry-level jobs or advanced study in their field(s) of interest. A summary of suggested electives for different career interests follows:

Medicine and Other Health Careers: Recommended courses for pre-med students include calculus and two terms of physics. Specific information about medical school admissions requirements can be obtained from the university's Health Careers Office, 203 Barnes Hall. Students interested in other health careers should acquire specific information about those requirements. Courses of interest may include those related to the biological and social determinants of health; human growth, development, and behavior through the life course; interpersonal communications; advanced biology; sociology; psychology; and ethics.

Dietetics: Students who wish to work in the areas of clinical nutrition, nutrition counseling, sports nutrition, community nutrition, or food and nutrition management should complete the academic requirements for The American Dietetic Association (ADA). Courses in foods,

nutrition and disease, microbiology, management, statistics, and nutritional care are added to the courses required for the nutrition programs. For more information about meeting ADA requirements see Anne Kendall, 3M5 MVR.

Exercise, Nutrition, and Health Promotion: Students should complete a course in physiology and a course in anatomy after introductory biology. Students can complete the Applied Exercise Science Concentration at Ithaca College, which includes courses in kinesiology, exercise physiology, and biomechanics. Students who wish to apply to graduate schools to study physical therapy should complete a year of introductory physics; a course in statistics; a course in ethics; and three courses in psychology. Students should check the specific requirements of their schools of interest. For information about the Applied Exercise Science Concentration, contact the DNS Academic Affairs Office, 309 MVR.

Biomedical Research/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.

Public Health and Community Nutrition: Suggested electives include courses in communications, education, human development, policy analysis and management, maternal and child nutrition, geriatric nutrition, nutrition and disease, and food economics.

Nutrition, Food, and Business: Recommended electives include courses in management, marketing, economics, communications, hotel administration, and food science.

Nutrition and Agriculture: Recommended electives include courses in 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 sciences related to maternal and child health and problems of developing nations.

Biology and Behavior: Recommended electives include courses in psychology, human development, and neurobiology.

Food, Nutrition, and Health Policy: Recommended electives include courses in economics, sociology, government, policy analysis, and management.

SPECIAL EXPERIENCES

Undergraduates can enhance their experiences by participating in structured field experiences or study abroad. Academic credit can be earned for field experiences in a community agency, health-care facility, or business. The Urban Semester in the College of Human Ecology provides students with an opportunity to study and gain field experience in New York City. All students intending to spend a term off campus in field experience or study abroad must plan their courses well in advance to be sure that all program requirements can be met.

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 the associate director for academic affairs or consider applying to the honors program.

HONORS PROGRAM

The honors program, leading to a B.S. degree with honors, 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 in designing and evaluating research, complete an original piece of research, and prepare an honors thesis. The honors project may be laboratory or field research or deal with policy and program development. For more information, students should contact Michael Kazarinoff, 230 Savage Hall.

COURSES RECOMMENDED FOR NONMAJORS

Courses in nutritional sciences can strengthen programs of study in biological sciences, biology and society, communications, 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 247, Food for Contemporary Living; NS 262, Nutrients and Cells; NS 275, Human Biology and Evolution; NS 306, Nutritional Problems of Developing Nations; NS 315, Obesity and the Regulation of Body Weight; NS 347, Human Growth and Development: Biological and Behavioral Interactions; NS 380, Integrating Food Systems and Human Nutrition Needs; NS 450, Public Health Nutrition; 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 345 Physicochemical and Nutritional Aspects of Foods; NS 421, Nutrition and Exercise; and NS 441, Nutrition and Disease.

GRADUATE PROGRAMS

Graduate study is administered by the Field of Nutrition, a group of about forty faculty members from throughout the university who have a common interest in nutritional problems. In the M.S. and Ph.D. degree programs, students may specialize in molecular and biochemical nutrition, human or animal nutrition, community nutrition, or international nutrition. Research is emphasized in all graduate programs. Field experience may be an important 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 choices 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. Students in international nutrition are expected to conduct their thesis research abroad.

For more information about the graduate program, please write for the brochure. Graduate Study in Nutrition, available from the Director of Graduate Studies, Field of Nutrition, Cornell University, 309 MVR Hall, Ithaca, New York 14853–4401; telephone (607)255–4410.

COURSES

NS 115 Nutrition and Health: Concepts and Controversies
Fall. 3 credits. S-U grades optional. M W F 1:25. D. Levitsky.
The course will discuss the 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 Concepts and Controversies
Fall. 1 credit. Corequisite: NS 115. S–U only. Limited to freshmen and transfer students, 10 per section. TBA.
D. Levitsky.
This course provides students enrolled in NS 115 individualized assistance in many skills used in NS 115 such as using computers to analyze diets, using electronic mail, finding and using scientific references, and reviewing material presented in NS 115 lectures.

NS 120 Nutrition and Health: Issues, Outlooks, and Opportunities
Spring. 1 credit. S-U grades only. Limited to 120 freshmen, sophomores and juniors, others by permission of instructor.
W 12:20. C. Bisogni.
A course for students interested in exploring careers in the broad fields of food, nutrition, and health. Experts representing different areas will discuss their work, focusing on current issues and trends as well as their requisite knowledge and skills. This course describes the many disciplines that are drawn upon in addressing human problems related to food, diet, and health. It also explores the related intellectual and career opportunities. This is not an introductory nutrition course for nonmajors.

NS 200 Vegetarian Nutrition: An Introduction
Fall. 3 credits. S-U grades optional. Prerequisites: NS 115 advised but not essential. M W F 11:15. T. C. Campbell.
This introductory course will survey vegetarianism from a variety of nutrition and health considerations. The material to be presented and discussed will primarily include the empirical scientific evidence presented for easy comprehension for students without nutrition training. The course will also consider the historical and sociocultural roots, both ancient and of more recent times, that have led to the growing interest in, and acceptance of, this type of dietary practice. Particular attention will be given to the role of vegetarianism in the prevention and reversal of chronic degenerative diseases. Special topics on competitive sport, childhood nutrition, food preparation, and dietary transition will be offered. Internationally known guest speakers, will provide 6-8 of the lectures.

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 25 students. Preregistration is required in room 309 Martha Van Rensselaer Hall. M W F 1:25. C. Garza.
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. T R 10:10–11:25. J. Sobal.
Theories, concepts, and methods from the social sciences will be used to examine food, eating, and nutrition. The course will use the food and nutrition system and the food choice process as conceptual models for examining the scope of social aspects of nutrition.

NS 247 Food for Contemporary Living
Fall and spring. 1 credit. Laboratory sections limited to 32 students. Preregistration during course pre-registration required in 309 Martha Van Rensselaer Hall. Laboratory coat or apron required. Fall T 1:25–4:25; spring T 1:25–4:25 or R 9:05–12:05. A. Kendall.
Emphasizes meal planning for healthy individuals using national nutrition standards; the development of food preparation and presentation skills; the application of sensory evaluation techniques; food science principles as they apply to cooking and ethnic and cultural influences on cuisine.

NS 262 Nutrients and Cells
Spring. 3 credits. Prerequisites: one semester of biology and chemistry. M W F 9:05. N. Noy.
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 by mammalian cells. 2. Intra-cellular outcomes of nutritional stimuli: effects on metabolism and gene expression, toxicity. 3. Pathways of neutralization: detoxification, secretion, DNA repair.

[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. Not offered 1999–2000.
See BIO SCI 275 for course description.]

NS 300 Special Studies for Undergraduates
Fall or spring. Prerequisites: permission of instructor. S-U grades optional. DNS faculty.
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 College Registrar's Office. The form, signed by both the instructor directing the study and the associate director for academic affairs, is filed at course registration or during the change-of-registration period.

NS 306 Nutritional Problems of Developing Nations
Spring. 3 credits. Prerequisites: NS 115. S-U grades optional. T R 10:10. J-P. Habicht, M. C. Latham.
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 functional consequences of these problems on individuals and societies, and the types of programs that can be implemented to improve health and nutrition.

NS 315 Obesity and the Regulation of Body Weight (also Psychology 613)
Spring. 3 credits. Prerequisites: NS 115, Psych 101. Limited to juniors and seniors. S-U grades optional. Offered alternate years. T R 1:30–3:00. Not offered 2000–2001. D. Levitsky.
This course is a multidisciplinary discussion of the causes, effects, and treatments of human obesity. Topics include the biopsychology of eating behavior, genetics of obesity, role of activity and energy metabolism, psychosocial determinants of obesity, anorexia nervosa, therapy and its effectiveness, and social discrimination.

NS 320 Introduction to Human Biochemistry
Fall. 4 credits. Prerequisites: one year college biology; one year college general chemistry; and CHEM 257 or 357–358; or permission of the instructor. S-U grades optional. M W F 10:10, sec T 1:25. W. Arion, P. Stover.
The principles of biochemistry are presented within the context of human health and disease. Metabolism of carbohydrates, lipids, proteins and selected micro-nutrients is taught from a perspective that emphasizes their role in supporting the structure and physiological functions of the major organs of the body, including blood. The concepts of enzyme catalysis, enzyme regulation, hormone action and bioenergetics are incorporated within this framework. The fundamental concepts of eucaryotic DNA structure, function and gene expression are covered with reference to their importance in regulating metabolism and the impact of a changing nutrient environment.

NS 331 Physiological and Biochemical Bases of Human Nutrition
Spring. 4 credits. Prerequisites: Biological Sciences 330 or 331 or equivalent. S-U grades optional. Lec M W F 10:10; disc, W or R. M. Stipanuk, C. McCormick.
This course examines the biochemical and physiological bases of human nutritional requirements. The instructors use an integrated approach to cover the digestion and metabolism of the nutrients (carbohydrates, proteins, lipids, vitamins, and minerals). Metabolic and chronic diseases that are related to nutrition are discussed throughout the semester. The discussion sections and problem sets provide an opportunity to examine in greater depth selected topics from lecture.

NS 332 Methods in Nutritional Sciences
Fall and spring. 3 credits. Each section limited to 18 students. Prerequisites: NS 345, NS 331 preferred or concurrent registration. Laboratory preregistration during course preregistration required in room 309 Martha Van Rensselaer Hall. One evening prelim to be scheduled. Fall. Lec M 12:20; lab M W 1:25–4:25 or M W 6:30–9:30 or T R 10:10–1:10. Spring. Lec M 12:20; labs M W 1:25–4:25 or T R 10:10–1:10 or M W 6:30–9:30. J. T. Brenna, M. N. Kazarinoff.
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
Spring. 4 credits. Letter grade only. Prerequisites: college biology; NS 115 recommended. Laboratory preregistration required in 309 MVR during preregistration. Limit 120. Lec M W F 12:20; lab W or R or F, 9:05–11:00 or 2:30–4:25. V. Utermohlen.
Introduction to human anatomy and physiology with particular emphasis on aspects of relevance to the nutrition sciences and medicine. All major organ systems will be covered. Laboratories will emphasize location, recognition, and description of anatomical structures. Testing of physiological functions will focus on the tests with 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. T R 1:25–2:40. B. Parker, B. Lewis.
A study of the nutritional, physical, and chemical properties of foods including composition, food structure, enzymic and nonenzymic phenomena, and processing/preparation aspects. Issues related to food safety, regulation, and food composition data bases will also be discussed.

NS 346 Introduction to Physiochemical Aspects of Foods—Laboratory
Spring. 1 credit. Each section limited to 18 students. Limited to dietetics students in DNS. Prerequisites: NS 345 or concurrent registration; a college course in organic chemistry and permission of instructor during course registration

(permission-of-instructor forms must be obtained from and returned to 309 MVR). Letter grade only. M 12:20–3:20 or T 9:05–12:05. B. Parker, R. Lewis.
Laboratory exercises designed to illustrate principles related to food quality and ingredient functionality, and to introduce students to the analytical methodology associated with food evaluation.

[NS 347 Human Growth and Development: Biological and Behavioral Interactions (also Human Development and Family Studies 347 and Biology and Society 347)
Spring. 3 credits. Prerequisites: Biological Sciences 101 or 109 or equivalent; Human Development and Family Studies 115 or Psychology 101 or equivalent. Offered alternate years. Not offered 1999–2000. M W F 1:25. J. Haas, S. Robertson.
This course is concerned with the interrelationships of physical and psychological growth and development in humans, particularly during infancy. Intrinsic and extrinsic causes of variations in growth, including various forms of stimulation, are considered. In addition, the consequences of early growth and its variation 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 361 Biology of Normal and Abnormal Behavior
Fall. 3 credits. Prerequisites: Biological Sciences 101–102 and Psychology 101, or permission of the instructor. A fundamental knowledge of biology and psychology is essential. S-U grades optional. Limited to juniors and seniors. Not offered 1999–2000. M W F 9:05. B. Strupp.
A critical evaluation of biological factors thought to influence behavior and/or cognitive functioning. Biological, psychological, and societal influences will be integrated. Topics include nutrition and behavior, psychiatric disorders, developmental exposure to environmental toxins and abused drugs, biopsychology of learning, memory, intelligence, and related cognitive disorders.]

NS 378 Food, Nutrition, and Service Management
Fall. 3 credits. Prerequisites: NS 115, NS 247 or permission of instructor. T R 8:40–9:55. TBA.
The course discusses how management principles and theories apply to foodservice operations and nutrition services. The systems concept of organization is used. Emphasis is placed on leadership development, decision making/problem solving as it relates 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
Spring. 2 credits. Prerequisites: NS 115 or Food 200 or An Sc. 100. Letter grade only. T R 8:40–9:55. G. Combs.
A student-centered course that uses case studies to examine the link between human nutrition and health issues to those involving systems of food production and distribution. Student teams will investigate new 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. T 12:20. M. Kazarinoff.
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 or group of students who want to study 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 department office, is filed at course registration or within the change-of-registration period along with an add/drop slip in 145 MVR, College Registrar Office. To ensure review before the close of the course registration or change-of-registration period, students should submit the special-studies form to the associate director for academic affairs as early as possible.

NS 400 Directed Readings
For study that predominantly involves library research and independent reading.

NS 401 Empirical Research
For study that predominantly involves data collection and analysis or laboratory or studio projects.

NS 402 Supervised Fieldwork
For study that involves both responsible participation in a community setting and reflection on that experience through discussion, reading, and writing. Academic credit is awarded for this integration of theory and practice.

NS 403 Teaching Apprenticeship
For study that includes assisting faculty with instruction.

[NS 421 Nutrition and Exercise
Spring. 3 credits. Prerequisites: Bio S 311 or NS 341 and NS 115 or NS 331. S–U grades optional. M W F 11:15. Not offered 1999–2000. Division faculty.
This course will acquaint students with the interaction between nutrition, exercise, and athletic performance. Topics will cover the biological, psychological, and sociological aspects of nutrition as it relates to exercise performance. Students will learn nutritional counseling techniques for educating the recreational and professional athlete, coach, and trainer.]

NS 431 Mineral Nutrition and Chronic Disease
Fall. 2 credits. Prerequisites: NS 331, AnSci 410, or permission of instructor. S-U grades optional. T R 11:15. C. McCormick.
We will evaluate the evidence that diet plays a role in osteoporosis and hypertension and whether iron status affects the development of heart disease and inflammation. A goal of the course is to review the data upon which recommendations for daily nutrient intakes are currently based. Class discussion of key research articles will be conducted and evaluated.

NS 441 Nutrition and Disease
Fall. 4 credits. Prerequisites: NS 331 and a human physiology course. S-U grades optional. M W F 10:10; F 8:00. V. Utermohlen.
Study of the anatomical, physiological, and metabolic abnormalities in acute and chronic illness, and the role of nutritional therapy in their prevention and care. Topics covered include: nutritional assessment, nutritional pharmacology, starvation, infection, trauma, cancer, diabetes mellitus, and renal, cardiovascular, pulmonary, skeletal, neurological, liver, and gastrointestinal disorders.

NS 442 Implementation of Nutrition Care
Fall. 3 credits. Prerequisites: NS 247, concurrent registration in NS 441 (or equivalent background in either course). S-U grades optional. Lec M W F 9:05. A. Kendall.
Development of skills necessary to implement nutrition care in clinical settings: nutrition screening, dietary assessment, principles of medical nutrition therapy, menu planning for disease states, quality assurance.

NS 450 Public Health Nutrition
Spring. 3 credits. Prerequisites: NS 115, and one course dealing with population-level studies, e.g., NS 245, HDFS 150, PAM 201, PAM 303, RSOC 100, RSOC 200. M W F 11:15. K. Rasmussen, D. Pelletier.
Public health nutrition is the major professional career track for nutritionists outside of dietetics. It deals with efforts to improve the diets and nutritional status of whole populations by working at the community, state, and national level. This course helps prepare students to work in public health nutrition by describing methods used in the assessment of nutrition problems, development of nutrition-related policies, and delivery of health, nutrition, and food assistance programs.

NS 451 Epidemiology and Health of Human Communities
Fall. 3 credits. Prerequisite: one semester of statistics (can be taken concurrently). M W F 1:25. E. Frongillo.
Examines through a series of case studies, the role of epidemiological investigation in understanding, assessing, and improving the health and nutrition of human communities and populations. Students will read and discuss scientific research and public policy literature on specific topics of current interest. Emphasis is on the conceptualization of epidemiology as an ecological science that studies the interdependence and interaction of humans with their social, cultural, and physical environment. Intended for advanced undergraduates and graduate students with an interest in health, human biology, nutrition, or epidemiology.

NS 457 National and International Food Economics (also Economics 374)
Spring. 4 credits. Prerequisites: Econ 101 or CEH 110 and junior standing, or permission of instructor. S-U grades optional. M W F 9:05. E. Thorbecke.
Analysis of the world food economy. Review and analysis of the major economic factors determining the demand for food, the composition of food consumption, and nutritional intake, as well as the major economic factors affecting food production

and supply. This course evaluates the effectiveness of various policies and programs in alleviating poverty and malnutrition.

NS 488 Applied Dietetics in Foodservice Systems

Spring. 3 credits. Limited to 27 students. Prerequisites: NS 378, Micro 290. Laboratory preregistration during course preregistration is required in room 309 Martha Van Rensselaer Hall. White lab coat is required. Approximately $25.00 will be needed for special supplies/activities. Lec M W 9:05; labs, M or T or W 1:30–6:00. TBA.

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; employee training; applied safety and sanitation standards; and will develop other skills required to operate/manage a foodservice program. The application of quality management in food service operations and 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 or F 2:30. M. Kazarinoff and division faculty.

Juniors (Mondays). Discussion of research opportunities in nutrition and orientation to research facilities. Delineation of honors research problems in consultation with faculty mentors. Seniors (Fridays). Workshop sessions on honors thesis and oral presentation preparation.

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 or more 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. Offered alternate years. W F 12:20. R. E. Austic.

The course emphasizes the dynamic aspects of protein digestion and absorption, amino acid transport, and amino acid and nitrogen metabolism and their relationships to the nutritional requirements for amino acids.

NS 602 Lipids (also Bio Sci 619)

Fall. 2 credits. T R 11:15. A. Bensadoun.

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 603 Mineral Nutrition: Metabolic, Health, and Environmental Aspects (also An Sc 603)

Fall. 2 credits. Letter grade only. Prerequisites: biochemistry, physiology, and nutrition. T 2:20–4:25. Offered alternate years, not offered 1999–2000. X. G. Lei, G. F. Combs, Jr.

The course emphasizes the metabolic roles and environmental impacts of mineral nutrition in animal, human, and food systems. Team-taught lectures include general biochemical and physiological aspects of mineral metabolism and specific mechanisms of gene expression regulation and mammal health disorders associated with individual elements. Methodology and facility of mineral research is also discussed.]

NS 604 The Vitamins (also An Sc 604)

Fall. 2 credits. T R 10:10. G. Combs.

Text-based discussion sessions on nutritional aspects of the vitamins, including recent developments in nutritional and biochemical interrelationships with other nutrients and metabolites.

NS 605 Nutritional Biochemistry Colloquim

Fall and spring. 1 credit. S-U grades only. R 12:20. Nutritional Biochemistry faculty.

Nutritional biochemistry colloquium is a graduate seminar series that focuses on recent advancements in biochemical nutrition. Weekly presentations are made by faculty, postdocs and graduate students and are based on the primary literature. The presentations are followed by a discussion involving all participants.

NS 607 Nutrition as an Integrating Discipline: Concepts and Paradigms

Fall. 3 credits. Prerequisite: some prior coursework or experience in nutrition, or permission of the instructor. M W F 10:10. M. Kazarinoff, J-P. Habicht, and division faculty.

An overview course for beginning graduate students which introduces them to the full breadth of nutritional science disciplines, including quantitative and qualitative sciences. Also suitable for seniors as an integrating course. The course presents concepts and paradigms of molecular biology, biochemistry, clinical nutrition, epidemiology, anthropology, economics, program planning and administration, policy development, and ethics. This semester the course uses Vitamin A as the example. Emphasis will be placed on the integration of factual and conceptual knowledge to solve nutrition problems in human societies.

NS 611 Molecular Toxicology (also Toxicology 611)

Spring. 3 credits. Prerequisite: Toxicology 610 and a full-year 400-level course in biochemistry or equivalent. S-U grades optional. TBA. S. Bloom, R. Dietert.

A study of the fundamental biochemical mechanisms of absorption, transport, metabolism, and excretion of drugs, carcinogens, and toxicants. Emphasis on oxidative and conjugative pathways of metabolism and of environmental and nutritional factors that influence toxicant metabolism and disposition. Methods of evaluating in vivo and in vitro metabolism are also addressed.

NS 612 Methods of Assessing Physical Growth in Children

Spring. 3 credits. Limited to graduate students and undergraduate students who have permission of the instructor. A previous course in statistics required. S-U grades optional. Lec T 1:25; lab, R 1:25–4:25; disc T 2:15–3:05. J. Haas.

A laboratory course to train students in methods and techniques used to assess the physical growth and development of children. The methods explored are those applicable for field, community, and clinical studies and cover anthropometry, body composition, skeletal age, maturity indicators, physical fitness, and energy expenditure.

NS 614 Topics in Maternal and Child Nutrition

Fall. 3 credits. Prerequisites: NS 331, and 222 or 347, Biological Sciences 311, and permission of instructor. T R 8:30–9:55. Will not be offered fall 2000. K. Rasmussen.

An advanced course on the role of nutrition during pregnancy and lactation. The 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. Bisogni, D. Way.

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. Videotaped simulations provide opportunity for practice and analysis of teaching behaviors.

NS 618 Teaching Experience

Fall or spring. 0 credit. Limited to division graduate students and students who have permission of instructor. S–U only. C. Bisogni.

Designed to provide experience in teaching nutritional sciences by direct involvement in college courses under supervision of a faculty member. The aspects of teaching and the degree of involvement vary, depending on the needs of the course and the experience of the student.

NS 619 Field of Nutrition Seminar (also Animal Science 619)

Fall or spring. 0 credit. S–U only. M 4:00. Faculty and guest lecturers.

Lectures on current research in nutrition.

NS 620 Food Carbohydrates (also Food Science 620)

Spring. 2 credits. Prerequisites: Biological Sciences 330 or equivalent. Letter grades only. Offered alternate years. T R 10:10. J. Brady, B. Lewis.

A consideration of the chemistry of carbohydrates, including sugars and complex carbohydrates (starches, pectins, hemicelluloses, gums, cellulose, and glycoconjugates). Emphasis is on intrinsic chemistry, functionality in food systems, and changes occurring during food processing and storage.

NS 626 Special Topics in Food
Fall. 2 credits. TBA. B. Lewis.
Discussion of current research on specific topics related to functional foods and nutraceuticals/phytochemicals.

NS 631 Dietary Assessment
Fall. 1 credit. 7 weeks only. Prerequisites: statistics and NS 331 or equivalent. Enrollment limited. R 2:30–5:30. D. Sanjur.
Study of methods and techniques for assessing dietary intakes at the individual and household levels.

[NS 636 Integration and Coordination of Energy Metabolism (also Biological Sciences 637)
Spring. 3 credits. Prerequisites: Biological Sciences 330 and 331, or equivalent. M W F 9:05. Not offered 1999–2000.
The dynamics of energy metabolism in humans and higher animals are developed through characterizations of how the metabolic components support the structure and function of the individual tissues. Mechanisms that control and coordinate energy metabolism within and between organs are analyzed in the context of selected physiological and pathological stresses.]

NS 637 Epidemiology of Nutrition
Spring. 3 credits. Limited to graduate students. Prerequisites: Biometry 601 and concurrent registration in Biometry 602 or NS 641 or equivalent knowledge. Basic knowledge about the nutritional aspects of growth and development and about nutritional biochemistry. TBA. J-P. Habicht.
This course covers principles of nutritional epidemiology, impact assessment of nutrition intervention programs, and nutritional surveillance. Principles of using nutritional information in decision making are presented. The course shows how the biochemistry and physiology of nutrition can be related to epidemiological assessment and research strategies.

NS 638 Epidemiology of Nutrition Seminar
Spring. 3 credits. Reserved for graduate students planning field intervention studies; by permission of instructor. Prerequisite: NS 637. TBA. J-P. Habicht.
Covers the meta-analysis, design, measurement, and analytic issues involved in developing, implementing, and analyzing studies of field interventions with nutritional impact.

NS 639 Epidemiology Seminar (also Statistics and Biometry 639)
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. M 12:20. P. Cassano.
This course will develop skills in the preparation and interpretation of epidemiological data by discussing current research topics and issues.

NS 640 Social Science Theories in Nutrition
Fall. 3 credits. Limited to 20 graduate students. T R 10:10–12:05. J. Sobal.
Social science theories and paradigms of sociology, psychology, anthropology, economics, political science, geography, and history that contribute to understanding food, eating and nutrition will be discussed to understand how theories apply to nutrition topics, issues, and problems.

NS 644 Community Nutrition Seminar
Fall and spring. Non-credit. S–U only. Fall M 11:15, spring M 12:20. A. Gillespie and Cornell Community Nutrition faculty.
This seminar, sponsored by the Cornell Community Nutrition Program, focuses on research presentations in nutrition education and other areas of community nutrition. Cornell faculty and graduate students and invited outside speakers present research proposals, results from ongoing research, theoretical bases for research, program evaluations, and discuss current programs and issues in community nutrition. The format varies but always includes discussion by participants.

NS 645 Nutrition Intervention in Communities: A Global Perspective
Spring. 3 credits. Limited to 25 graduate students with an interest in human nutrition and health and exceptional senior nutrition majors by permission. Prerequisite: NS 640. M W 1:25–2:40. C. Olson.
The goal of the course is to help students gain tools and develop a conceptual framework for thinking critically about nutrition interventions in communities around the world. The course involves extensive reading, active involvement in class discussions and fieldwork.

NS 646 Seminar in Physicochemical Aspects of Food
Spring. 1–3 credits. Prerequisite: a college course in organic chemistry or biochemistry. S-U grades optional. T R 1:25–2:40. B. Parker, B. Lewis.
An introduction to physicochemical aspects of food, for graduate students who have had limited or no work in this area. The seminar uses the lectures of NS 345 as a basis for supplementary readings and critical review of research on selected topics.

NS 660 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 specific topic related directly or indirectly to nutrition. The course may include individual tutorial study, experience in research laboratories, a lecture series on a special topic selected by a professor or a group of students, and/or selected lectures of another course already offered. Topics may be changed so that the course may be repeated for credit.

NS 680 International Nutrition Problems, Policy and Programs
Spring. 3 credits. Prerequisite: permission of instructor. T R 11:15–12:30. M. Latham.
Designed for graduate students who want to learn about the important nutritional problems of developing countries. The major forms of malnutrition related to poverty and their underlying causes are discussed. Emphasis is placed on programs and policies that can assist poor countries and communities to improve their nutritional and health status.

NS 681 Nutritional and Public Health Importance of Human Parasitic Infections
Fall. 2 credits. Prerequisites: graduate student status or permission of instructor. S-U grades optional. M 2:30–4:15. L. Stephenson.
Reviews the scientific evidence on the relationships between human nutritional status and common human parasitic infections. Concentrates on malnutrition (protein-energy malnutrition, anemia) in developing countries. The parasitic infections emphasized are malaria, hookworm, ascaris, schistosomiasis, and trichuriasis. Format is lecture-discussion.

NS 683 Field Studies in International/ Community Nutrition
Fall. 1 credit. Graduate student status or permission of instructor required. Strongly recommended for graduate students doing field research. S-U grades only. Mainly audio-tutorial format. Available as independent study most semesters. TBA. L. Stephenson.
Reviews practical considerations in conducting field research in developing countries, including (1) seeking fundings, (2) experimental design issues, (3) choice of procedures, and (4) planning for and carrying out data collection. Also includes how to a) construct a C.V., b) write an abstract and prepare a clear 10-minute talk with legible slides (FASEB formation), and c) when, where, and how to publish research results. Extensive handouts. Lecture/demonstration/discussion.

NS 685 Food and Nutrition Policy (also Agricultural Economics 685)
Spring. 3 credits. Prerequisites: introductory microeconomics, intermediate statistics (through multiple regression), or instructor's permission. M W 2:55–4:10. D. Sahn.
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 and advanced undergrads. Prerequisite: Chemistry 288 or 390, 302 or Chemistry 208 and Mathematics 112, or permission of instructor. S-U grades optional. Offered alternate years. T R 10:10. J. T. Brenna.
Survey course in modern high precision isotope ratio mass spectrometry (IRMS) techniques and trace/surface methods of analysis. Topics include dual inlet and continuous flow IRMS, thermal ionization MS, inductively coupled plasma MS, atomic spectroscopy, ion and electron microscopies, X-ray and electron spectroscopies, and biological and solid state applications.

NS 698 International Nutrition Seminar
Fall and spring. No credit. No grades given. R 12:20–1:10. J-P. Habicht.
This seminar series consists of presentations by Cornell faculty and graduate students, and by invited outside speakers. Speakers cover a range of topics relating 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 International Nutrition Program.

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 usually consists 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. TBA. Staff.
A discussion of the most current developments in various areas of toxicological research and testing. Faculty and students will participate jointly in evaluating research findings and provide seminars and discussion of such material. For information regarding the topic, instructor, and credit, contact the office of the Graduate Field of Environmental Toxicology.

NS 702 Seminar in Toxicology (also Toxicology 702)
Fall or spring. 1 credit. S-U grades only. F 12:20. Staff.
The seminar program covers varied topics in biochemical, genetic, nutritional, veterinary, and regulatory toxicology, ecotoxicology, and environmental chemistry. Included are presentations of basic research studies, fundamental concepts, and research activities involving environmental problems of a toxicological nature. Presentations are given by speakers from Cornell and visitors.

NS 703 Seminar in Nutritional Sciences
Fall and spring. 1 credit. S-U grades only. T 12:20 or W 12:20. Division faculty.
Presentations of original articles pertinent to the Nutritional Sciences. Students will learn how to make professional presentations and how to critique the presentations by others. In addition, students will read and learn how to interpret original articles published 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. M 1:25–3:20. Not offered 1999–2000.
M. Kazarinoff, K. Rasmussen.
The goal of this course is to provide an integrative capstone learning experience for advanced graduate students with majors or minors in nutrition. Groups of 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

Arion, William J., Ph.D., U. of N. Dakota. Prof.
Bensadoun, Andre, Ph.D., Cornell U. Prof., Nutritional Sciences/Physiology
Bisogni, Carole, Ph.D., Cornell U. Assoc. Prof. and Associate Director for Academic Affairs
Brenna, Thomas, Ph.D., Cornell U. Assoc. 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.
Crompton, D. W. T., Ph.D., Sc.D., U. of Cambridge (England). Adjunct Prof.
Devine, Carol M., Ph.D., Cornell U. Asst. Prof.
Frongillo, Edward, Jr., Ph.D. Cornell U. Assoc. Prof.
Garza, Cutberto, M.D., Baylor College; Ph.D., MIT. Prof.
Gillespie, Ardyth, Ph.D., Iowa State U. Assoc. Prof.
Haas, Jere D., Ph.D., Pennsylvania State U., Director and Nancy Schlegel Meining Professor in Maternal and Child Nutrition
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, Molecular and Cell Biology
Latham, Michael C., D.T.M.&H., U. of London (England). Prof.
Levitsky, David A., Ph.D., Rutgers U. Prof.
Lewis, Bertha A., Ph.D., U. of Minnesota. Assoc. Prof.
McCormick, Charles, Ph.D., North Carolina St. U. Assoc. Prof.
Noy, Noa, 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.
Pelletier, David, Ph.D., The Pennsylvania State U. Assoc. Prof.
Pelto, Gretel, Ph.D., U. Minnesota, Prof.
Peto, Richard, M.Sc., U. London (England). Adjunct Prof.
Rasmussen, Kathleen M., Sc.D., Harvard U. Prof.
Rivera, Juan, Ph.D., Cornell U. Adjunct Asst. Prof.
Sahn, David, Ph.D., M.I.T. 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.
Thorbecke, Erik, Ph.D., U. of California. H. E. Babcock Professor of Economics and Food Economics
Utermohlen, Virginia, M.D., Columbia U. Assoc. Prof., Nutritional Sciences/Biochemistry, Molecular and Cell Biology

Other Teaching Personnel

Kendall, Anne, Ph.D., R.D., Cornell U. Lecturer and Director of Dietetics Program

Joint Appointees

Bauman, Dale, Prof., Animal Science/Nutritional Sciences
Miller, Dennis, Prof., Food Science/Nutritional Sciences
Van Campen, Darrell R., Assoc. Prof., U.S. Plant, Soil, and Nutrition Laboratory/Nutritional Sciences

OFFICER EDUCATION

Military instruction began at Cornell University in 1868 under the provisions of the Morrill Act of 1862. Since that time, officer education has been highlighted by the construction of Barton Hall in 1914 and the establishment of a formal Reserve Officers Training Corps (ROTC) unit in 1917. The program evolves to keep pace with the latest military changes and emphasizes the development of leadership and managerial skills. Cornell's Officer Education Program has produced many outstanding civilian and military leaders.

The Officer Education Programs prepare students for a commission as an officer in either the United States Army, Navy, Air Force, or Marine Corps. Each service program is headed by a senior military officer who also serves as a full professor on the Cornell faculty.

MILITARY SCIENCE

Lieutenant Colonel John M. Keefe, Engineer, United States Army, Professor of Military Science and Commanding Officer, U.S. Army ROTC Instructor Group

Major Brian Edholm, Military Intelligence, United States Army

Captain Scott Hillmer, Infantry, United States Army

Captain Reginald Snell, Armor, 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 and be able to obtain a Secret level security clearance prior to being commissioned as lieutenants. (Non-citizens 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 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 credit from secondary or military schools (Junior Division AROTC) may receive advanced standing, if qualified. 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 are taken. In addition, academic-enrichment courses are required in such fields as written communications, computer science, and military history. All cadets attend a five-week camp, with pay, between the junior and senior years. All cadets participate in physical fitness training three days per week. Each year selected cadets are sent to the Army's Airborne School, Winter Survival School, and Air Assault Course, depending upon availability and student 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, rifle marksmanship, historical site visits, land navigation, interpersonal communication, 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 program-related hours.

During the fall of the second year, students take a two-credit course in American military history. The course consists of instruction in three primary areas. The first section develops the concept of the art and theory of modern warfare. It analyzes America's first attempt at war, the American Revolution, and ends with the development of modern warfare under Napoleon Bonaparte. The second section focuses on America at war in the nineteenth century. Section three focuses on warfare in the twentieth century and concludes with the prospects of future actions for the military.

During the spring of the second year, students take a one-credit course in map reading and spend approximately two hours a week in practical leadership training, land navigation, and military skills.

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 Basic Camp, a six-week summer training camp, or prior military training. Students entering the Advanced Course must have the equivalent of four academic semesters 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 potential for eventual commissioning.

When students are accepted for the Advanced Course or accept a scholarship, they sign 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 offered. Concurrently with the signing of the contract, students enlist in the United States Army Reserve.

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 five-week advanced summer camp conducted at Ft. Lewis, Washington.

Scholarships

Scholarships are awarded on the basis of merit and may be 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 up to $16,000 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 also receive $450 per year toward the cost of text books.

Commissioning

All students who successfully complete the Advanced Course, including the advanced summer camp, are commissioned as second lieutenants in the United States Army 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 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, officers are assigned to a unit and location determined by the desires of the individual and the requirements of the Army. Officers selected for reserve duty attend the Officer Basic Course, after which they are released to reserve status.

ROTC graduates generally serve four years on active duty and four years in reserve status; however, some may serve eight years on reserve duty.

Choice of Branch

Cadets in the second year of the Advanced Course (normally the senior year) may specify the branch of the Army—such as Infantry, Armor, Field Artillery, Air Defense Artillery, Aviation, Corps of Engineers, Signal Corps, Military Police, Military Intelligence—in which they prefer to serve. They are notified in December of the branch to which they are assigned. Appointment in a chosen branch depends upon the student's academic and officer education performance, degree area, and the needs of the Army at that time.

Graduate Study

Active duty deferments, or educational delays, may be granted to individuals who want to attend graduate school at their own expense. Requests will be considered on the basis of needs of the service. Admission to graduate school is the student's responsibility.

Benefits

Each cadet in the Advanced Course (Mil S III and Mil S IV) receives $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. A cadet in the Two-Year Program receives the same payments as cadets in the Advanced Course and, in addition, receives approximately $700 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 and between military forces and branches and departments of the government. The U.S. 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. Students develop skills in conducting oral and written presentations.

Mil S 102 Leadership Theory
Spring. 1 credit. Required. Staff.
This course allows students to develop a basic understanding and appreciation of 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, resource management, motivation, and organization effectiveness. The student is introduced to the concepts of integrity, ethics, and professionalism. Classes on historical events and strategy are also presented.

Sophomore Year (Mil S II)

Mil S 222 Small Organizational Operations/Land Navigation
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. The course will also provide practical knowledge of the various forms of topographic representation. Students will use maps in terrain association and land navigation. Knowledge of topography is complemented by an orientation on significant environmental influences of physical, social, and climatic factors. Portions of the course offer experience in land navigation and orienteering.

Mil S 321 Armed Conflict in Society
Fall. 2 credits. Required. Staff.
This course provides practical knowledge in American Military History. It is primarily an overview course designed to provide an understanding of the art and nature of warfare and particularly how warfare has affected the United States. The course consists of three primary areas of instruction with an emphasis on American military history. The first area of instruction addresses the art and theory of modern warfare. It analyzes America's first attempt at war, the American Revolution, and ends with the development of modern warfare under Napoleon Bonaparte. The second phase focuses on America at war in the nineteenth century. It places particular emphasis on the American Civil War and the strategy of annihilation versus the strategy of attrition. The final phase looks at warfare in the twentieth century and finishes with an analysis of the future of warfare for the military of the United States.

Junior Year (Mil S III)

Mil S 331 Theory and Dynamics of the Military Team
Fall. 2 credits. Required. Staff.
After an initial introduction to techniques of presenting briefings, students are provided with a broad understanding of the principles and application of teamwork in military organizations. Particular emphasis is given to leadership responsibilities of the commander as the team coordinator. This course helps students 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 and the process of planning, coordinating, and directing the operations of military units through operation plans and orders.

Senior Year (Mil S IV)

Mil S 441 Leadership, Management, and Ethics for the Junior Military Officer
Fall. 2 credits. Required.
An overview of the functions, responsibilities, and interrelationships among small-unit leaders, the commander, and the staff. Detailed discussions focus on actions of small-unit leaders, communication skills, army operations, the logistical support of the army in the field, and the army training system. The course focuses on the dynamics of leadership in battle through the detailed analysis of a series of case studies. Just war theory, ethics, and professionalism are also addressed in a seminar-type environment.

Mil S 442 Contemporary Military Environment
Spring. 2 credits. Required.
A continuation of Mil S 441. Conferences and seminars examine the techniques of effective military leadership with special attention given to professionalism and ethical considerations in the armed forces during both peacetime and armed conflict. Army operations and basic doctrine are also discussed. This is a capstone course designed to prepare the student for commissioning.

Practical Leadership Training

All Army Officer-Education Students

As with many laboratory periods, no credit is given, and participation is required for successful completion of the AROTC program. Students 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 hours of military training each week, and one or two weekend training exercises per semester.

Mil S I Leadership Laboratory I

Fall.	Spring.
0 credits. S/U.	0 credits. S/U.
Mil S 151	Mil S 152

Mil S I cadets meet for two hours each week to learn a variety of military skills including rappelling, first aid, drill and ceremonies, weapons familiarization, and physical fitness training.

Mil S II Leadership Laboratory II

Fall.	Spring.
0 credits. S/U.	0 credits. S/U.
Mil S 251	Mil S 252

Cadets meet for two hours each week as members of the cadet organization to

participate in practical leadership exercises. Types of practical activities include 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.	Spring. 0 credits.
Required. S/U.	Required. S/U.
Mil S 351	Mil S 352

Cadets meet for two hours a week and some weekends to prepare for a five-week summer camp that follows their junior year. Emphasis is on the development of individual practical and leadership technique 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 proficiency in signal communications, physical fitness, drill and ceremonies, rappelling, orienteering, tactics, water survival, and other military skills.

Mil S IV Leadership Laboratory IV

Fall. 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. Includes two to three hours a week devoted to physical fitness.

Professional Military Education (PME) Requirements

In addition to the ROTC classes and leadership laboratories listed 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: communication skills, military history, 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 V. Lynch, United States Navy, Professor of Naval Science and Commanding Officer, Naval ROTC Unit

Lieutenant Colonel R. Minor, United States Marine Corps

Lieutenant J. Cleary, United States Navy

Lieutenant M. Vannoy, United States Navy

Lieutenant J. Biondi, 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 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. These courses 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 as space limitations allow.

Requirements for Enrollment

An applicant for the Naval ROTC program at Cornell must be a citizen of the United States. Applicants must have reached their seventeenth birthday by June 30 of the entering year and be less than twenty-seven 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 to students during college preceding the award of the baccalaureate degree.

Benefits

The program offers scholarships that provide *full tuition* and are not need-based. 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 prior scholarship award are entitled to compete for two- or three-year scholarships controlled by the Chief of Naval Education and Training.

Entering the Scholarship Program

There are three ways to enter the Scholarship Program:

First, by applying to the national competition each year. This process entails filling out and submitting 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.

Starting in the junior year, each of these programs provides textbooks for naval science courses, uniforms, and a subsistence allowance of $150 a month.

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, R.I.

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. In somes cases, following commissioning, specialized training such as aviation or nuclear power will add additional active duty requirements.

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 newly commissioned officers their duty of choice.

Among the assignments available are duty in naval aviation as either a pilot or naval flight officer, on submarines, and on surface ships. Other specialties, such as special warfare or medical service corps, 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), Marine-option students travel to Quantico, Virginia, where they undergo six weeks of intensive training known as the USMC Officer Candidate School. 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, either 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 afternoons. 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 have slightly different curriculum requirements for their junior and senior years.

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 also covered.

Nav S 102 Sea Power and Maritime Affairs

Spring. 3 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. 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

Fall. 3 credits.

The theme of the course is the "evolving role of the manager, organizational decision maker, and leader." The course will begin by briefly studying the theoretical principles of management and will progress through practical skills of managers and leaders. Lectures, reading assignments, films, and discussions should provide students with an excellent opportunity to wrestle with complex managerial and leadership issues. The goal of this course is for students to begin to develop a sound personal leadership philosophy that will enable them to more effectively accomplish assigned responsibilities leading men and women in today's demanding and increasing "hi-tech" naval environment.

Nav S 202 Naval Ship Systems I (also Mechanical and Aerospace Engineering 101)

Spring. 3 credits.

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.

Junior Year (Navy)

Nav S 301 Principles of Navigation (also Agricultural Engineering 305)

Fall. 4 credits.

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 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 seamanship 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 Ethics

Spring. 3 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 and appreciation of leadership and ethics in preparation for assignments in the naval service. Through the use of lectures, case studies, and role playing, the student will learn various aspects of Navy leadership and ethical decision-making. Marine-option students may also take this course.

Junior or Senior Year (Marine Options)

Nav S 310 Evolution of War

Spring. 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

Navy Option Scholarship Program

To be eligible for a commission in the United States Navy, midshipmen must successfully complete all the requirements for a baccalaureate degree in any field of study offered by Cornell University and complete courses in the following subjects (specified courses to be approved by the Professor of Naval Science):

American military affairs or national security policy (one semester)

English (one year)

calculus (one year)

calculus-based physics (one year)

computer science (one semester)

The calculus requirement must be satisfied by the end of the sophomore year and the physics requirement by the end of the junior year.

Although free choice of academic majors is permitted, students are encouraged to pursue majors in engineering and the physical sciences to meet the technological requirements of the modern Navy.

Navy Option College Program

Navy-option College Program students must complete one year of college-level study in mathematics, physical science, and English as a prerequisite for commissioning. The mathematics course must be completed by the end of the junior year; the physical science course by the end of the senior year. In addition, one term of computer science is required. College Program students who desire entry into the Navy-option Scholarship Program should fulfill all of the requirements applicable to Navy-option scholarship students if they wish to be eligible and competitive for a scholarship controlled by the Chief of Naval Education and Training.

Marine Option

Any midshipman, in either the Scholarship Program or the College Program, who completes all of Cornell University's degree requirements in any academic major, is eligible for a commission in the U.S. Marine Corps or U.S. Marine Corps Reserve. Marine-option students take the same naval science courses and naval professional laboratories as Navy-option students for the freshman and sophomore years. During the junior and senior years, Marine-option students have slightly different naval science course requirements than their Navy-option student counterparts. Two semesters of courses (a minimum of 3 hours each) in the subject area of American Military Affairs or National Security Policy are required. One semester of a modern foreign language must be completed.

Extracurricular Activities

The NROTC midshipman at Cornell is offered a broad range of activities, including sail training and a comprehensive intramural sports program. Midshipmen participate in a myriad of social events, including the annual Navy/Marine Corps Birthday Ball.

DEPARTMENT OF AEROSPACE STUDIES

Colonel James L. Wilson, Jr., United States Air Force, Professor of Aerospace Studies and Commander, Air Force ROTC Detachment 520

Captain Reid N. Orth, United States Air Force

Captain Daniel P. McAlister, 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, leadership, and management. Students study national security policy and the role of the military in a democratic society. This program includes specific courses in aerospace studies and practical leadership 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. An applicant must be a United States citizen to become a commissioned officer. Noncitizens may enroll and will receive certificates acknowledging completion of the course but cannot receive a commission.

All applicants receive physical examinations at no cost and must meet certain physical requirements to be accepted. 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, the 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 also enter a condensed version of the four-year program after coordination with the AFROTC staff. Students in a five-year program may enroll during 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 General Military Courses (GMC) and Professional Officer Courses (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 General Military Courses (GMC) take a one-credit-hour 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 the 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 Courses (POC) provide a two-year advanced program 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 offered, a commission in the United States Air Force upon graduation.

Classroom study in the POC is a three-credit-hour course 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 two hours a week in the junior and senior years. In leadership laboratory, cadets are exposed to advanced leadership experiences and apply principles of leadership learned in the classroom.

Two-Year Program

The Two-Year Program consists of the last two years (Professional Officer Courses) of the regular Four-Year Program plus a five-week summer training course preceding enrollment.

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 supported under a 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 complete a five-week summer training program at government expense.

Scholarships

The Air Force offers four-year scholarships to high school seniors and two- and three-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 Cornell (AFROTC phone number is 607–255–4004), from a local Air Force recruiter, or from AFROTC/RROO, Maxwell AFB, AL 36112–6663, 1–800–522–0033, extension 2093. 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 two and three 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 $3,400 per year to full tuition, fees and books, and provide a $150 monthly nontaxable allowance during the school year. Scholarships do not include the cost of room and board.

Fees

An initial uniform deposit of $50 is required on entry into AFROTC. Two subsequent $50 uniform payments are due, one on entry into the POC and one before commissioning. At that point, cadets can purchase uniforms with their deposits or return uniforms and receive their deposits back.

Benefits

All cadets in the advanced program (POC)—whether they are on scholarship or not—receive a $150-a-month, nontaxable subsistence allowance during the academic year. During the four- or five-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 AFROTC-sponsored field trips made to Air Force bases throughout the country as well as voluntary summer programs for professional development. 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 five-week course for Two-Year Program applicants. Students in these

programs normally attend field training between 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 five-week training program includes sixty hours of Air Force ROTC academic course work that substitutes for the freshman and sophomore Aerospace Studies courses.

Cadets may also 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 Army Airborne Training.

Commissioning Obligations

All students who successfully complete the AFROTC advanced program (POC) are awarded a baccalaureate degree, tendered a commission, and 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 ten years after completing flying training. Navigators serve six years after completing training.

Air Force Careers

The Air Force assigns new officers to a career field based on mission requirements, educational background, and officers' preferences. Students in the engineering-scientific category may be assigned to practice in their specialty in research and development, communications, electronics, aeronautics, astronautics, the biological sciences, computer design and maintenance, meteorology, space, or other engineering and scientific fields. Graduates in the nontechnical category can anticipate assignments in manpower management, information management, logistics, law enforcement and investigation, intelligence, personnel, transportation, accounting and finance, and other career fields. They will be placed in positions of responsibility and be given the opportunity to further their development in leadership and management skills. Their specific educational expertise may be required.

Any undergraduate major is suitable for those who are qualified and interested in becoming pilots or navigators. After completion of flying training, 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. There are no prerequisites for any Aerospace Studies courses.

Freshman Year

Air S 161 The Foundations of the United States Air Force I
Fall. 1 credit.
This is a survey course designed to introduce students to the United States Air Force and Air Force Reserve Officer Training Corps. Featured topics include: mission and organization of the Air Force, officership and professionalism, military customs and courtesies, Air Force officer opportunities, group leadership problems, and an introduction to communication skills. Leadership Laboratory is mandatory for AFROTC cadets and complements this course by providing cadets with followership experiences.

Air S 162 The Foundations of the United States Air Force II
Spring. 1 credit.
Continuation of Air S 161.

Sophomore Year

Air S 211 The Evolution of USAF Air and Space Power I
Fall. 1 credit.
This course is designed to examine general aspects of air and space power through a historical perspective. Utilizing this perspective, the course covers a time period from the first balloons and dirigibles to the space-age global positioning systems of the Persian Gulf War. Historical examples are provided to extrapolate the development of Air Force capabilities (competencies) and missions (functions) to demonstrate the evolution of what has become today's USAF air and space power. Furthermore, the course examines several fundamental truths associated with war in the third dimension: e.g., Principles of War and Tenets of Air and Space Power. As a whole, this course provides the students with a knowledge-level understanding of the general element and employment of air and space power from an institutional, doctrinal, and historical perspective. In addition, students will continue to discuss the importance of the Air Force Core Values by examining operational examples and historical Air Force leaders and will continue to develop their communication skills.

Air S 212 The Evolution of USAF Air and Space Power II
Spring. 1 credit.
Continuation of Air S 211.

Junior Year

Air S 331 Air Force Leadership and Management I
Fall. 3 credits.
This course is a study of leadership, quality management fundamentals, professional knowledge, Air Force personnel and evaluation systems, leadership ethics, and communication skills required of an Air Force junior officer. Case studies are used to examine Air Force leadership and management situations as a means of demonstrating and exercising practical application of the concepts being studied. A mandatory Leadership Laboratory complements this course by providing advanced leadership experiences in officer-type activities, giving students the opportunity to apply leadership and management principles of this course.

Air S 332 Air Force Leadership and Management II
Spring. 3 credits.
Continuation of Air S 331.

Senior Year

Air S 401 National Security Affairs/ Preparation for Active Duty I
Fall. 3 credits.
This course examines the national security process, regional studies, advanced leadership ethics, and Air Force doctrine. Special topics of interest focus on the military as a profession, officership, military justice, civilian control of the military, preparation for active duty, and current issues affecting military professionalism. Within this structure, continued emphasis is given to refining communication skills. A mandatory Leadership Laboratory complements this course by providing advanced leadership experiences, giving students the opportunity to apply the leadership and management principles of this course.

AS 402 National Security Affairs/ Preparation for Active Duty II
Spring. 3 credits.
Continuation of Air S 401.

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 formal dinner 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 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 the importance of applying effective human relations skills 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
Cadets assume command leadership responsibilities to operate a military organization. Cadets apply effective leadership and managerial techniques with individuals and groups and participate in self-analysis of leadership and managerial abilities.

Air S 442 Precommissioning Laboratory
Factors that facilitate transition from civilian to military life are reviewed. The need for military security, base services and activities, personal finances, travel regulations, and social obligations are introduced.

DEPARTMENT OF PHYSICAL EDUCATION AND ATHLETICS

ADMINISTRATION

Alan E. Gantert, director

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 the physical education course registration or may be found on "Bear Access," a package of software for accessing a variety of network services at Cornell, or on the World Wide Web (at http://www.athletics.cornell.edu/PE). Course fees are billed through the Office of the Bursar.

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. Prerequisite: 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 CPR-FPR 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
Spring. Fee charged.
This course is offered during the spring intersession period. Scuba trips to various destinations such as the Bahamas. Locations change from year to year. See the information sheet at the registration table.

Swimming, Introduction to (ARC)
Fall, spring, and summer. (6 weeks).
Instruction and practice in skills leading to passing the basic swimming proficiency test.

Swimming, Advanced Beginning (ARC)
Spring.
Ideal for all who have taken one term of Beginning Swimming, regardless of whether the 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 is to strengthen the student's confidence and competence.

Swimming, Intermediate (ARC)
Fall and spring.
Practice of basic skills and five basic strokes; front crawl, back crawl, elementary backstroke, breaststroke, sidestroke.

Swimming, Advanced (ARC)
Fall and spring.
Practice of nine strokes: front crawl, back crawl, elementary backstroke, breaststroke, inverted breaststroke, sidestroke, overarm sidestroke, trudgeon, and butterfly.

Swimming Conditioning
Fall and spring. Prerequisite: reasonable 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.

Water Safety Instructor
Spring. Fee charged. Prerequisite: passing of written and skill water tests which are given on the first day.
American Red Cross water safety instructor certification is awarded upon satisfactory completion of the course. This is not a course for a casual participant. Approximately 45 hours of work is required.

Water Safety Instructor Refresher Course
Spring. Fee charged.
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 all advanced courses, since they require the mental and physical ability to perform more-complex phrases in various styles.

Ballet I
Fall and spring.

Ballet II
Fall and spring.

Ballet III
Fall and spring.

Ballroom Dancing
Fall, spring and summer. Fee charged. One class a week, Helen Newman Hall. Students and their partners must sign up at course registration.
Includes instruction in the waltz, swing, cha cha, calypso, tango, and others.

Belly Dancing
Fall and spring. Fee charged.
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, then put them together in a dance to music of the Middle East.

Introduction to Swing Dance
Fall and spring. Fee charged.
No partners are needed. Beginners can expect to develop significant capacity for enjoyment of two forms of swing dance: jitterbug and street boogie. Partners will be rotated throughout the course. Effort will be made at registration to equalize male and female ratios.

Latin Dance
Fall and spring. Fee charged.
Partner sign-in required. This is an introductory course that will teach salsa, mambo, Latin and meringue. Emphasis on listening, feeling and expressing Latin rhythms with precise detail and technique.

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.

Equitation Courses

Basic, Intermediate, Advanced
Fall, spring, and summer (6 weeks). Fee charged.
All riding classes are held at the Cornell Equestrian Center located on Pine Tree Road near East Hill Plaza. Detailed information will be offered by the equitation staff at the registration sign-up table. Basic—never ridden; Intermediate I—completed basic with knowledge of walk/trot/canter; Intermediate II—walk/trot/canter with control over 2' course; Advanced—strong jumping/dressage skills with experience hunting/showing/eventing. Students must fill out a release form to participate in any riding class.

First Aid/CPR Courses

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.

NYS Emergency Medical Technician—Basic
Two-semester course. Fee charged.
This intensive 130-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.

Fishing Courses

Fly Fishing and Basic Flytying Techniques, Level I
Fall and spring. Fee charged.
Learn the art of tying several of your own artificial flies while you learn the art of fly casting. Students must have a valid NYS fishing license and their own wader boots. All other materials provided.

Salt Water Fly Fishing
Fall. Fee charged.
Learn the special techniques necessary for salt water fly fishing. This course includes 4 hours of classroom instruction and 4 days of fishing over fall break.

Fitness Courses

Aerobic Dance
Fall, spring, and summer (6 weeks). Fee charged.
A 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. Fee charged.

Cardio Crazy
Fall and spring. Fee charged.
The course is designed to acquaint the student with the various types of indoor aerobic training equipment, rowing machines, tread mills, stair machines, exercycles, and Nordic Traks, and to teach them to design a personal fitness program incorporating the equipment.

8 O'Clock Rock
Fall and spring. Fee charged.
This class combines the best of the principles of weight training and the cardio training in the 8 O'Clock Rock Class.

Aerobic Instructor Training
Fall and spring. Fee charged.
The course is designed to train the student to teach aerobics and prepare for the A.F.A.A. Primary Aerobic Instructors Certification Test.

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.

Jogging
Fall and spring.
This course will cover 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.
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 and is open to both male and female participants.

Ice Skating Courses

Skating, Introduction to
Fall and spring. For beginning to intermediate skaters. Fee charged.
Students provide their own skates or rent them at Lynah Rink. Course will cover forward and backward skating, turns, and stops.

Figure Skating, Beginning, Intermediate, and Advanced Levels
Fall and spring. Fee charged.
Instruction and practice in basic figure skating techniques: forward, backward, crossovers, turns, and spirals. Students provide their own skates or rent them at Lynah Rink.

Martial Arts—Self-Defense Courses

Boxing, Introduction to
Fall and spring. Fee charged.
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 offensive and defensive moves. Equipment furnished.

Fencing, Intermediate
Spring. Fee charged. Prerequisite: Introduction to Fencing or the equivalent.
Interclass competition is stressed. Equipment is furnished.

Fencing, Classical
Fall and spring. Fee charged.
Classical fencing is a martial art that uses the practice of the sword to cultivate self-mastery.

Judo, Introduction to
Fall and spring. Fee charged.
Conditions and increases suppleness. 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.
Conditions and increases suppleness. Continue 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.

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 emphasis on high and powerful kicks. Basic kicking, punching, and blocking 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. Fee charged.
Introduction to T'ai Chi, a system of graceful 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.

Basic Rock-Climbing, for Women
Fall, spring. Fee charged.
Seven afternoons climbing inside on the Lindseth climbing wall taught by and for women.

Basic Rock-Climbing, for 24 and Over
Fall, spring. Fee charged. Non-credit course.
Four evenings climbing indoors on the Lindseth wall for people age 25 or older.

High Adventure 101
Fall, spring, and summer. Fee charged.
Six afternoons at local parks and wilderness areas, some classes on indoor Lindseth climbing wall.

Continuing Rock-Climbing
Fall, spring. Fee charged.
Seven afternoons of advanced climbing techniques on the Lindseth climbing wall.

Ice Climbing
Spring. Fee charged.
Four outings to local state parks and gorges.

Outdoor Top Roping
Fall, spring. Fee charged.
Two outings (nights) on the Lindseth climbing wall and two outings at local climbing areas.

Shawangunks Rock-Climbing
Fall, spring. Fee charged.
Four-day climbing camp at the Shawangunks.

Backpacking Courses

Natural History of the Finger Lakes
Fall, spring. Fee charged.
Backpacking skills with a strong environmental focus.

Backpacking in the Finger Lakes
Fall, spring. Fee charged.
Classes lead to two full weekends on the trail.

Southwest Backpacking
Spring. Fee charged.
Spring break trip to the SW deserts and canyons.

Trail Maintenance
Fall, spring. Fee charged.
Work with the local trails club to support and maintain trail systems.

Wilderness Skills
Fall, spring. Fee charged.
Break trip focusing on wilderness travel and living skills.

Wilderness Survival Skills
Fall, spring. Fee charged.
Primitive living skills taught in three classes and a weekend backpack trip.

Biking Courses

Bike and Hike
Fall, spring. Fee charged.
Four full days exploring local countryside.

Bike Repair, Beginning
Fall, spring. Fee charged. Non-credit.
Two evenings of hands-on repair work.

Bike Repair, Intermediate
Fall, spring. Fee charged. Non-credit.
One evening of hands-on repair work.

Mountain Biking
Fall. Fee charged.
Four full days exploring local countryside.

Canoeing Courses

Canoeing, Adirondacks
Fall. Fee charged.
Break trip explores the beauty of the Adirondacks via canoe.

Introduction to Paddling
Fall, spring. Fee charged.
A sampler of beginning canoeing and kayaking.

Canoe/Camping, Flatwater
Fall, spring. Fee charged.
Four full days paddling local waterways including an overnight.

Canoeing, Moving Water
Fall, spring. Fee charged.
Includes a full weekend of river paddling.

Caving Courses

Caving
Fall, spring. Fee charged.
Four days in the fall and two weekends in the spring in Pennsylvania caves.

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 Day Trip
Spring. Fee charged. Non-credit course.
Day excursion for paddlers with basic skills.

Whitewater Kayaking
Fall, spring. Fee charged.
Includes a full weekend of whitewater paddling.

Pool Kayaking
Fall, spring. Fee charged.
Seven-session 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. Non-credit.
Two evenings of specialized wilderness care.

Wilderness First Responder
Offered in January, over winter break. Fee charged.
Ten days of instruction and practical application of backcountry first aid. Participants earn CPR and First Responder certifications. Taught by SOLO Wilderness Medical Institute.

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 at Song Mountain Ski Area.

Personal Growth Courses

Body-Mind
Fall and spring.
Activities 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.

Introduction to Meditation
Fall and spring. Fee charged.
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.

Living Routines
Fall and spring.
Provides the opportunity to explore a variety of ancient and modern methods designed to bring one to the state of meditation.

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, spring, and summer. 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, spring, and summer. Fee charged.
Provides 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.

Shiatsu Massage
Fall and spring. Fee charged.
Gain an experimental understanding of your body and learn certain shiatsu massage techniques.

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.

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
Fall, spring, and summer. Fee charged.
Instruction for beginners. Equipment is furnished. Protective eyewear required.

Squash, Introduction to, Intermediate
Fall, spring, and summer. Fee charged.
Classes for appropriate level of play. Equipment is furnished. Protective eye wear required.

Tennis, Introduction to
Fall, spring, and summer. Fee charged.
Basic skills taught include forehand, backhand, serve, and volley. Scoring methods taught.

Tennis, Intermediate
Fall, spring, and summer. Fee charged.
Review basic strokes plus topspin and underspin. Doubles strategy emphasized.

Tennis, Advanced
Fall, spring. Fee charged.
Advanced strokes and doubles play emphasized. Recommended for tournament players or those with previous team experience.

Tennis, Indoor-Recreational
Fall and spring. Fee charged.
Play is conducted at the new Reis Tennis Center. Players must have high school or college tournament experience or a rating of 3.5 or higher from the USTA. Matches are played in both doubles and singles. 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.

Catamaran, Introduction to
Fall, spring, and summer (6 weeks). Fee charged.
Learn unique skills necessary for sailing multihull catamarans.

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.

Water Skiing
Fall only. Fee charged.
Introductory course for beginning water skiers. Classes will be conducted from East Shore Marina.

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. Fee charged. Two classes a week.
Instruction in the care of equipment; seven basic steps for shooting; scoring; practice shooting at twenty, thirty, and forty yards.

Pistol, Introduction to
Fall, spring, and summer (6 weeks). Fee charged.
Instruction in use of pistol in the three modes of fifty-foot competitive target shooting—slow fire, timed fire, and rapid fire. Emphasis on safety and responsibility while firing.

Riflery
Fall and spring. Fee charged.
Instruction and practice in the techniques of target riflery 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. Prerequisite: basic skating ability. Fee charged.
Stick handling, passing, and shooting are stressed. Some scrimaging. 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.

Soccer
Spring.
Introduction to the game. Includes basic individual skills (passing, trapping, shooting) and team play and strategy.

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

Trotter Circuit Training
Fall and spring. Fee charged.
Students will gain a working knowledge of the basic principles of Trotter selectorized weight lifting equipment. Emphasis on principles of weight training, circuit training, intensity training, and program design.

Principles of Weight Training
Fall and spring. Fee charged.
Introduces 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.

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. Permission to enter this program must be granted by the program director.

SCHOOL OF CONTINUING EDUCATION AND SUMMER SESSIONS

The School of Continuing Education and Summer Sessions provides a wide variety of educational opportunities beyond the degree-granting programs of the university. These programs serve virtually all age groups in a great variety of formats and time frames. For information about the following programs write B20 Day Hall, Ithaca, New York 14853–2801; call 607/255–4987; e-mail cusce@cornell.edu; or fax 607/255–9697; unless indicated otherwise below. You may also visit us on the Web at www.continuingeducation.cornell.edu.

ADMINISTRATION

Glenn C. Altschuler, dean

Judith K. Eger, director, program development and marketing

Abby H. Eller, director, Cornell University Summer College

Christine Holmes, special programs coordinator

Ralph Janis, director, Cornell's Adult University

Charles W. Jermy, Jr., associate dean, and director, Cornell University Summer Session

Joseph Lindner, manager, computing

Ann L. Morse, media manager

Cathy M. Pace, registrar

Diane E. Sheridan, director, finance and administration

CORNELL UNIVERSITY SUMMER SESSION

The Cornell University Summer Session provides unique and unusually attractive opportunities for study and recreation at a time when the Cornell campus and the Finger Lakes region of central New York are at their loveliest and the Ithaca weather is at its best. Participants may choose from a wide spectrum of courses scheduled during three-, six-, and eight-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. For information call 607/255–4987; e-mail cusce@cornell.edu; or visit our Web site at www.summer.cornell.edu.

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 eight weeks and noncredit weekend and weeklong short courses. Programs can also be designed to respond to the needs and interests of corporations, 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 cusp@cornell.edu; fax 607/255–9697; or visit www.continuingeducation.cornell.edu/SP/.

SUMMER COLLEGE PROGRAMS FOR HIGH SCHOOL STUDENTS

High school sophomores, 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 summer_college@cornell.edu; fax 607/255–8942; or visit www.summercollege.cornell.edu.

CORNELL'S ADULT UNIVERSITY

Cornell's Adult University (CAU) offers week-long noncredit courses on campus for adults and families during the summer. During the fall, winter, and spring, there are weekend seminars, week-long domestic programs, and international study tours. Developed and led by distinguished members of the Cornell faculty, all programs are inspired by the belief that learning never ends and that one of the roles of a great university is to provide a bridge between traditional formal education and informal, noncredit study. For information, write Cornell's Adult University, 626B Thurston Avenue, Ithaca, New York 14850–2490; e-mail cauinfo@cornell.edu; fax 607/254–4482; call 607/255–6260; or visit www.cau.cornell.edu.

DISTANCE LEARNING

The School of Continuing Education and Summer Sessions offers courses through distance learning. Instructional materials for these courses may be presented on the World Wide Web, video tapes, and/or CD-ROMs. Students interact with the instructor and other students by phone or e-mail. Assignments and examinations are completed within a scheduled session, just as in on-campus courses, but students have the option of beginning study prior to the start of the session. For information, visit www.continuingeducation.cornell.edu/DL/.

EXTRAMURAL STUDY

Cornell undergraduate or graduate students whose studies have been interrupted may find it appropriate to resume their studies by taking classes on a part-time basis. Area residents may take courses on a part-time basis by registering as extramural students. Those interested may enroll in almost any course offered in the fall and spring terms if they receive the instructor's written approval. Another offering, the **Visitor's Program**, 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 from the instructor. For information, write to Extramural Study, B20 Day Hall, Ithaca, NY 14853–2801; call 607/255–4987; fax 607/255–9697; e-mail cusce@cornell.edu; or visit www.continuingeducation.edu/EXMU/.

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. For information, write to Winter Session, B20 Day Hall, Ithaca, NY 14853–2801; call 607/255–4987; fax 607/255–9697; e-mail cusce@cornell.edu; or visit www.wintersession.cornell.edu.

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. It also provides information about short courses, workshops, professional updates, and executive programs offered by the university to people inside and outside Cornell. For information, write to Continuing Education, B20 Day Hall, Ithaca, NY 14853–2801; call 607/255–4987; fax 607/255–9697; or e-mail cusce@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. Courses are posted to the Web (www.summer.cornell.edu) in the fall as the roster is developed. A preliminary course roster is available beginning in late November. If a course is also offered through distance learning, the course title will be followed by **DL**.

Africana Studies

AS&RC 205 African Cultures and Civilizations

A program in African languages is also offered. Consult the department for a complete listing.

Agricultural and Biological Engineering

ABEN 476 Solid Waste Engineering

Agricultural, Resource, and Managerial Economics

ARME 220 Introduction to Business Management

ARME 221 Financial Accounting

ARME 320 Business Law I

ARME 324 Financial Management

ARME 451 Environmental Economics and Policy

American Studies

AM ST 101–102 Introduction to American Studies **DL**

AM ST 124 Democracy and Its Discontents: Political Traditions in the United States

AM ST 202 Popular Culture in the United States, 1945 to the Present **DL**

Anthropology

ANTHR 101 Introduction to Anthropology

ANTHR 201 Lost Tribes and Sunken Continents

Archaeology

ARKEO 100 Introduction to Archaeology

ARKEO 201 Lost Tribes and Sunken Continents

ARKEO 361 Summer Program in Etruscan Archaeology at La Piana

Other field study opportunities are usually available through this department.

Architecture

ARCH 110 Introduction to Architecture: Design Studio

ARCH 130 Introduction to Architecture: Lecture Series

ARCH 251 Photography I

ARCH 351 Photography II

ARCH 388 Modernism

Consult the Department of Architecture office for a complete list of summer design offerings including foreign study opportunities.

Art

ART 121 Introductory Painting

ART 123 Landscape Painting

ART 141 Introductory Sculpture

ART 151 Drawing I

ART 152 Drawing II

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 Electronic Imaging in Art

ART 221 Painting II

ART 241 Sculpture II

ART 261 Photography II

ART 321 Painting III

ART 361 Photography III

ART 372 Special Topics in Studio Art

ART 429–489 Independent Studio

Asian Studies

ASIAN 407 Religion and Human Rights

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 207 Evolution

BIO G 209 Introduction to Natural-Science Illustration

BIO G 467 Seminar in the History of Biology: Evolution, Ethics, and Meaning in Life

BIO G 499 Undergraduate Research in Biology

Biochemistry, Molecular and Cell Biology

BIOBM 333 Principles of Biochemistry: Proteins, Metabolism, and Molecular Biology

BIOBM 602 Molecular Biology for Teachers

Ecology and Evolutionary Biology

BIOES 261 Ecology and the Environment

BIOES 373 Biology of the Marine Invertebrates

Genetics and Development

BIOGD 281 Genetics

Microbiology

BIOMI 290–291 General Microbiology

Plant Biology

BIOPL 245 Plant Biology

Shoals Marine Laboratory

BIOSM 160 Oceanography of the Gulf of Maine

BIOSM 161 Introduction to Field Marine Science

BIOSM 204 Biological Illustration

BIOSM 303 Ecology of Marine Fishes

BIOSM 309 Climates and Ecosystems

BIOSM 364 Field Marine Science

BIOSM 365 Underwater Research

BIOSM 366 SEA Introduction to Oceanography

BIOSM 367 SEA Introduction to Maritime Studies

BIOSM 368 SEA Introduction to Nautical Science

BIOSM 372 SEA Practical Oceanography

BIOSM 374 Field Ornithology

BIOSM 375 Field Marine Ecology

BIOSM 413 Experimental Marine Ecology

BIOSM 418 Tropical Marine Science

BIOSM 449 Seaweeds, Plankton, and Sea Grass: The Ecology and Systematics of Marine Plants

BIOSM 477 Marine Vertebrates

BIOSM 499 Undergraduate Research in Biology

Biology and Society

B&SOC 447 Seminar in the History of Biology: Evolution, Ethics, and Meaning in Life

Biometrics

BTRY 601 Statistical Methods I

Chemistry

CHEM 206 Introduction to General Chemistry

CHEM 207–208 General Chemistry

CHEM 251 Introduction to Experimental Organic Chemistry

CHEM 257 Introduction to Organic and Biological Chemistry

CHEM 357–358 Organic Chemistry for the Life Sciences

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 320/520 Introduction to Statistical Reasoning for Urban and Regional Analysis

Classics

Classical Civilization

CLASS 236 Greek Mythology

CLASS 361 Summer Program in Etruscan Archaeology at La Piana

Greek

CLASS 104 Intensive Greek

Latin

CLASS 107 Intensive Latin

CLASS 369 Intensive Medieval Latin Reading

Communication

COMM 116 Communication in Social Relationships

COMM 120 Contemporary Mass Communication **DL**

COMM 201 Oral Communication

COMM 203 Argumentation and Debate

COMM 204 Effective Listening

COMM 240 Communication Systems and Technologies

COMM 263 Organizational Writing

COMM 272 Principles of Public Relations and Advertising **DL**

COMM 301 Business and Professional Speaking

COMM 350 Writing for Magazines

COMM 411 Leadership from a Communication Perspective

COMM 497 Individual Study in Communication

Comparative Literature

COM L 105 The Hero in Literature

COM L 204 Global Fictions

COM L 236 Greek Mythology

COM L 353 European Cultural History, 1870–1945

Computer Science

COM S 099 Fundamental Programming Concepts

COM S 100 Introduction to Computer Programming

COM S 211 Computers and Programming

COM S 410 Data Structures

Economics

ECON 101 Introductory Microeconomics **DL**

ECON 102 Introductory Macroeconomics

ECON 106 Introduction to Financial Statement Analysis

ECON 205 Managerial Accounting for Planning and Control

ECON 313 Intermediate Microeconomic Theory

ECON 314 Intermediate Macroeconomic Theory

ECON 362 International Monetary Theory and Policy

ECON 409 Environmental Economics and Policy

Education

EDUC 420 Field Experience

EDUC 445 Curriculum Design Workshop

EDUC 497 Independent Study

EDUC 501 Communication Workshop

EDUC 507 Science and the Environment for Teachers

EDUC 523 Food and Fiber Across the Curriculum

EDUC 548 Effective College Teaching

EDUC 620 Internship in Education

EDUC 621–622 Work-Experience Coordinator Certification Course

EDUC 694 Special Topics in Education

EDUC 711 Contemporary Issues in Educational Psychology

EDUC 760 Practicum Seminar in Educational Administration

EDUC 783 Comparative Extension Education Systems

EDUC 800 Master's-Level Thesis Research

EDUC 900 Doctoral-Level Thesis Research

Engineering

Distribution Courses

ENGRD 203 Dynamics

ENGRD 211 Computers and Programming

ENGRD 221 Thermodynamics

ENGRD 270 Basic Engineering Probability and Statistics

The Engineering Cooperative Program offers a number of other engineering courses. Contact that office for more information.

English

ENGL 131 Critical Reading and Writing

ENGL 132 The Personal Essay

ENGL 211 Fantasy and Horror

ENGL 227 Shakespeare

ENGL 273 Children's Literature

ENGL 288–289 Expository Writing

ENGL 448 The American Short Story

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

Geological Sciences

GEOL 101 Introductory Geological Science

GEOL 104 The Sea: An Introduction to Oceanography

GEOL 213 Marine and Coastal Geology

GEOL 417 Geologic Field Mapping in Argentina

GEOL 475 Advanced Topics in Oceanography I

GEOL 491 Undergraduate Research

GEOL 492 Advanced Topics in Oceanography II

Government

GOVT 111 Introduction to American Government and Politics

GOVT 131 Introduction to Comparative Government and Politics

GOVT 161 Introduction to Political Philosophy **DL**

GOVT 181 Introduction to International Relations

GOVT 307 An Introduction to Public Policy

GOVT 313 The Nature, Functions, and Limits of Law

GOVT 331 The Political Environment of International Business

History

HIST 101–102 Introduction to American History

HIST 124 Democracy and Its Discontents: Political Traditions in the United States

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 363 European Cultural History, 1870–1945

HIST 371 World War II in Europe

HIST 415 Seminar in the History of Biology: Evolution, Ethics, and Meaning in Life

History of Art

ART H 202 Survey of European Art: Renaissance to Modern

Horticultural Sciences

HORT 494 The How, When, and Why of Grafting **DL**

Hotel Administration

H ADM 165 Managerial Communication I

H ADM 174 Microcomputing

H ADM 210 The Management of Human Resources

H ADM 354 Computer-Aided Design

H ADM 365 Managerial Communication II

H ADM 450/651 Principles of Real Estate

Human Development

HD 115 Human Development

HD 440 Internship in Educational Settings for Young Children

Human Ecology

HE 406 Fieldwork in Professional Practice: Summer in the City

Industrial and Labor Relations

Collective Bargaining, Labor Law, and Labor History

ILRCB 100 Introduction to U.S. Labor History: Nineteenth Century

ILRCB 201/501 Labor and Employment Law

ILRCB 300 Collective Bargaining

ILRCB 499 Summer Employment Research

ILRCB 608 Special Topics in Collective Bargaining, Labor Law, and Legislation

Human Resource Studies

ILRHR 266 Personal Computer Basics

ILRHR 468 Human Resources Management Simulation

Organizational Behavior

ILROB 170/520 Introduction to Microorganizational Behavior and Analysis: The Social Psychology of the Workplace

ILROB 171 Introduction to Microorganizational Behavior and Analysis

Social Statistics

ILRST 210–211 Statistical Reasoning **DL**

ILRST 510–511 Statistical Methods for the Social Sciences **DL**

Jewish Studies

JWST 364 Introduction to Field Archaeology in Israel

Landscape Architecture

LA 500 The Art of Place

Linguistics

LING 242 Diversity in American English

Management

NBA 560 Business Law I

NBA 584 Management of the Multinational Corporation

Marine Science

Consult related department listings for summer offerings in marine science.

Mathematics

MATH 103 Mathematical Explorations

MATH 105 Finite Mathematics for Biologists

MATH 109 Precalculus Mathematics

MATH 111–112 Calculus

MATH 171 Statistical Theory and Application in the Real World

MATH 192–193 Calculus for Engineers

MATH 221 Linear Algebra and Calculus

MATH 293–294 Engineering Mathematics

Mechanical and Aerospace Engineering

M&AE 221 Thermodynamics

Modern Languages

Chinese

CHIN 160 Introductory Intensive Chinese (Mandarin)

CHIN 201–202 Intermediate Chinese

French

FRDML 121 Elementary French

FRDML 203 Intermediate Composition and Conversation

Japanese

JAPAN 160 Introductory Intensive Japanese

JAPAN 203–204 Intermediate Japanese Conversation

JAPAN 403 Teaching of Japanese as a Foreign Language

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 121 Elementary Spanish

SPAND 123 Continuing Spanish

SPAND 203 Intermediate Composition and Conversation

SPAND 205 Translation

Swahili

AS&RC 131–132 Swahili

Music

MUSIC 105–106 Introduction to Music Theory

MUSIC 274 Opera

MUSIC 331 Sage Chapel Choir

Natural Resources

NTRES 306 Coastal and Oceanic Law and Policy

NTRES 309 Environmental Sovereignty: Managing Natural Resources in American Indian Territories

NTRES 417 Wetlands Resources

Near Eastern Studies

NES 364 Introduction to Field Archaeology in Isreal

Operations Research and Industrial Engineering

OR&IE 270 Basic Engineering Probability and Statistics

Philosophy

PHIL 101 Introduction to Philosophy

PHIL 145 Contemporary Moral Issues

PHIL 249 Feminism and Philosophy

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

PHYS 202 The World According to Physics—The Way Things Work

PHYS 213 Physics II: Heat/Electromagnetism

PHYS 214 Physics III: Optics, Waves, and Particles

PHYS 400 Informal Advanced Laboratory

PHYS 500 Informal Graduate Laboratory

PHYS 510 Advanced Experimental Physics

Policy Analysis and Management

PAM 320 (formerly HSS 322) Managing the Nonprofit Organization

PAM 430 Sociology of Health and Human Behavior

Psychology

PSYCH 101 Introduction to Psychology: The Frontiers of Psychological Inquiry

PSYCH 128 Introduction to Psychology: Personality and Social Behavior **DL**

PSYCH 199 Sports Psychology

PSYCH 214 Issues in Cognitive Psychology

PSYCH 223 Introduction to Biopsychology

PSYCH 265 Psychology and the Law

PSYCH 298 Meritocracy from Plato to the Bell Curve

PSYCH 350 Statistics and Research Design

Religious Studies

RELST 407 Religion and Human Rights

Rural Sociology

R SOC 101 Introductory Sociology

R SOC 324 Environment and Society

R SOC 434 Sociology of Health and Human Behavior

Science and Technology Studies

S&TS 287 Evolution

S&TS 324 Environment and Society

S&TS 447 Seminar in the History of Biology: Evolution, Ethics, and Meaning In Life

Sociology

SOC 101 Introduction to Sociology

SOC 324 Environment and Society

Textiles and Apparel

TXA 114 Introduction to Computer-Aided Design

Theoretical and Applied Mechanics

T&AM 203 Dynamics

T&AM 293–294 Engineering Mathematics

Women's Studies

WOMNS 249 Feminism and Philosophy

Writing

WRIT 134 An Introduction to Writing in the University

NEW YORK STATE COLLEGE OF VETERINARY MEDICINE

ADMINISTRATION

Donald F. Smith, dean

Robert O. Gilbert, associate dean for clinical programs and professional service

Douglas D. McGregor, associate dean for research and graduate education

Hollis N. Erb, secretary of the college

Katherine M. Edmondson, assistant dean for learning and instruction

Bonita S. Voiland, assistant dean for hospital operations

Gene R. Wheeler, assistant dean for administration

Gloria R. Crissey, director, office of student records, schedules, and financial planning

Corine Farewell, director of career development

Mary Beth Jordan, director of human resources

Carol S. Peterson, director of financial aid

Joseph A. Piekunka, director of admissions

Kathleen M. Quinlan, director of educational development

John E. Saidla, director of continuing education

Jai Sweet, director of student services and multicultural affairs

DEPARTMENT CHAIRS

Biomedical Sciences: B. Cooper, C. Farnum, J. Wooton, co-chairs

Clinical Sciences: C. Lothrup

Microbiology and Immunology: R. Avery

Molecular Medicine: G. Weiland

Population Medicine and Diagnostic Services: D. Lein

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 Doctors of Veterinary Medicine and some highly qualified holders of baccalaureate degrees and lead to the degree of Master of Science or Doctor of Philosophy.

More detailed information is contained in the 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 professional curriculum; the new course requirements apply to the class that matriculated in the fall of 1993 and to subsequent classes. Courses in the revised professional curriculum are designated with the prefix "VTMED," and consist of two categories of courses: foundation courses and distribution courses.

The Professional Curriculum

FOUNDATION COURSES

In foundation courses I, II, III, and IV (VTMED 510, 520, 530, 540), students work in small groups under the guidance of a faculty tutor. Case-based exercises are used to facilitate the understanding of basic science concepts within the context of clinical medicine. On average, three to four 2-hour tutorial sessions are scheduled each week. These are complemented by lectures, laboratories, and discussion sessions or other organized learning opportunities specific to the individual course. Faculty are available to respond to questions that arise as a result of the case-based exercises.

Tutorial sessions and all other organized learning programs are usually scheduled during the mornings, thereby reserving the afternoons for independent study. By situating learning in a clinical context, students are better able to integrate material from the basic and clinical sciences, and are encouraged to develop an understanding of the clinical reasoning process from the beginning of the curriculum. The tutorial-based educational format creates an atmosphere that requires students to be involved actively in their learning and allows them to develop skills in communication, information retrieval, and analysis.

Note: Courses listed in brackets [ ] are approved courses that are not offered during the 1999-2000 academic year.

VETMED 510 The Animal Body (Foundation Course I)
Fall. 12 credits. Limited to first-year veterinary students. Letter grades only. S. S. Suarez and staff.
This course is designed to enable students to understand the principles of veterinary anatomy at the gross, microscopic, and ultrastructural levels. Developmental anatomy is emphasized to the extent that it reflects determination of adult form and species differences. Radiologic and related imaging techniques are used throughout the course to assist in the understanding of normal structural anatomy. Understanding of the anatomic basis of common surgical procedures is achieved during the various dissection procedures. The course is based on tutorials with significant emphasis on practical laboratories. Lectures and modules complement student learning.

VETMED 517 Animals, Veterinarians, and Society: Part A (Foundation Course VIIa)
Fall. 1 credit. Limited to first-year veterinary students. Letter grades only. A fee of approximately $10 is charged for the course guide. J. E. Saidla and staff.
This course is the correlate for VETMED 510 The Animal Body. This is a laboratory-based course that teaches physical examination of four species (dog, cat, cow, and horse). The class is divided into small groups and each group meets for two hours each week during the first eleven weeks. The skills of auscultation, percussion, palpation, and observation are taught along with clinically related diagnostic procedures.

VETMED 520 Genetics and Development (Foundation Course II)
Fall and spring. 8 credits. Limited to first-year veterinary students. Prerequisite: VETMED 510 The Animal Body. Letter grades only. R. A. Levine and staff.
An appreciation of how gene expression and cell behavior contribute to normal animal development and health is crucial for our understanding of the pathogenesis of disease. Students will gain an understanding of the cellular and molecular mechanisms that regulate development and maintain normal structure and function throughout the life of an animal. Emphasis will be placed on defining and characterizing normal cellular behaviors and on understanding how mutations in specific genes promote disease. Students will become familiar with the common molecular procedures being used to develop new diagnostic and therapeutic tools to maintain health and combat disease. Tutorial sessions are complemented by lectures, laboratories, and class discussions.

VETMED 521 Neuroanatomy and Clinical Neurology
Spring. 3 credits. Limited to first-year veterinary students. Letter grades only. A. de Lahunta.
Fundamentals of functional neuroanatomy and diseases of the nervous system are taught so that each student is competent in the diagnosis of clinical neurologic disorders of domestic animals. This is a vertically integrated course that includes dissection of the central nervous system of the dog, the anatomic basis for the diagnosis of diseases of

the nervous system, and the differential diagnosis of those diseases. Clinical cases with pertinent lesions are demonstrated with each system. Films and videotapes of clinical patients are used to demonstrate the clinical signs produced by the various diseases. Slides of gross and microscopic lesions are used to emphasize the clinical and neuroanatomic relationships and to stress characteristic features of representative conditions.

VETMED 527 Animals, Veterinarians, and Society: Part B (Foundation Course VIIb)

This course begins in the last part of fall semester and finishes at the end of winter session. 1 credit. Limited to first-year veterinary students. Prerequisite: VETMED 517 Animals, Veterinarians, and Society: Part A. Letter grades only. A fee of approximately $7.00 is charged for the course guide. J. F. Saidla and staff.

This course is the correlate for VETMED 520 Genetics and Development. It enters into a study of ethical issues related to animal use, animal welfare, animal genetics, clinical application of genetics, genetics counseling, and clinical day-to-day ethics. The course meets for one 2-hour session each week.

VETMED 530 Function and Dysfunction: Part I (Foundation Course IIIa)

Spring. 9 credits. Limited to first-year veterinary students. Prerequisite: VETMED 520 Genetics and Development. Letter grades only. D. Robertshaw and staff.

This course is designed to develop students' understanding of how an animal maintains itself as a functional organism; how this is achieved through the integration of different functional organ systems; how tissue structure relates to tissue function; how injury alters structure and leads to dysfunction, manifested as clinical signs; how organ function can be assessed; and how it can be modulated pharmacologically. The course incorporates aspects of physiology, biochemistry, cell biology, histology, pathology and histopathology, clinical pathology and pharmacology.

VETMED 531 Function and Dysfunction: Part II (Foundation Course IIIb)

Fall. 7 credits. Limited to second-year veterinary students. Prerequisite: VETMED 530 Function and Dysfunction: Part I. Letter grades only. D. Robertshaw and staff.

A continuation of VETMED 530 Function and Dysfunction: Part I.

VETMED 537 Animals, Veterinarians, and Society: Part C1 (Foundation Course VIIc)

Spring. 1 credit. Limited to first-year veterinary students. Prerequisite: VETMED 527 Animals, Veterinarians, and Society: Part B. Letter grades only. A fee of approximately $9.00 is charged for the course guide. J. F. Saidla and staff.

This course is the correlate for VETMED 530 Function and Dysfunction: Part I. The central goal of this course is to provide students with the interpersonal skills and techniques necessary to communicate effectively with clients. In addition, students will be provided an opportunity to study the human-animal bond, animal death, and grief counseling. This course also provides opportunities to practice client interviewing skills and to participate in a home or farm visit.

VETMED 538 Animals, Veterinarians, and Society: Part C2 (Foundation Course VIIc, continued)

Fall. 1 credit. Limited to second-year veterinary students. Prerequisite: VETMED 537 Animals, Veterinarians, and Society: Part C1. Letter grades only. A fee of approximately $6.00 is charged for the course guide. J. E. Saidla and staff.

This course is the correlate for VETMED 531 Function and Dysfunction, Part II. This course provides for understanding the importance of the medical record, the diversity of clients, employees, and society in general, and a session on alternative medicine and its various practices. How to critically read and evaluate clinical studies and journal articles is also addressed.

VETMED 540 Host, Agent, and Defense (Foundation Course IV)

Fall. 12 credits. Limited to second-year veterinary students. Prerequisite: VETMED 531 Function and Dysfunction: Part II. Letter grades only. TBA (course leader) and others.

This course is divided into six sections: the host response, intracellular environment, extracellular environment, somatic environment, external environment, and surrounding environment. Using this approach, students develop an understanding of the host response to insult; a familiarity with groups of important pathogens; an understanding of how pathogens manipulate the host and how the host defends itself against attacks; and an understanding of the roles played by the external environment and human intervention in the epidemiology of infectious organisms.

VETMED 547 Animals, Veterinarians, and Society: Part D (Foundation Course VIId)

Fall. 1 credit. Limited to second-year veterinary students. Prerequisite: VETMED 538 Animals, Veterinarians, and Society: Part C2. Letter grades only. A fee of approximately $12.00 is charged for the course guide. J. E. Saidla and staff.

This course is the correlate for VETMED 540 Host, Agent, and Defense. This course will emphasize maintaining health in both individuals and populations of animals and humans. Topics will include animal bites, nosocomial infections, rabies control programs, vaccines and vaccine reactions, zoonotic diseases, and integrated health maintenance programs. The course emphasizes veterinary public health.

VETMED 550 Animal Health and Disease: Part I (Foundation Course V)

Spring. 10 credits. Limited to second-year veterinary students. Prerequisite: VETMED 540 Host, Agent, and Defense. Letter grades only. D. M. Ainsworth.

This course integrates the clinical sciences of medicine, surgery, anesthesiology, radiology, and theriogenology, which are themselves integrated subjects, with systems pathology and relevant aspects of applied pharmacology. The course will be presented on a systems basis moving from clinical signs of alteration in function, to pathophysiology of clinical signs, to strategies for diagnosis and treatment. Specific examples will be used to establish a cognitive framework and knowledge of the most important diseases. This course will provide a sound foundation for clinical rotations in Foundation Course VI. It builds upon the strengths developed in earlier courses by an increased exposure to case examples in a more directed way, taking advantage of the diversity of skills and special knowledge of both faculty and students. A variety of educational techniques will be used, including lectures in which interaction is encouraged, laboratories, demonstrations, case discussions, and autotutorials.

VETMED 551 Animal Health and Disease: Part II (Foundation Course V, continued)

Fall. 20 credits. Limited to third-year veterinary students. Prerequisite: VETMED 550 Animal Health and Disease: Part I. Letter grades only. D. M. Ainsworth and staff.

A continuation of VETMED 550 Animal Health and Disease: Part I.

VETMED 557 Animals, Veterinarians and Society: Part E (Foundation Course VIIe)

Spring. 1 credit. Limited to second-year veterinary students rolling over into fall semester for the then third-year veterinary students. Prerequisite: VETMED 547 Animals, Veterinarians, and Society: Part D. Letter grade only. A fee of approximately $14.00 is charged for the course guide. J. E. Saidla and staff.

This course is a correlate with Foundation Course V, Animal Health and Disease. The course will examine governmental regulation of the veterinary profession, including proper drug usage, extra label drug use (FDA), controlled substances (DEA), substance abuse, professional liability and malpractice insurance, professional and unprofessional conduct, hazardous materials in the workplace (OSHA), and environmental issues (EPA). Also included will be sessions relating to controlling and preventing the spread of animal diseases and the role of USDA and specifically APHIS in these regulatory functions.

VETMED 560 Ambulatory and Production Medicine I

Fall, winter, spring and summer. Credit variable (either one or two credits). Letter grades only. L. D. Warnick and staff.

A clinical service rotation in which students accompany latory clinicians on farm and stable calls and learn the skills and procedures necessary for operation of a modern veterinary practice offering primary care to large animal clients. Routine herd health visits are conducted for cattle, horses, sheep, goats, and swine. Reproductive evaluations (including pregnancy and fertility examinations), nutritional evaluation, and disease prevention are stressed. Herd health programs also include vaccinations, parasite control, mastitis prevention, and routine procedures such as castration and dehorning. With appropriate herds, analysis of computerized performance data is conducted and discussed with the owner. In addition to assisting with routine scheduled work, students participate in diagnosis and medical or surgical treatment of ill or injured animals. This includes rotating assignments for night and weekend duty.

VETMED 561 Community Practice Service-Medicine (enroll in VTMED 561)

2 credits. Required component of Clinical Rotations (Foundation Course VI). Letter grades only. W. E. Hornbuckle and staff.

The Community Practice-Medicine Service is structured to provide supervised clinical experience in the practice of small companion

animal medicine. The course is conducted in the Small Animal Clinic of the Veterinary Medicial Teaching Hospital. Students interact directly with clients presenting their pet for primary medical care. Under the supervision of the clinical faculty and staff, the students are expected to formulate and carry out plans for the diagnostic evaluation and medical management of these patients. After review, students explain their plans to the clients and provide follow-up care and management of these patients.

VETMED 562 Community Practice Service-Surgery and Anesthesiology
2 credits. Required component of Clinical Rotations (Foundation Course VI). Letter grades only. H. J. Harvey and staff.
Basic principles of anesthesiology and surgery are emphasized in the clinical rotation. Under direct staff supervision, students will anesthetize and perform surgical procedures on patients presented to the Small Animal Clinic for neutering and minor elective procedures. Students will be responsible for all aspects of patient care during their hospital stay and will be expected to fully participate in client communications. Ordinarily, this course will precede Anesthesiology Service and Small Animal Surgery Service (soft tissue component).

VETMED 563 Small Animal Medicine
Fall, spring, winter, and summer. 4 credits. Required course open to second-semester third-year and all fourth-year veterinary students; not open to others. Letter grades only. S. C. Barr, S. A. Center, J. F. Randolph, K. W. Simpson.
The Small Animal Medicine Service is structured to provide supervised clinical experience in the practice of companion small animal medicine. The course is conducted in the Small Animal Clinic of the Companion Animal Hospital. Students interact directly with clients presenting their pets for primary or referral medical care. Under the supervision of the clinical faculty and staff, the students are expected to formulate and carry out plans for the diagnostic evaluation and medical management of these patients. After review, students explain their plan to the clients and provide follow-up care and management of these patients.

VETMED 564 Small Animal Surgery Service
Fall, winter, spring, and summer. 4 credits. Required of all third- and fourth-year veterinary students; not open to others. Letter grades only. E. J. Trotter and small animal surgery faculty.
A clinical service rotation, this course exposes the student to the practice of surgery under hospital conditions. Students participate in the diagnostic techniques; planning of therapy; and daily care of dogs, cats, and exotic species under the direction of a faculty veterinarian. Students assist experienced surgeons in the operating room and, with house-officer supervision, are responsible for patients undergoing elective ovariohysterectomy or castration. Client communications and the basics of efficient practice are emphasized.

VETMED 565 Ambulatory Medicine Service
Fall, winter, spring, and summer. 4 credits. Required component of Clinical Rotations (Foundation Course VI). Letter grades only. C. L. Guard and staff.
A clinical service rotation in which students accompany ambulatory clinicians on farm and stable calls and learn the skills and procedures necessary for operation of a modern veterinary practice offering primary care to large animal clients. Routine herd health visits are conducted for cattle, horses, sheep, goats, and swine. Reproductive evaluations (including pregnancy and fertility examinations), nutritional evaluation, and disease prevention are stressed. Herd health programs also include vaccinations, parasite control, mastitis prevention, and routine procedures such as castration and dehorning. With appropriate herds, analysis of computerized performance data is conducted and discussed with the owner. In addition to assisting with routine scheduled work, students participate in diagnosis and medical or surgical treatment of ill or injured animals. This includes rotating assignments for night and weekend duty.

VETMED 566 Large Animal Medicine Service
Fall, winter, spring, and summer. 3 credits. Required component of Clinical Rotations (Foundation Course VI). Letter grades only. D. Ainsworth, T. Divers and staff.
Students assigned to this service will assist the faculty and house staff of the Large Animal Medicine service in the diagnosis and care of patients. The goal of this course is for students working on this service to acquire knowledge and skills in history taking, physical examination, election and completion of appropriate ancillary tests, diagnosis, treatment and patient care. Daily rounds and discussions are used to monitor patient progress and further educate students.

VETMED 567 Large Animal Surgery Service
Fall, winter, spring, and summer. 4 credits. Required component of Clinical Rotations (Foundation Course VI). Letter grades only. R. P. Hackett and staff.
This clinical rotation is structured to provide supervised clinical experience in the practice of large animal surgery. Under the direction of faculty and house staff, students participate in the diagnosis, surgical treatment, and care of patients presented to the Large Animal Clinic. Training through patient care is supplemented by formal rounds and didactic instruction.

VETMED 568 Anesthesiology Service
Fall, winter, spring, and summer. 3 credits. Required component of Clinical Rotations (Foundation Course VI). Letter grades only. R. D. Gleed, J. W. Ludders, P. F. Moon and staff.
This course is designed to provide clinical experience in the use of anesthetics in small companion animals, horses, and some food animals. The students participate in selecting suitable anesthetic techniques for patients in the Veterinary Medical Teaching Hospital and then implement those techniques under the supervision of faculty and residents. The goal is for students to learn the skills and thought processes necessary to perform safe anesthesia in a modern veterinary practice.

VETMED 569 Dermatology Service
Fall, winter, spring, and summer. 2 credits. Required component of Clinical Rotations (Foundation Course VI). Letter grades only. W. H. Miller and staff.
During this clinical rotation, students participate in the diagnosis and management of skin disorders in small and large animals. Patients are examined by appointment and through consultation with other hospital services.

VETMED 570 Ophthalmology Service
Fall, winter, spring, and summer. 2 credits. Required component of Clinical Rotations (Foundation Course VI). Letter grades only. R. C. Riis, T. Kern, N. Irby and J. Cho.
This course combines clinical experience with beginning skills in diagnostic ophthalmology. Students learn how to apply the ophthalmic diagnostic tests. A competent ocular examination is the goal of this rotation. Confidence in using direct and indirect ophthalmoscopes, slit lamps, tonometers, goniolenses, conjunctival cytology, and surgery comes with the practice provided by this rotation. Students are required to review the introductory orientation videotapes in the Autotutorial Center entitled, "Ocular Examination I and II," before the start of the rotation. This rotation provides surgical experience and consultations. A high percentage of the consultations are referral cases that usually challenge the service. Adequate routine case material is presented to prepare most students for practice.

VETMED 571 Pathology Service
Fall, winter, spring, and summer. 2 credits. Required component of Clinical Rotations (Foundation Course VI). Letter grades only. B. A. Summers and staff.
This course involves the hands-on diagnostic necropsies of most mammalian species that are presented to the pathology necropsy room and of avian species that are admitted to the avian and aquatic animal medicine necropsy room. Students work in groups of three to five for the two-week rotation. Necropsies are performed under the guidance of pathology faculty and residents. Students prepare written reports of necropsies performed, review microscopic hematology and cytology slides, perform urinalyses, and discuss case studies.

VETMED 572 Radiology Service
Fall, winter, spring, and summer. 2 credits. Required component of Clinical Rotations (Foundation Course VI). Letter grades only. N. L. Dykes and staff.
A two-week clinical experience in the Radiology Section of the Veterinary Medical Teaching Hospital. Students will use radiographic, CT, ultrasonographic, and nuclear medicine imaging techniques to evaluate animal patients under treatment in the Veterinary Medical Teaching Hospital. Students obtain and interpret radiographic and ultrasonographic studies with guidance from radiology faculty and technical staff. Two 3-hour laboratory sessions are given to allow hands-on experience in patient positioning and radiographic technique. An autotutorial teaching film file is used to familiarize students with radiographic examples of common diseases of large and small animal species. Small-group discussions are scheduled to present and discuss current cases. The safe use of x-ray producing equipment and radioisotopes are discussed.

VETMED 573 Fourth-Year Seminar
Fall and spring. 1 credit. Required of all fourth-year veterinary students. First-, second-, and third-year students and all staff members are also invited and encouraged to attend. S-U grades only. F. H. Fox, chair of the Senior Seminar Committee.
The aim of this course is to give the student the responsibility and opportunity of selecting and studying disease entity on the basis of a case or series of cases, or to conduct a short-term, clinically oriented research project under the direction of a faculty member. In either case, an oral report will be presented at a weekly seminar. A written report will also be submitted at the time of the seminar. All participants are encouraged to foster an atmosphere in which discussion, exchange of ideas, and the airing of controversial opinions might flourish.

DISTRIBUTION COURSES

Distribution courses comprise 30 percent of the curriculum and are usually scheduled during the first half of each spring semester. During the first two years, many of the distribution courses are oriented to the basic sciences. During years three and four, students have additional distribution course offerings from which to choose. Some will emphasize clinical specialties, whereas others will integrate basic science disciplines with clinical medicine and will be co-taught by faculty representing both areas. Students from different classes have the opportunity to take many of these courses together.

Grades: grading options for distribution courses are either letter or S-U.

VETMED 601 Anatomy of the Carnivore
Spring. 3 credits. Prerequisite: VETMED 510 The Animal Body or permission of instructor. First-, second-, third, and fourth-year veterinary students, others by permission. Letter grades only. A. J. Bezuidenhout
Carnivore anatomy is studied by detailed systematic and regional dissection of the cat, with comparison to the dog. Student dissection is supplemented with prosections, radiographs, and exercises focusing on surgical approaches. There are opportunities for dissection of other carnivores, such as the ferret and the fox, depending on availability of speciments. The lectures augment the laboratory dissection, and introduce the student to functional morphological comparative features in the Order Carnivore. Students do an independent research project on the carnivore species of their choice, and give an oral presentation on this to the class.

VETMED 602 Anatomy of the Horse
Spring. 3 credits. Prerequisite: VETMED 510 The Animal Body or permission of instructor. First-, second-, third, and fourth-year veterinary students, others by permission. Letter grades only. M. S. Hackett.
This course is organized as a traditional anatomy course that relies primarily on students learning the anatomy of horses through hands-on dissection laboratories augmented by lectures and highlighted by clinical correlations. An understanding of anatomy that provides the foundation for surgery and is directly relevant to clinical practice will be emphasized in the regional approach to dissection. Structural-functional correlations that are unique or important in the horse will be the area of emphasis for most lectures. Microscopic anatomy will be integrated into the course in selected areas to lay a foundation for the later study of pathology or when it reinforces concepts of structure and function that are difficult to understand by a study of the gross anatomy alone (i.e., hoof). Student dissection cadavers will be supplemented by skeletal materials, radiographs, models, preserved pre-dissected specimens and fresh specimens when they are available.

VETMED 603 Anatomy of the Ruminant
Spring. 3 credits. Prerequisite: VETMED 510 The Animal Body or permission of the instructor. First-, second-, third, and fourth-year veterinary students, others by permission. Letter grades only. J. Hermanson.
The regional anatomy of several ruminant species will be covered using dissection laboratories, lectures, and large-group discussions. Functional consequences of structural modifications and anatomical features directly relevant to clinical practice will be emphasized. Microscopic anatomy will be correlated with gross anatomy when appropriate to relate structure to function and to provide a foundation for later study in pathology. Student dissection material will be supplemented by skeletal materials, radiographs, models, predissected specimens, and postmortem specimens. Students will be required to complete an independent study project on a relevant subject of their choice. Assessment includes written and practical examination.

VETMED 605 Comparative Anatomy: Pattern and Function
Spring. 3 credits. Prerequisite: VETMED 510 The Animal Body. First-, second-, third, or fourth-year veterinary students, others by permission. Letter grades only. L. A. Mizer.
The goal of this course is to study anatomical variability among amniote (mammals, birds, and reptiles) and anomniote (amphibian & fish) species. This is accomplished by relating the anatomy of major organ systems in each species to a common basic pattern and considering the differences in a functional perspective. Six major systems will be explored (integumentary, locomotory, neurosensory, cardiorespiratory, digestive, and urogenital) in a variety of species as available.

VETMED 606 Advanced Clinical Neurology
Spring. 1 credit. Prerequisite: VETMED 521 Neuroanatomy and Clinical Neurology. Third-and fourth-year veterinary students. Letter grades only. A. deLahunta.
The objective of this course is to further the experience and confidence of the student in the diagnosis and understanding of clinical neurological disorders. It continues their correlation of anatomy, physiology, and pathology in the diagnosis of diseases of the nervous system and the understanding of their pathogenesis. Neurological disorders that are not covered in the foundation course will be considered here. The course is entirely based on case examples that are presented on videotapes or 16mm film and slides.

VETMED 607 The Literature and Subject Matter of Natural History
Spring. 1 credit. First-, second-, third-, and fourth-year veterinary students, others by permission. S-U grades only. H. E. Evans.
This course is an introduction to classic and current natural history literature. Materials relating to the earth sciences and the biology of plants and animals from around the world will be shown and discussed. Students will be required to show and discuss a book that concerns natural history in a country of their choice. A recommended reference text for this course is, *The Cambridge Illustrated Dictionary of Natural History*, by R. J. Lincoln and G. A. Boxshall, 1990.

VETMED 609 Anatomy and Histology of Fish
Spring. 2 credits. Minimum enrollment 4; maximum enrollment 6. First-, second-, third, and fourth-year veterinary students, others by permission. S-U grades optional. P. R. Bowser.
This course provides an overview of the diversity of anatomy and histology of fish. Students will participate in lecture, discussion and laboratory exercises to review the major organ systems. Extensive use of library resources for assigned readings will be expected. Each student will prepare a term project and make one oral presentation.

[VETMED 610 Veterinary Aspects of Avian Biology
Spring. 1 credit. Minimum enrollment 10; maximum enrollment 60. First-, second-, third-, and fourth-year veterinary students, others by permission. Letter grades only. Offered odd-numbered years. Not offered spring 2000. G. V. Kollias.
An introduction to avian biology for veterinary students. The course will include lectures and laboratories involving avian evolution, anatomy, physiology, and ecology. Emphasis will be on the development of a strong foundation in avian biology that will be applied in VETMED 616 Diseases of Birds and VETMED 652 Avian Medicine and Surgery.]

VETMED 611 Fish Health Management
Spring. 1 credit. Minimum enrollment 8; maximum enrollment 16. First-, second-, third, or fourth-year veterinary students, others by written permission of instructor. S-U grades optional. P. R. Bowser.
This course will present a summary of important diseases of fin fishes. Diseases covered will be those of importance in commercial aquaculture as well as those encountered by the tropical fish hobbyist. The course is designed to provide the students with a knowledge base and hands-on diagnostic experience in diseases of fish.

VETMED 612 Management of Aquarium Systems
Spring. 1 credit. Minimum enrollment 8; maximum enrollment 16. First-, second-, third-, and fourth year veterinary students or written permission of instructor. S-U grades optional. P. R. Bowser.
This is a lecture and laboratory course dealing with procedures and practices involved in management of aquarium systems. Topics include water quality, types of aquarium filtration systems, fish health, fish nutrition, and general fish biology. A portion of the course will require independent work in aquarium system management.

VETMED 613 Aquavet I: Introduction to Aquatic Veterinary Medicine
Four weeks of full-time instruction at Woods Hole, Massachusetts, immediately after the spring term. 4 credits. Maximum enrollment 24 students from Cornell University, the University of Pennsylvania, and other U.S. colleges and schools of veterinary medicine. By permission of the instructor and special application procedure. S-U grades only. Course fee required. P. R. Bowser.

The course is sponsored by Cornell University, the University of Pennsylvania, and three marine science institutions at Woods Hole: the Marine Biological Laboratory, Woods Hole Oceanographic Institution, and Northeast Center of the National Marine Fisheries Service. It is designed to introduce veterinary students to aquatic animal medicine. The marine environment is described and visited on field trips in the Woods Hole area. Specific aspects of the comparative anatomy, physiology, nutrition, microbiology, pathology, and medicine of a variety of marine and freshwater species are discussed. Some emphasis is placed on systems of aquaculture. The specific diseases of a few selected species are presented as examples, including the diseases of a crustacean, a shellfish, a finfish, and marine mammals. The course is taught by an invited faculty of thirty-five individuals who are leaders in their respective fields of aquatic animal medicine. Students present seminars on appropriate topics.

VETMED 614 Aquavet II: Comparative Pathology of Aquatic Animals
Two weeks of full-time instruction at Woods Hole, Massachusetts, immediately after the spring term. 2 credits. Prerequisites: formal course work in diseases of aquatic animals or appropriate experience and permission of the instructor. Maximum enrollment 18. S-U grades optional. Course fee required. Special application procedure required. P. R. Bowser.

This course is sponsored by Cornell University, the University of Pennsylvania, and three marine science institutes at Woods Hole: the Marine Biological Laboratory, Woods Hole Oceanographic Institution, and Northeast Center of the National Marine Fisheries Service. It is an advanced course in the comparative pathology of aquatic invertebrates and vertebrates commonly used as laboratory animals. The material presented will consist of discussions of the diseases of aquatic animals as well as extensive use of the microscope to examine the histopathology associated with these diseases. The course is taught by an invited faculty of twelve individuals who are leaders in their respective fields of aquatic animal medicine.

[VETMED 615 Veterinary Medicine in Developing Nations
Spring. 2 credits. Maximum enrollment 20. First-, second-, third-, and fourth- year veterinary students; others by permission of instructor. S-U grades only. Offered odd-numbered years. Not offered 1999–2000. K. A. Schat.

Veterinary medicine has an important role to play in developing nations in (a) developing and providing economical sources of animal proteins for human consumption and (b) protecting ecological resources. This seminar course will provide interested veterinary students with information on and insight into the multitude of complex issues facing U.S. veterinarians working in developing nations.]

VETMED 616 Diseases of Birds
Spring. 2 credits. Minimum enrollment 10; maximum enrollment 80. Second-, third-, and fourth-year veterinary students. Letter grades only. S. Naqi and G. V. Kollias.

This course is designed to introduce second-, third-, and fourth-year veterinary students to a basic and practical knowledge of the most common infectious and non-infectious diseases affecting a variety of avian species. The course will emphasize the latest diagnostic and control approaches. The course format will be a combination of didactic lectures and discussions.

[VETMED 618 Adaptation of Animals to the Environment
Spring. 1 credit. Minimum enrollment 10. Graduate, first-, second-, third-, and fourth-year veterinary students. Letter grades only. Not offered spring 2000. D. Robertshaw.

The course will examine the physiological adaptations of animals to their environment in addition to methods of acclimatization to novel environments. The course will focus on environmental parameters that exist in harsh environments and include heat, cold, altitude and xeric conditions. Thus the physiological mechanisms of thermoregulation in mammals, birds and ectotherms will be examined together with their responses to low food and water availability. The knowledge obtained will help in understanding the consequences of translocation of both wild and domestic animals and provide a rational basis for animal housing and the provision of appropriate habitats for zoological gardens. The degree of environmental adaptation will also be examined in terms of animal production from a basic science standpoint.]

[VETMED 619 Pathogenesis of Viral Disease (also VETMI 701)
Spring. 2 credits. Minimum enrollment 15; maximum enrollment 45. Strongly recommended prerequisite of immunology. First-, second-, third-, and fourth-year veterinary students. Letter grades only. Offered odd-numbered years. Not offered spring 2000. J. D. Baines.

Course content and objectives: the course will focus on the balance between host defense against viral infections and the mechanisms by which viruses perpetuate themselves in human and animal populations. In the process, the mechanisms of cell and animal infection, spreading between cells, disease mechanisms, and the roles of the immune response in enhancing and suppressing disease will be explored. This will include a systems-based approach exploring the pathogenesis of disease in the CNS, gastrointestinal, hepatic, tegumentary, respiratory and urogenital systems. The basic principles of virus taxonomy, structure and replication will be included to introduce various viral groups and their special properties. Methods of intervention (vaccination, antiviral drugs) will also be covered. Lectures are derived from relevant current literature, the text, Nathanson's *Viral Pathogenesis*, 1997, and Field's, *Virology*, third edition, 1996. Relevant materials will be placed on reserve in the veterinary library.]

VETMED 620 Molecular Biology and Immunology of Host-Parasite Interactions (also VETMI 702)
Spring. 2 credits. First-, second-, third-, and fourth-year veterinary students, others by permission of the instructor. Letter grades only. Offered even-numbered years. E. J. Pearce.

The primary objective of this lecture course is to make the student aware of the most important areas of research in contemporary parasitology. Lectures will focus on a broad range of parasites, with an emphasis on those of medical importance. Recently published research articles and reviews will be used as the basis from which to explore the issues of host invasion, evasion of host defense mechanisms by parasites, vaccination against parasitic infections, chemotherapy, drug resistance, vector biology, and molecular diagnosis. Biological processes that are especially well understood through work on parasites, such as RNA editing and GPI-anchor biosynthesis and structure, will be covered in detail.

VETMED 622 Foreign Infectious Diseases of Animals
Spring. 1 credit. Minimum enrollment 6. Second-, third, and fourth-year veterinary students. Letter grades only. D. H. Schlafer.

This course describes the etiology, pathogenesis, clinical signs, gross pathology, differential diagnosis, methods of spread, reservoir hosts, and control of foreign animal diseases that present serious economic threats to the United States. The format is student seminar presentations with each student responsible for presenting one seminar. Ordinarily the course will also include presentations by College faculty and research scientists working on F.A.D.s.

VETMED 625 Osteoarthritis
Spring. 1 credit. Maximum enrollment 16. Graduate, first-, second-, third-, and fourth-year veterinary students. Letter grades only. G. Lust.

This course provides a basis at the molecular, cellular, and tissue levels for understanding the function of mammalian diarthrodial joints. It includes a description of a diarthrodial joint and the detailed composition and metabolism of bone, articular cartilage, ligaments, meniscus, capsule, and synovium. The interrelationship of synovium, synovial fluid, joint lubrication, articular cartilage, simple biomechanical considerations, and enervation are described to address joint function. A comprehensive discussion of the osteoarthritis that is inextricably associated with hip dysplasia in dogs serves as a basis for the etiopathogenesis of this disease. Osteoarthritis in joints of cats, dogs, horses, pigs, sheep, and cows also are discussed in detail as is osteochondrosis.

Consideration is also given to infectious arthritis and human joint diseases such as gout and pseudogout. The role of pain receptors, a brief discussion of therapy such as the role of nonsteroidal anti-inflammatory drugs, glucocorticoids, and mention of possible corrective surgery procedures are included.

VETMED 626 Epidemiology of Infectious Diseases
Spring. 1 credit. Maximum enrollment 8. Second-, third-, and fourth-year veterinary students. Letter grades only. H. Mohammed and staff.

This course will provide an introduction to the epidemiologic methods used in infectious disease investigations. The importance of surveillance systems in detecting modern epidemics and in the development of effective disease prevention and control strategies will also be discussed. An emphasis will be placed on understanding the relationships between the host, the agent and the environment as they relate to disease causation. The course will explore contemporary epidemiologic methods applicable to old diseases that remain real or potential problems, newly emerging infectious diseases, and nosocomial infections. Selected diseases will be discussed to clarify the role of epidemiology in understanding the pathogenesis of infectious processes in individuals and groups of animals. The students will have the opportunity to apply the methods learned to actual disease problems and write an epidemiologic report that might lead to a publication in a peer reviewed scientific journal.

VETMED 627 Diseases of Antiquity

Spring. 1 credit. Second-, third-, and fourth-year veterinary students. Letter grade option only. J. Saidla.

This is a study of 30 human and animal diseases that have had profound effects on the course of human history from the beginning of recorded time to the present. This course combines aspects of literature, medicine, and history and explores the interactions between demographics, commerce, imperialism, medical care, the environment and disease. Prevailing superstitions and religious views are considered in context with each illness and simultaneously occurring world events.

VETMED 628 Clinical Pathology

Spring. 2 credits. Minimum enrollment 20; maximum enrollment 60. Second-, third-, and fourth-year veterinary students. Letter grades only. T. Stokol.

This six-week course addresses a range of issues related to laboratory medicine and interpretation of laboratory results. General topic areas include hematology, clinical chemistry and immunology, and urinalysis. The primary mode of instruction is student-driven small group (untutored) exploration of case materials followed by faculty-moderated large-group discussions. Selected lectures and laboratory sessions will supplement and expand on issues generated by the case discussions. This course builds on concepts previously addressed in Block 3 and 4, and also provides additional experiences in practical clinical pathology procedures and microscopy.

VETMED 630 Clinical Biostatistics for Journal Readers

Spring. 1 credit. Minimum enrollment 6; maximum enrollment 20. First-, second-, third-, and fourth-year veterinary students, all others by permission of the instructor. Letter grade. H. N. Erb.

The student will become familiar with the statistical methods commonly used in veterinary clinical articles, will be able to recognize obvious misuse of those methods, and will be able to interpret the statistical results.

VETMED 631 Clinical Diagnostic Parasitology

Fall and spring. 0.5 credit. Prerequisite: VETMED 551. Third- and fourth-year veterinary students. S-U grades only. To be arranged with Dr. Frongillo. D. D. Bowman and M. K. Frongillo.

This course will provide a chance to perform diagnostic parasitology methods using samples obtained from ongoing clinic cases. Students will attend eight one-hour sessions as they rotate through the ambulatory, community practice, and pathology rotations. In the ambulatory service (four sessions with students), diagnostics will concentrate on the laboratory examination of samples from large animal cases that have been observed during the prior week. In the Community Practice Service, one hour will concentrate on the examination of samples from ongoing cases, while a second hour will consist of a discussion of the treatment of common endo- and ecto-parasites. The two hours spent as part of the pathology rotation will examine methods of recovering parasites from pathology specimens, including the examination of wet preparations and the digestion of tissues for parasite recovery. The course is considered to be a logical extension to the foundation course, Host, Agent, and Defense, and is expected to build upon the didactic material presented in Large and Small Animal Parasitology.

VETMED 632 Senior Seminar

Fall and spring. 1 credit. First-, second-, and third-year veterinary students. S-U grades only. Must be completed in two consecutive terms (either fall to spring or spring to fall). R. O. Gilbert.

Attendance at fourteen of the senior seminar sessions presented during the academic year constitutes acceptable completion of this course.

This course does *not* fulfill the one-credit Set VII minimum.

VETMED 633 Introduction to Nontraditional Companion and Laboratory Animals

Spring. 1 credit. First-, second-, third-, and fourth year veterinary students. Letter grades only. J. E. Saidla and staff.

This course is both laboratory and lecture based and deals with a wide variety of nontraditional species that might be brought into a small animal practice other than a dog or cat. These can be either companion or laboratory animals and include rodents, lagomorphs, other small mammals, reptiles, amphibians, birds, fish, goats, sheep, potbellied pigs, primates, and llamas. Instruction in restraint and handling, breeding, husbandry, and general management information is provided for each species. This is followed, where practical, by laboratory sessions for observation, restraint, and physical examination.

VETMED 635 Introduction to the Professional Literature

Spring. 1 credit. Minimum enrollment 6; maximum enrollment 20. First-, second-, third-, and fourth-year veterinary students. Letter grades only. D. Lee.

This course introduces veterinary students to the professional and biomedical literature, including development of critical reading skills. Students will become familiar with the broad range of professional and biomedical literature and will be encouraged to develop a rigorous approach to journal and scientific article review. Secondary emphasis is on developing skills in library and bibliographic search techniques, as well as exploring the use of veterinary-related on-line information.

VETMED 637 Introduction to Community Practice Service

Fall, winter, spring, and summer. 1 credit. First- and second- year veterinary students by permission of instructor. S-U grades optional. W. E. Hornbuckle.

This course introduces veterinary students to primary care small animal clinical practice through direct exposure to the Community Practice Service of the Veterinary Medical Teaching Hospital. Students observe and assist with restraint, examination and routine treatment of pets, and communication with clients. Successful completion requires satisfactory participation during ten half-days of clinical service.

VETMED 638 Physiological Nutrition

Spring. 1 credit. Minimum enrollment 10; maximum enrollment 90. Second-, third-, and fourth-year veterinary students, others by permission of the instructor. Letter grades only. F. A. Kallfelz.

This course will provide information on the evaluation and formulation of rations for large and small animals. These concepts will be applied in discussion on the nutrition requirements of these animals during maintenance, gestation, lactation, growth, stress, and aging. The course is recommended for all second-year veterinary students who do not have a strong background in ruminant, equine, canine, and feline nutrition. This course, or its equivalent, will be necessary for comprehension of clinical nutrition concepts in Foundation Course V.

VETMED 639 Veterinary Dentistry

Spring. 1 credit. Maximum enrollment 96. Second-, third-, and fourth-year students. Letter grades only. J. E. Saidla.

This is an introductory-level course in small animal dentistry. It is a laboratory course that meets for two hours, twice a week for 16 sessions. Basic concepts and practical topics in dental nomenclature, dental anatomy, oral/dental examination, routine dental care including prophylaxis, recordkeeping, genetics and breed differences, feline-specific dental disease, occlusion/malocclusion, periodontics, endodontics, restorative dentistry, oral surgery, and orthodontics are presented. Basic instrumentation dental radiography and materials used in dentistry are stressed. The class will use prepared specimens for all sessions.

VETMED 640 Veterinary Aspects of Captive Wildlife Management

Spring. 2 credits. First-, second-, third-, and fourth-year veterinary students. Letter grades only. G. V. Kollias.

This course will concentrate on principles of captive wildlife management, both clinical and nonclinical. Students will be challenged to learn and integrate a variety of disciplines that are essential to successfully managing wildlife in a captive or semi-free-ranging environment. These disciplines include but are not limited to species-specific (1) behavior and behavioral requirements, (2) nutritional requirements and problems, (3) natural history, (4) zoonotic, and toxicological problems, (5) manual restraint and anesthesia, (6) preventive medicine, and (7) medical and legal ethics. In even numbered years the course will emphasize North American wildlife species, and in odd numbered years Central and South American, African, Asian, and Australian Species.

VETMED 641 Approaches to Problems in Canine Infectious Diseases
Spring. 1 credit. Minimum enrollment 10; maximum enrollment 80. Second-, third-, and fourth-year veterinary students. Letter grades only. S. C. Barr.
The course consists of two 50-minute discussion/lecture periods a week for eight weeks. The letter grade will be obtained entirely from the result of a written examination given in the final period. The course will emphasize the approach to clinical medical problems generally and infectious diseases specifically. The overall objective is to give future small animal practitioners skills in the approach to clinical problems with specific emphasis placed on history taking, clinical signs and examination skills, assessment of clinicopathology data and diagnostic materials (radiographs, ultrasounds), treatment plans, and prevention. The course expands knowledge gained in Foundation Course IV and under the instruction of a clinical faculty member is aimed at facilitating the use of that knowledge into the practical skills of managing clinical cases.

VETMED 642 Management of Fluid and Electrolyte Disorders
Spring. 2 credits. Minimum enrollment 20; maximum enrollment 40. For second-, third-, and fourth-year veterinary students. Letter grades only. D. F. Smith.
Students will focus on clinical manifestations and the pathophysiologic mechanisms associated with fluid, electrolyte, and metabolic acid base disturbances in domestic animals. The course is divided into segments dealing with salt and water imbalances, potassium abnormalities, metabolic acidosis, metabolic alkalosis, and mixed acid-base disturbances.

VETMED 643 Fundamental Aspects of Embryo Transfer
Spring. 1 credit. Maximum enrollment 16. Enrollment is done by lottery. Third- and fourth-year veterinary students or graduate students with permission of instructor. S-U grades only. R. Gilbert.
This course provides an introduction to the theory and practice of embryo transfer in domestic animals. Topics include background, advantages and disadvantages, superovulation, embryo recovery techniques, embryo culture and manipulation, embryo transfer techniques, registration of offspring, import and export, and related topics in assisted reproductive technologies. Students are exposed to practical techniques of embryo transfer in cattle, small ruminants, horses, and swine. The course consists of lectures, demonstrations, and laboratory classes during which students practice techniques of embryo recovery, evaluation, handling and transfer.

VETMED 644 Equine Surgical and Anesthetic Techniques
Winter. 1 credit. Prerequisite: VETMED 602, Antaomy of the Horse. Minimum enrollment 3; maximum enrollment 21. Enrollment is done by lottery. Third- and fourth-year veterinary students. S-U grades only. S. L. Fubini (coordinator) and other large-animal surgeons.
This course consists of five laboratories performing surgical procedures on ponies and cadaver specimens. It is the intent of this course not to make the students proficient in these procedures but to familiarize them with some specialized surgical techniques and to make them more enlightened referring practitioners. The course, therefore, is intended for students anticipating equine practice after graduation. This course is offered during a one-week period over winter intersession.

VETMED 645 Food Animal Surgical and Anesthetic Techniques
Winter. 1 credit. Prerequisite: VETMED 603, Anatomy of the Ruminant. Minimum enrollment 6; maximum enrollment 30. Third- and fourth-year veterinary students. S-U grades only. Enrollment is done by lottery. S. L. Fubini and other large-animal surgeons.
This course consists of five laboratories performing surgical procedures on sheep, calves, cadaver specimens, and adult cattle. It is the intent of this course not to make the students proficient in these procedures but to familiarize them with surgical techniques and to make them more enlightened referring practitioners. The course, therefore, is intended for those students anticipating food animal practice after graduation. This course is offered during a one-week period over winter intersession.

VETMED 646 Llama Tutorial
Fall, spring, and summer. 1 credit. Prerequisite: VETMED 540. Second semester second-, third- or fourth-year veterinary students. S-U grades only. Independent Study. M. C. Smith.
This autotutorial or group tutorial course covers common problems of llamas and alpacas. Participants will be provided with study guides consisting of brief case descriptions and sample study questions. Reference will be made to textbooks, journal articles, videotapes, and (if available) a teaching llama to assist students in finding the answers to the questions efficiently. Grading is based on an oral exam.

VETMED 647 Poisonous Plants
Fall. 1 credit. First-, second-, third-, and fourth-year veterinary students or by permission of the instructor. S-U grades only. R. Hillman and M. Smith.
Field trips demonstrate toxic plants growing in natural or cultivated settings. Lectures address economically important poisonous plants native to the United States. Information presented includes plant identification, natural habitat, toxic principles, clinical signs of toxicity, and treatment and prevention of poisoning in animals. Some of the major toxic principles found in plants and considered in detail in the course are nitrates, cyanide, oxalates, photodynamic agents, alkaloids, and mycotoxins.

VETMED 648 Clinical Management of Native Wildlife
Fall, spring, and summer (credit given in fall). 1 credit. Enrollment not to exceed 20 students per semester, 2 students per rotation. First-, second-, third-, fourth-year veterinary students by permission of the instructor. Letter grades only. G. Kollias and staff.
This course introduces veterinary students to primary native wildlife care and to wildlife issues that face practicing veterinarians on a daily basis. Students are responsible for the assessment, physical examination, and medical care of native wildlife presented to the Veterinary Medical Teaching Hospital by the public and local wildlife rehabilitators. Student activities are directly supervised and assessed by faculty wildlife clinicians on a daily basis. Successful completion of the course requires 40 hours of satisfactory supervised participation per semester in the clinic. Clinic times will be appropriately scheduled throughout the semester. Students are required to submit two case summaries before the end of the semester.

VETMED 649 Introduction to Equine Practice
Spring. 0.5 credit. First- and second-year veterinary students. Maximum enrollment 30. Letter grades only. R. Hackett and C. Collyer.
This is an introductory course in equine husbandry intended for students with little or no experience working with horses. Lecture topics will include horse breeds and colors, housing facilities and fencing, and overview discussions of the racing, showing, and breeding industries. Laboratories will emphasize basic equine handling and restraint as well as feeds and bedding.

VETMED 650 Veterinary Parasitology: Large Animal
Spring. 1 credit. First-, second-, third-, and fourth-year veterinary students. Letter grades only. D. Bowman.
This course provides a basic introduction to large animal parasites of veterinary importance, concentrating mainly on the biology, control, and diagnosis of protozoan and metazoan parasites. Emphasis will be given to parasites representative of significant disease processes or of significant economic importance to veterinarians, clients, and producers. The course will elaborate on the biology and pathogenesis of these major pathogens with the ultimate goal being to maximize the recognition of the major disease manifestations induced through examples of each of the different groups of organisms.

VETMED 651 Veterinary Parasitology: Small Animals
Spring. 1 credit. First-, second-, third-, and fourth-year veterinary students. Letter grades only. D. Bowman.
This course provides a basic introduction to small-animal parasites of veterinary importance, concentrating mainly on the biology, control, and diagnosis of protozoan and metazoan parasites. Emphasis will be given to parasites representative of significant disease processes or of significant clinical importance to veterinarians and pet owners. The course will elaborate on the biology and pathogenesis of these major pathogens with the ultimate goal being to maximize the recognition of the major disease manifestations induced through examples of each of the different groups of organisms.

VETMED 652 Avian Medicine and Surgery
Spring. 2 credits. Minimum enrollment 20; maximum enrollment 80. Third- and fourth-year veterinary students. Letter grades only. G. Kollias and staff.
This course is designed to introduce Third- and fourth-year veterinary students to the principles and practice of clinical avian medicine and surgery. The course will be taught in a basic didactic lecture and discussion format with laboratories that will reinforce concepts presented in the lectures.

VETMED 653 Advanced Equine Lameness

Spring. 1.5 credits. Minimum enrollment 7; maximum enrollment 21. Third- and fourth-year veterinary students. Enrollment is done by lottery. S-U grades only. N. Ducharme, A. Nixon, and staff.

This course is designed to help students understand the methodology and to develop the manual skills required for lameness examination in horses. Emphasis will be on developing diagnostic skills. Specifically, the student will be expected to develop proficiency in the identification of clinical characteristics associated with recognized lamenesses and to localize the origin of the lameness. Teaching aids will include video modules outlining various gait abnormalities. In addition, horses with specific gait abnormalities will be available for physical, radiographic, and ultrasonographic examination.

[VETMED 654 Current Therapy in Equine Reproduction

Spring. Lec, 1 credit; lab 0.5 credit. Lab, minimum enrollment 12; maximum enrollment 24. Laboratory enrollment is done by lottery. Concurrent enrollment in Current Therapy in Equine Reproduction Lecture is required. Third- and fourth-year veterinary students. Letter grades only. Not offered spring 2000.

This course will cover aspects of physiology and therapy of equine reproduction. The purpose of the course is to prepare the student for equine broodmare practice.]

VETMED 655 Production Animal Theriogenology

Spring. Lec, 1 credit; lab, 1 credit. Lab, minimum enrollment 12; maximum enrollment 24. Laboratory enrollment is done by lottery. Concurrent enrollment in Production Animal Theriogenology Lecture is required. Third- and fourth-year veterinary students. Letter grades only. R. Gilbert.

This course deals with specific reproductive conditions of production animals as well as reproductive management of production units. Content includes reproductive biology of production animals, economic considerations, and medical and surgical approaches to management of reproductive disorders. Laboratory sessions are tailored to acquisition of specific skills fundamental to the practice of theriogenology of production animals. Emphasis is on dairy cows.

VETMED 656 Special Problems in Equine Medicine

Spring. 1.5 credits. Minimum enrollment 10; maximum enrollment 30. Enrollment is done by lottery. Third- and fourth-year veterinary students. S-U grades only. T. Divers and staff.

This course is intended for students who plan to or may enter equine practice. In-depth study of important diseases, review of recent literature, health management, and hands-on procedures or demonstrations will be the core of this course.

VETMED 657 Disorders of Large Animal Neonates

Spring. 1 credit. Minimum enrollment 10; maximum enrollment 100. First-, second-, third-, and fourth year veterinary students. Grade A-F only. D. Ainsworth.

The common medical problems of foals and calves, with emphasis placed on the neonatal period, are discussed. Specific topics examined in detail include disorders affecting the respiratory, gastrointestinal, and musculoskeletal systems. Students will also spend several hours in the neonatal intensive care unit providing medical care of hospitalized patients under staff supervision.

VETMED 659 Equine Soft Tissue Surgery

Spring. 1 credit. Minimum enrollment 6; maximum enrollment 21. Third- and fourth-year veterinary students. Enrollment is done by lottery. Letter grades only. R. Hackett and staff.

This course, intended for students anticipating equine practice after graduation, will build upon material presented in the foundation courses to provide supplemental instruction in surgical disorders of the horse. Lectures will be case based and emphasize those disorders likely to be encountered in equine practice (colic, traumatic injuries, dentistry, upper respiratory tract disorders, prepurchase examination). Laboratories will emphasize those diagnostic and therapeutic procedures in which an entry-level equine practitioner should be competent.

VETMED 661 Surgical Pathology

Spring, summer, fall. Variable 1–2 credits. Second-, third-, and fourth-year veterinary students with permission of instructor. Letter grades only. S. McDonough.

This two-week course (approximately eight hours per day for 2 credits) will provide hands-on experience in the Surgical Pathology Service of the Department of Pathology. Students will assist in tissue selection and sample submission and in trimming and preparing specimens. Working with the attending pathologist, they will examine tissue specimens histologically, propose diagnoses, and discuss their interpretations.

VETMED 662 The Bottom Line

Fall and spring. 0.5 credit. First-, second-, third-, and fourth-year veterinary students. S-U grades only. R. Lewis.

This course provides case analysis of material submitted to the necropsy service. Gross and microscopic lesions for each disease/condition are emphasized and correlated with relevant antemortem findings. When appropriate, pathogenetic mechanisms, epidemiology, etiology, prevention, and treatment are included in the discussion.

VETMED 664 Veterinary Clinical Immunology

Spring. 1 credit. Minimum enrollment 12. First-, second, third-, and fourth-year veterinary students. Letter grades only. R. Lewis.

This course is a case-based discussion course in which selected diseases of immunologic origin are presented for and by the students. Emphasis is placed on the immunologic mechanisms which lead to clinical disease.

Review of hospital medical records, selection of an appropriate case, and written assessment of the case forms the bases of student evaluation.

VETMED 665 Medical and Surgical Problems of Dairy Cattle—Emphasis on the Individual Animal

Spring. 1.5 credits. Minimum enrollment 6; maximum enrollment 28. Enrollment is done by lottery. Third- and fourth-year veterinary students. Letter grades only. S. Fubini and staff.

This course will provide students with a special interest in dairy practice the opportunity for in-depth discussions of special problems in bovine medicine and surgery. Emphasis will be on case discussions, physical examination techniques, and ethical and practical matters. The course will emphasize individual cow treatment.

VETMED 667 Special Problems in Small Animal Medicine

Spring. 1 credit. Minimum enrollment 10; maximum enrollment 40. Third- and fourth-year veterinary students. S-U grades only. K. Simpson and staff.

During the 4-week course, students will work through cases in small animal medicine. The course consists of a 50-minute weekly discussion period. The focus will be on the medical problems associated with cases using historic, clinical, clinical pathologic, and pathologic findings to elucidate basic pathophysiologic principles of disease. The overall objective is to give future small animal practitioners skills in the approach to clinical problems with specific emphasis placed on history taking, clinical signs and examination skills, assessment of clinical pathology data and diagnostic materials (radiographs, ultrasounds), treatment plans, and prevention. The course expands knowledge gained in Foundation Course V and, under the instruction of a clinical faculty member, is aimed at facilitating the use of that knowledge into the practical skills of managing clinical cases.

VETMED 668 Practice Management

Spring. 2 credits. The number of sections will be determined by the enrollment. Third- and fourth-year veterinary students. S-U grades only. J. E. Saidla.

Course participants form a veterinary group practice that includes the specialties of each person's interest. Topics are presented and discussed in the staff meeting format of the practice. Topics include basic practice organization, leadership styles, career planning, communication skills, facility management, human resource management, maintenance of standards, marketing and merchandising, building and maintaining clients, practice growth, finances, computing systems and information management, money management, legal issues and insurance, professional relations and responsibility, and maintaining an acceptable quality of life, including stress management. Various practitioners and practice managers will speak to the group about their very different successful practices, concentrating on management and organizational skills.

VETMED 669 Sheep and Goat Medicine

Spring. Lec, 1 credit; lab 0.5 credit. Lab, concurrent enrollment in Sheep and Goat Medicine Lecture is required. Third-, and fourth-year veterinary students. S-U grades only. M. Smith.

This course will discuss diagnosis, treatment, and prevention of medical and surgical problems of individual small ruminants and of sheep and goat herds. Basic information on breeds, behavior, nutritional requirements, and management systems will be supplied. Economically important contagious or metabolic diseases will be discussed in depth. The diagnostic evaluation and differential diagnoses for common clinical presentations such as skin disease, neurologic disease, lameness, and mastitis will be considered.

Herd monitoring of economically important parameters and necropsy diagnosis of abortions and neonatal losses will be addressed. Breeding systems, pregnancy diagnosis methods, and correction of dystocias will be discussed and demonstrated in optional laboratory sessions.

VETMED 670 Drug Handling in the Body
Spring. 0.5 credit. Maximum enrollment 60. For second-, third-, and fourth-year veterinary students. Letter grades only. R. A. Cerione and G. A. Weiland.
This course will provide an in-depth consideration of the pharmacological principles of administration, adsorption, distribution, metabolism, and elimination of drugs. Emphasis will be on the conceptual basis of the pharmacokinetic considerations in the therapeutic use of drugs. The course will build on the pharmacological and physiological principles introduced in Foundation Course III.

VETMED 671 Autonomic Pharmacology
Spring. 0.5 credit. Maximum enrollment 80. For second-, third-, and fourth-year veterinary students. Letter grades only. G. A. Weiland.
This course will provide an in-depth consideration of the pharmacological and physiological principles of autonomic pharmacology. Molecular, cellular, and organ system mechanisms will be emphasized. The course will explore in more detail the fundamental pharmacological and physiological principles of the effects of drugs on autonomic organs introduced in Foundation Course III.

VETMED 672 Antimicrobial Drug Therapy in Veterinary Medicine
Spring. 1 credit. Second-, third-, and fourth-year veterinary students. Letter grades only. W. S. Schwark.
The objective of this course is to familiarize students with antimicrobial drugs used in veterinary practice. The course will build on fundamental pharmacological and microbiological principles covered in Foundation Courses III and IV and will consider antibacterial, antifungal, antiparasitic, and anticancer drugs from the point of view of unique pharmacokinetic properties, indications for clinical use, and potential toxicities as the basis for rational use.

VETMED 673 Growth Factor-Coupled Signal Transduction
Spring, even-numbered years. 0.5 credit. First-, second-, third- and fourth-year veterinary students and permission of the instructor. Letter grades only. R. A. Cerione.
This course will present basic information regarding the regulation of cell growth and differentiation. The emphasis will be on the signal transduction pathways that are responsible for translating growth factor binding at the cell surface into nuclear responses and mitogenesis. The course should complement cases covered in Foundation Course II and tie together the biochemical pathways underlying cell growth with biological processes such as wound healing and disease states such as cancer.

VETMED 674 Physiology and Pharmacology in the Understanding and Treatment of Diabetes
Spring, even-numbered years. 1 credit. Maximum enrollment: 24. Letter grade. G. Sharp.
This course will cover the basic causes of the manifestations of diabetes, signal transduction mechanisms controlling insulin secretion and insulin action, and the principles underlying current and potential future treatment for this group of diseases. The course will stress the value of basic research into cellular and molecular mechanisms for the treatment and cure of disease.

[VETMED 675 Fundamental Principles of Vertebrate Central Nervous System Pharmacology
Spring. 0.5 credit. Minimum enrollment 6. Second-, third-, and fourth-year veterinary students. Letter grades only. Not offered 1999–2000. Next offered spring 2002. L. M. Nowak.
This course will include up-to-date knowledge of physiological and pharmacological aspects of the main central nervous system neurotransmitter receptors and provide a basis for rational understanding of the drugs used during surgery and in treatment of neurological diseases.]

VETMED 676 Clinical Ophthalmology
Spring. 0.5 credit. Third- and fourth-year veterinary students. S-U grades only. R. Riis, N. Irby and T. Kern.
The principles and practice of entry-level veterinary ophthalmology introduced in, Block V, Introduction to Veterinary Ophthalmology, are supplemented by lectures and discussions that emphasize species differences, basic surgical decision-making, and recognition of ocular conditions appropriate for referral.

VETMED 677 Dairy Production Medicine
Fall. 2 credits. Minimum enrollment 6; maximum enrollment 14. Third-, and fourth-year veterinary students. Letter grades only. C. Guard.
This is an intermediate course in the techniques and procedures used by veterinarians in modern dairy practice. Many of these activities fall outside the traditional boundaries of medicine, surgery, and theriogenology and might include housing, facilities, manure management, and employee education. Data analysis, disease and productivity monitoring, and evaluation of deviations from targeted performance are used to plan cost-effective interventions or corrections, followed by continued surveillance to monitor their effect. Students will be introduced to the dominant software currently used in dairy management. Local dairy herds will serve as additional laboratories for class projects.

[VETMED 678 Small Animal Theriogenology
Spring. 1 credit. Third-and fourth-year veterinary students. Letter grades only. Not offered spring 2000. R. Gilbert.
This is a distribution course in a lecture-based format designed to complement the knowledge gained in the theriogenology component of Foundation Course V, Animal Health and Disease. Content includes discussion of breeding management, infectious and non-infectious causes of infertility and pathology of the male and female reproductive tracts, their diagnosis and management. The emphasis of the course will be on conditions affecting dogs and cats, but some conditions of other common pet species will be discussed.]

VETMED 679 Clinical Pharmacology
Spring. 0.5 credit. Third- and fourth-year veterinary students. S-U grades only. W. Schwark.
This course is offered after Blocks I-V and formal exposure to pharmacology course work is completed. The course is designed to familiarize students with drug use in the clinical setting and utilizes ongoing cases in the teaching hospital as a teaching tool. Pharmacological concepts are emphasized, with a focus on the rationale for drug choice, alternative drug choices available, pharmacokinetic considerations, and potential drug interactions/toxicities. This course is offered at the time students are about to embark on their clinical rotations. It is designed to emphasize practical aspects of pharmacology in the clinical setting, utilizing basic concepts obtained during formal course work. The onus will be placed on the student to explain/rationalize drugs employed in clinical cases in the teaching hospital.

VETMED 680 Behavior Problems of Horses
Spring. 1 credit. Prerequisite: one semester of veterinary curriculum. First-, second-, third-, and fourth-year veterinary students. S-U grades only. K. A. Houpt.
The goal of this course is to give veterinary students the ability to treat the behavior problems of horses. History-taking, counseling, diagnostic tests, follow-up, the importance of cooperation with the referring veterinarian, prevention of behavior problems, training techniques of value to the practitioner, and socialization of foals will be presented.

VETMED 681 Behavior Problems of Small Animals
Spring. 1 credit. Prerequisite: one semester of veterinary curriculum. First-, second-, third-, and fourth-year veterinary students. S-U grades only. K. A. Houpt.
The goal of this course is to give veterinary students the ability to treat the behavior problems of cats and dogs. History-taking, counseling, and follow-up methods will be presented. Each student will have the opportunity to participate in three cases. Behavioral and pharmacological treatments for behavior problems will be presented.

VETMED 682 Topics in Veterinary Emergency and Critical Care Medicine
Spring. 1 credit. Minimum 10; maximum enrollment 35. Enrollment is done by lottery. Third-, and fourth-year veterinary students, all others need instructor approval. S-U grades optional. P. Moon.
This course will provide an introduction to emergency and critical care medicine. It is designed to have 1–2 topics per week. An introductory seminar will present basic information on the topic(s) at the beginning of the week, students will receive 1–2 case scenarios with homework questions and a two hour group discussion will occur later in the week. Although most of the cases will be based on small animal cases, the same principles will apply to both large animal and small animal situations. Topics which might be covered include: trauma stabilization, emergency fluid therapy, cardiac and pulmonary emergencies, nutritional support, common toxicology problems, emergency surgical procedures (chest tubes, tracheotomies), and basic and advanced cardiopulmonary resuscitation. When two courses (i.e. section "A" and "B") are offered in the same year, different topics will be covered in the two courses.

[VETMED 685 Physiology of Pregnancy
Spring. 2 credits. Maximum enrollment 20. Second-, third-, and fourth-year veterinary students. Letter grades only. Not offered spring 2000. P. W. Nathanielsz.
This course is presented in lecture fashion, with weekly assignments consisting of one major reference per lecture related to that week's work to review. Subjects covered are placental function, fetal growth, central nervous system development, fetal breathing, biorhythms in maternal and fetal physiology, parturition, and adaptations to newborn life.]

VETMED 689 Fundamentals of Ruminant Digestion and Metabolism
Spring. 0.5 credit. Minimum enrollment 5; maximum enrollment 50. First-, second-, third-, and fourth-year veterinary students; selected graduate students by permission of the instructor. Letter grades only. T. R. Houpt.
This course is designed for the student with little or no previous course work in ruminant digestive physiology. It will consist primarily of lectures surveying the functional aspects of: control of feed intake; salivation; reticuloruminal motility, including rumination and eructation; microbial flora and fauna; fermentation in reticulorumen (digestion of carbohydrates, proteins and fats); ruminal gas formation; absorption of short-chained fatty acids; special features of ruminal nitrogen metabolism; passage of nutrients to lower tract; and a brief consideration of the functions of omasum, abomasum, small and large intestines. Emphasis will be on the differences of the ruminant digestive processes from those of the simple-stomached animals.

VETMED 690 Molecular and Genetic Basis of Inherited Disorders in Animals and Application to Clinical Medicine
Spring. 2 credits. Minimum enrollment 5; maximum enrollment 15. First-, second-, third- and fourth-year veterinary students; graduate and undergraduate students also welcome. Letter grades only. Offered even-numbered years. J. Ray.
This course introduces the molecular basis of inherited diseases in domestic animals. Topics include several inherited metabolic defects causing systematic malfunctions; muscle, bone abnormalities; retinal degeneration; failure of the immune systems. Techniques to characterize genes and mutations. Use of molecular techniques for diagnosis and prevention. Use of molecular tools for the treatment of inherited disorders.

VETMED 692 Current Concepts in Reproductive Biology
Fall. 3 credits. First-, second-, and third-year veterinary students or appropriate undergraduate/graduate training. Letter grades only. Lec, 2 hours each week; disc, 2 hours each week; T R 10:10–12:05. J. Fortune, R. Butler, and staff.
This is a team-taught survey course in reproductive physiology/endocrinology. Lectures by a number of reproductive biologists on various aspects of male reproductive function (endocrine regulation, testis function, spermatogenesis, and sperm physiology/function); female reproductive function (endocrinology, ovarian development and function, oocyte physiology/fucntion); pregnancy; parturition; puberty; and reproductive technology. Student participation in the form of discussions and/or presentations.

VETMED 695 Genetic Basis of Eye Diseases
Spring. 1 credit. Minimum enrollment 5; maximum enrollment 14. First-, second-, third- and fourth-year veterinary students. Letter grades only. G. Aguirre.
This course covers the topic of the molecular and genetic basis of inherited eye diseases in domestic and laboratory animals. It is aimed at the professional student in the veterinary curriculum, but is open to graduate level students. The course will be given in a combination lecture/seminar format, with students leading and actively participating in discussions. The students are expected to do assigned and independent outside research, both for class discussions and the paper.

VETMED 696 Fundamental Principles and Anesthetic Techniques for Small Animal Practice
Spring. 1 credit. Minimum enrollment 15. Third-, and fourth-year veterinary students. Letter grades only. C. Short.
This course is designed for the veterinary student with interest in small animal practice. It will consist of lectures, case discussions, and anesthetic protocol development for routine and complicated cases. Subjects covered in the course will include: management of anesthesia for elective surgery, management of the high-risk patient, fluid therapy, drug interactions, pain management, treatment of respiratory complications, treatment of cardiovascular complications, cardiopulmonary resuscitation, and post-anesthetic management. While fundamental concepts and advancements in anesthesia will be utilized in this course, a practical application for use in private practice will be a major objective.

VETMED 698 Special Projects in Veterinary Medicine
Fall, winter, spring, summer. Variable 1–4 credits. Must be arranged with a College of Veterinary Medicine tenure-track faculty member. S-U grades optional.
This course provides the opportunity for students to work individually with a faculty member to pursue an area of particular interest and, typically, not part of the established curriculum. Specific course objectives and course content are flexible and reflect the scope and academic expertise of the faculty.

VETMED 699 Research Opportunities in Veterinary Medicine
Fall, winter, spring, summer. Variable 1–4 credits. Must be arranged with a College of Veterinary Medicine tenure-track faculty member. S-U grades optional.
This course provides the opportunity for individual students to work in the research environment of faculty involved in veterinary or biomedical research. Specific course objectives and course content are flexible and reflect the specific research environment. Research projects may be arranged to accumulate credit toward requirements in Distribution Sets I, II, III, IV, and V.

VETMED 700 Large Animal Theriogenology Service
Spring. 2 or 4 credits. Prerequisite of VETMED 551. Maximum enrollment 6 per rotation. Third-and fourth-year veterinary students. Letter grades only. R. O. Gilbert and staff.
This clinical service rotation is offered to provide additional hands-on experience in all phases of theriogenology. Equine reproductive experience is gained in teasing, rectal palpations, ultrasound scanning, semen collection and evaluation, natural breeding, and artificial insemination. Additional techniques emphasized include taking and evaluating endometrial biopsies, endometrial culturing, and collecting and evaluating endometrial cytology smears. Bovine experience includes weekly trips to the slaughterhouse, where rectal-palpation findings can be compared to actual structures present in recovered tracts. Additional experience in rectal palpation is gained by following cyclic changes in assigned cows in the college dairy herd as well as by participating in herd-health palpations. Trips to the Department of Animal Science's sheep and swine barns allow observation of breeding programs and provide experience in castration, docking, clipping milk teeth, and notching ears. Weekly seminars are presented on current topics in theriogenology.

VETMED 701 Cardiology Service
Fall and spring. 2 credits. Prerequisite VETMED 551. Minimum enrollment 1 per rotation; maximum enrollment 2. Third-, and fourth-year veterinary students. Letter grades only. S. Moise.
The purpose of the cardiology rotation is to provide the student with the opportunity to put into practice what they have learned in the foundation years. The management of the most common cardiac diseases will be emphasized including congestive heart failure, arrhythmias, and secondary cardiac diseases. All species will be examined, large and small, although the majority will be small animals. Diagnostics including cardiovascular physical examination, electrocardiography, radiography, and echocardiography will be taught. The rotation includes clinical work, didactic teaching, and self-initiated digging for information.

VETMED 702 Laboratory Animal Medicine
Fall and spring. 2 credits. Prerequisite of VETMED 551. Maximum enrollment of 4 per rotation. Third- and fourth-year veterinary students. Letter grades only. F. Quimby and staff.
The practice of laboratory animal medicine requires a combination of preventive programs, clinical skills, knoweldge of various species' biologies, familiarity with research methodology, and acquaintance with state and federal regulations. This course is offered as a two-week introduction to that specialty. Students accompany laboratory animal veterinarians on clinical rounds of Cornell's research animal housing and participate in laboratory diagnostic work. Review sessions are conducted on the biology, medicine, pathology, and husbandry of rodents, rabbits, and primates and on current legislation regulating the care and use of research animals. The course may include a field trip to the research animal facilities of Rockefeller University, the Cornell University Medical College, Marshall Farms, and the Laboratory of Experimental Medicine and Surgery in Primates.

VETMED 703 Clinical Wildlife, Exotic, and Zoo Animal Medicine
Fall, winter, spring, and summer. 2 credits. Prerequisite: VETMED 551. Maximum enrollment 2 per rotation. Third- and fourth-year veterinary students. Letter grades only. G. V. Kollias and staff.

This course introduces students to primary medical care of non-traditional pet species, zoo animals, and native wildlife. Students, directly supervised by the attending clinician, are responsible for the assessment, physical examination, and medical management of exotic animal species presented to the veterinary teaching hospital. Other opportunities available to assist in the development of clinical skills in wildlife, zoo and exotic animal medicine include the wildlife clinic cases, ongoing wildlife research and service projects, and trips to the Burnett Park Zoo. Successful completion of the course requires satisfactory performance during this 14-day clinical rotation.

VETMED 704 Quality Milk

Fall or spring. 2 credits. Prerequisite: VETMED 551. Third- and fourth-year veterinary students. Letter grades only. R. Gonzalez, D. Wilson and staff.

This course covers the causes, diagnosis, treatment, and prevention of bovine mastitis. The role of management practices is stressed. The course includes lectures, readings, discussions, laboratory exercises, and farm visits as part of the Quality Milk Promotion Services—New York State Mastitis Control Program.

VETMED 705 Special Opportunities in Clinical Veterinary Medicine

Fall, spring, and summer. Prerequisite: VETMED 551. Third- and fourth-year veterinary students. S-U grades only.

This course provides opportunities for students finished with Foundation Course V to explore professional areas not available through the regular curriculum. Blocks of two to four weeks are usually spent at other teaching hospitals, research laboratories, or zoological facilities. Student proposals are submitted to the associate dean for academic programs for review and approval. On-site supervisors of the block act as ex-officio faculty members and are required to evaluate each student formally.

VETMED 707 Poultry Medicine and Production Rotation

Fall. 2 credits. Prerequisite: VETMED 551 and VETMED 616, Disease of Birds is recommended. Third- and fourth-year veterinary students. K. A. Schat.

This course is a two-week rotation that will take place at the University of St. Hyacinthe or the University of Guelph in alternating years. This course provides students with an introduction in practical poultry medicine by a combination of lectures, discussions, and laboratory sessions including postmortem examinations. Students will also visit hatcheries, broiler, layer, and turkey farms.

VETMED 720 Issues and Preventive Medicine in Animal Shelters

Spring. 1 credit. Prerequisite: VETMED 540. Minimum enrollment 5; maximum enrollment 30. Second-, third-, and fourth-year veterinary students. Letter grades only. J. M. Scarlett and staff from the American Society for Prevention of Cruelty to Animals.

Veterinarians often work for or with animal shelters, serve on shelter boards of directors, are community resources for issues relating to companion animal welfare, participate in spay and neuter programs and influence the quality of the human-animal bond. This course will address the history of the humane movement, role of the veterinarian in relation to shelters, preventive and palliative health management (including highlighting diseases of major concern), issues surrounding euthanasia, reasons for relinquishment, programs for behavior modification and the legal concerns of shelters. These issues will be addressed using lectures and large group discussions.

VETMED 725 Diagnostic Cytology

Spring. 1.0 credit. Prerequisite: VETMED 628. Maximum enrollment 5. Second-, third-, and fourth-year veterinary students. S-U grades only. T. Stokol.

This two week course will provide in-depth experience in preparation and interpretation of cytological specimens. Evaluation of the cytological specimens will be incorporated into clinical cases, so that the results are interpreted with respect to the provided case material. The primary mode of instruction is based on faculty-driven microscopic slide evaluation. Students will be required to evaluate the slides independently prior to the microscope sessions. Selected mini-tutorials and laboratories will complement the microscopic sessions. The course builds on concepts previously addressed in the Foundation Blocks 3 and 4 and in the Clinical Pathology Distribution Course (VETMED 628). This course is limited to those students that are participating in or have completed the Clinical Pathology Distribution Course.

VETMED 726 Reptile Medicine and Surgery

Spring. 1 credit. Minimum enrollment 10; maximum enrollment 40. Third-, and fourth-year veterinary students. Letter grades only. G. V. Kollias.

This course is designed to introduce third- and potentially fourth-year veterinary students to the principles and practices of reptile medicine and surgery. The course will be taught in a basic lecture and discussion format with laboratories reinforcing concepts presented in the lectures.

VETMED 730 Vaccines: from Jenner to DNA

Spring. 1 credit. Prerequisite: introductory course in immunology or VETMED 540 or VETMI 315. Minimum enrollment 10; maximum enrollment 40. Second-, third-, and fourth-year veterinary students and graduate students. Others by permission of the instructor. Letter grades only. Grades based on two examinations. Offered even-numbered years. T. Clark.

This course will provide an overview of vaccines used in clinical practice, as well as an in-depth look at vaccine development. Emphasis will be placed on the most recent advances in vaccine design and delivery, including the use of recombinant DNA techniques for targeting specific immunological responses. Lectures will touch on vaccines commonly used in veterinary practice and will address in detail the use of: carriers, adjuvants and immunostimulants; attenuated pathogens; synthetic peptides; recombinant subunit vaccines; viral and bacterial vectors for vaccine delivery; synthetic antibodies; and genetic immunization with "naked" DNA.

VETMED 732 Veterinary Clinical Toxicology

Spring. 1.5 credits. Second-, third-, and fourth-year veterinary students. S-U grades optional. L. Thompson and K. Earnest-Koons.

This course will provide the veterinary student with a solid introduction to concepts and principles of toxicology and how they are applied in the clinical setting. Students will learn about specific common toxicants, clinical signs in affected animals and treatment protocols for the toxicants in question. Students will also gain an understanding of the clinical approach to suspected or unknown toxicoses, sample collection and handling, and resources available for clinical toxicologic problems. The course will be conducted with two one-hour lectures per week and one hour-long large group discussion per week. The class will meet two days per week, the first day for one hour and the second day for two hours. Grades will be based on weekly quizzes, a final exam, a short paper and/or oral participation.

VETMED 733 Selected Infectious Diseases of Swine

Spring. 1.5 credits. Minimum enrollment 6; maximum enrollment 80. Second-, third-, and fourth-year veterinary students. S-U grades optional. K. Earnest-Koons.

This course will provide veterinary students with a solid introduction to concepts and principles of swine infectious diseases and how they are treated in the clinical setting. Students will learn about specific infectious diseases, clinical signs in affected animals and treatment protocols for the diseases in question. Students will also gain an understanding of the clinical approach to suspected or unknown infectious agents, sample collection and handling, and resources available for infectious disease diagnosis. The course will be conducted with two one-hour lectures per week and one hour-long large group discussion per week. The class will meet three days per week for one hour each. Grades will be based on weekly quizzes, a final exam, a short paper and/or oral presentation.

VETMED 735 Special Topics in Ambulatory and Production Animal Medicine.

Fall, winter, spring and summer. Variable 1–2 credits. Prerequisite: VETMED 560. Enrollment is done by lottery. Second-, third-, and fourth-year veterinary students. Letter grades only. L. Warnick and staff.

This course provides specialized experiences in the Ambulatory and Production Medicine Service. The course will consist of participation in scheduled and emergency farm calls and completion of projects designed to provide experience in herd problem solving, records analysis and implementing herd-health programs. Clinical service assignments will be planned to meet individual student goals. Examples of focus areas available include livestock production medicine, dairy reproductive examinations, small-ruminant medicine, and equine ambulatory practice.

VETMED 736 Veterinary Diagnostic Imaging: Anatomy and Interpretation

Spring. 1 credit. Minimum enrollment 20; maximum enrollment 50. First- and second-year veterinary students by permission of instructor. Third- and fourth-year veterinary students. S-U grades only. P. Scrivani.

The course is designed to emphasize the relevance of a solid foundation in veterinary anatomy as it clinically applied to diagnostic imaging. Additionally, the course is designed to provide students with an understanding of the strengths and limitation of diagnostic imaging by discussing interpretation prin-

ciples, pitfalls and interpretations, and measurements obtained through lectures, laboratory exercises, weekly quizzes, and reading assignments. Integration of these objectives will culminate in weekly laboratory exercises where students will have to make or evaluate decisions regarding patient management based on evaluation of clinical signs and imaging examinations. The "Roentgen-Sign" approach to diagnostic imaging interpretation will be used as a model.

VETMED 745 Dynamics of Dairy Herd Health and Management
Spring. 1 credit. First-, second-, third-, and fourth-year veterinary students. Letter grades only. Y. T. Grohn and L. D.Warnick.
Competitive pressure, increasing input costs, and comparatively stagnant milk and salvage values require dairy producers to become more efficient. The current trend of increasing herd size drives changes in management. Dairy cattle are handled in groups, although individual cow health and productivity fundamentally underpin the financial success of the dairy enterprise. Veterinarians are called upon to advise dairy producers not only in matters of herd health, but increasingly in matters of productivity and management decision making. Identifying opportunity areas to improve productivity and ultimately profitability requires modern veterinarians to recognize and solve complex and interdependent milk production, reproduction, and health issues. Until the advent of the new veterinary curriculum, biological systems were often taught in isolation. Yet there are research models that integrate the dynamic nature of dairy production, health, management, and economics through epidemiological and economic modeling. Despite the existence of such advanced research models, they have not been integrated fully into the curriculum. The goal of this course is to teach students the dynamic relationships of herd performance parameters with dairy herd health and management. This will be done with a combination of lectures and exercises using two computer simulation models. The following topics will be addressed: 1) how often production diseases occur and when, 2) how they are interrelated, 3) the impact of disease on milk production, reproductive performance, and risk of culling, and 4) how to use this information in production medicine.

The format of this eight-week course (two days per week) is a lecture one day and hands-on work with computer simulation models on the other day.

Veterinary Biomedical Sciences

VETBMS 346 Introductory Animal Physiology (enroll in VETPH 346) (also BIOAP 311) (Undergraduate)
Fall. 3 credits. Prerequisites: BIOG 105, BIOG 106 or BIOG 101, BIOG 102, BIOG 103, BIOG 104, BIOG 107, BIOG 108; CHEM 207, CHEM 208, or CHEM 206, OR CHEM 215, CHEM 216; MATH 106, MATH 111 OR MATH 191 or AP credit for any of the above; or one year of college-level biology, chemistry, and mathematics. S-U grades optional. M W F 11:15. E. R. Loew.
A general course in animal physiology emphasizing principles of operation, regulation, and integration common to a broad range of living systems from the cellular to the organismal level. Structure-function relationships are stressed along with underlying physical-chemical mechanisms.

VETBMS 600 Special Projects in Anatomy (enroll in VETA 600)
Fall, spring. 1 credit per 2.5-hour period. By permission of the instructor. S-U grades only.

[VETBMS 628 Graduate Research in Animal Physiology (Graduate) (enroll in VETPH 628) (also BIO S 719)
Fall, spring. 1–3 credits. By written permission of department chairperson and faculty mentor who will supervise the work and assign the grade. S-U grades optional. Not offered 1999–2000.
Similar to Biological Sciences 499 but intended for graduate students who are working with faculty members on an individual basis.]

[VETBMS 637 Postmortem Pathology (enroll in VETPA 637)
Fall, spring. 2 credits. Intended for veterinary students but open to others. S-U grades optional. Not offered 1999–2000. J. M. King.
A presentation of gross and microscopic lesions of diagnostic significance, employing color projection slides as illustrations. Emphasis on pathological and differential diagnosis of a wide spectrum of viral, metabolic, bacterial, parasitic, and other diseases.]

VETBMS 639 Autotutorial in Laboratory Animal Medicine and Science (enroll in VETPA 639)
Spring. 1–3 credits. Letter grades only. F. W. Quimby.
This course is offered to individuals interested in pursuing various aspects of laboratory animal medicine and science in depth. A variety of resources are available to assist students in their research on a particular topic: the library of the Division of Laboratory Animal Medicine, including the autotutorial library; the university libraries; and special information collected from other institutions. Grades are determined on the basis of a paper, an oral presentation, or the creation of an audiovisual teaching aid, any of which may be selected by the student.

VETBMS 641 Veterinary Clinical Immunology (enroll in VETPA 641)
Spring. 1 credit. By permission of the instructor. Letter grades only. R. M. Lewis.
This course emphasizes the clinical aspects of fifteen specific diseases that are mediated by immunologic processes. Case material from the Teaching Hospital is used to illustrate presenting clinical signs, laboratory diagnostic methods, clinical course, therapeutic approaches, and eventual outcome of each disease under discussion. Student participation in informal case discussions is encouraged as a means of introducing students to the practice of veterinary medicine through case discussion and analysis. Training is also provided in the use of the college's computerized biomedical information system and the hospital records system to develop a critical written case analysis, which serves as the basis for grading.

VETBMS 700 Predictions of Form or Phlogeny (enroll in VETA 700)
Spring. 1 credit. By permission of the instructor. S-U grades optional. J. W. Hermanson.
Form and function are often discussed as a correlated entity in biology. This seminar group will start with the question, "Does form really predict function?" This will be addressed initially with respect to the analysis of paleobiology, but will then encompass examples of experimental functional morphology. In particular, there is a growing body of experimental data demonstrating that diverse functions can be achieved with nearly identical morphologies, and that the functional diversity may better be explained by behavior or environmental factors. Might these observations refute current theories about the origin of flight in extinct organisms (i.e., the cursorial or ground-up theory of flight versus the arboreal gliding theory of flight evolution)? Specific topics pursued will be selected by participants in this course. Participation will be open to interested graduate students, advanced undergraduate students, and veterinary students.

VETBMS 720 Special Problems in Physiology (Graduate) (enroll in VETPH 720)
Fall, spring. 1–3 credits. By permission by instructor. Laboratory work, conferences, collateral readings, and reports. Adapted to the needs of students. S-U grades optional.

VETBMS 788 Seminar in Surgical Pathology
Fall, spring. 1 credit. Intended for residents. Third- and fourth-year veterinary students may attend. Letter grades only. B. A. Summers and staff.
The major objective of this discussion and seminar course is to introduce the residents to the discipline of surgical pathology. Selected material from the Surgical Pathology Service is prepared in advance for independent review by the residents. The material is presented in a slide-seminar format by the residents under the review of the faculty. Emphasis is placed on pathogenesis, etiology, and pathologic descriptions of the lesions. In addition, appropriate guest lecturers cover specific areas of interest and special topics not encountered in the departmental service programs.

[VETBMS 796 Medical Primatology (enroll in VETPA 796)
Fall. 1 credit. For residents and graduate students by permission of instructor. Offered even-numbered years. Not offered fall 1999. F. W. Quimby.
A survey of major diseases, medical care, and management techniques for all life stages of primates. Topics include physical examination, restraint anesthesia, housing, and management of various nonhuman primate species; bacterial, viral, and parasitic diseases; noninfectious diseases; infant and nursery care reproduction and behavioral considerations; and therapeutics.]

VETBMS 811 Advanced Physiology Methods I (enroll in VETPH 811) (also BIO S 811) (Graduate)
Fall. 2 credits. Enrollment limited. Prerequisites: graduate student status or permission of course coordinator. S-U grades only. Lab to be arranged. J. Ray.
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 students with the latest techniques and methods in physiological research. Three

modules are offered each semester by arrangement with the course coordinator.

VETBMS 812 Advanced Physiology Methods II (enroll in VETPH 812) (also BIO S 812) (Graduate)
Spring. 2 credits. Enrollment limited. Prerequisites: graduate student status or permission of course coordinator. S-U grades only. Lab to be arranged. J. Ray.
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 students with the latest techniques and methods in physiological research. Three modules are offered each semester by arrangement with the course coordinator.

Veterinary Clinical Sciences

[VETCS 700 Pathophysiology of Gastrointestinal Surgery
Fall. 1.5 credits. S-U grades only. Offered every third year. Next offered in fall of 2001. N. G. Ducharme.
Normal anatomy and physiology of the gastrointestinal system in carnivores, herbivores and ruminants will be presented initially. This will be followed by in-depth discussion of the pathophysiological mechanisms and sequelae of gastrointestinal obstructions including reperfusion injury, peritonitis, adhesions and short bowel syndrome. The emphasis of this course is development of advanced understanding of surgically relevant gastrointestinal problems which lead to appropriate decision making.]

[VETCS 701 Pathophysiology of Orthopedic Surgery (Graduate)
Spring 1.5 credits. Prerequisites include DVM, MD, or equivalents, or approval of instructor. S-U grades only. Offered every third year. Next offered spring 2002.]

VETCS 702 Pathophysiology of Cardiopulmonary Surgery (Graduate)
Fall. 1.5 credits. Prerequisite: DVM degree or equivalent. S-U grades only. Offered every third year. R. P. Hackett, S. L. Fubini, N. G. Ducharme, H. J. Harvey.
Using lectures and group discussions, the objective of this course is to explain the pathophysiology of various cardiovascular diseases (cardiac arrest, cardiac arrythmia under anesthesia) and thoracic disease (various forms of upper airway resistance). The emphasis is placed on understanding these mechanisms and outlining the surgeon's response to them.

VETCS 703 Surgical Principles and Surgery of the Integumentary System (Graduate)
Spring. 1.5 credits. For graduate DVM's (or equivalent) in residency or graduate training programs. S-U grades only. Offered every third year.
This course is designed for surgery residents and graduate students. It is largely discussion format and examines surgical principles and surgery of the integumentary system.

[VETCS 704 Pathophysiology of Urogenital Surgery (Graduate)
Fall. For graduate DVM's or equivalent in residency or graduate training programs. 1.5 credits. S-U grades only. Offered every third year. Next offered fall 2001. S. Fubini.
This course is designed to review and discuss uogenital surgical procedures in animals and the rational basis for them. Pathophysiology will be stressed. Some classes will consist of reprints with discussion.]

[VETCS 706 Pathophysiology of Neurologic Surgery (Graduate)
Spring. Requisite includes DVM, MD or equivalent, or approval of instructor. 1.5 credits. S-U grades only. Offered every third year. Next offered spring 2001.]

VETCS 710 Advanced Veterinary Anesthesiology I
Fall, winter. Prerequisites: VETMED 568 Veterinary Anesthesiology or permission of instructor. Third- and fourth-year veterinary students, graduate students, interns, and residents. S-U grades only. P. F. Moon and staff.
The content of the course is designed for preparation for the American College of Veterinary Anesthesiology examinations. However, the course is also suitable for residency training in other areas such as surgery and internal medicine. Speakers will be from both inside and outside the college. Topics will cover the basic sciences as they apply to anesthesiology such as physics and engineering, applied pharmacology, physiology and pathology. Clinically oriented lectures will also be given concerning specific anesthetic techniques and species-specific differences in response to anesthetic drugs.

VETCS 711 Advanced Veterinary Anesthesiology II
Fall, winter. 1 credit. Prerequisites: VETMED 568, Veterinary Anesthesiology or permission of instructor. Third- and fourth-year veterinary students, graduate students, interns, and residents. S-U grades only. P. F. Moon and staff.
The content of the course is designed for preparation for the American College of Veterinary Anesthesiology examinations. However, the course is also suitable for residency training in other areas such as surgery and internal medicine. Speakers will be from both inside and outside the college. Topics will cover the basic sciences as they apply to anesthesiology such as physics and engineering, applied pharmacology, physiology and pathology. Clinically oriented lectures will also be given concerning specific anesthetic techniques and species-specific differences in response to anesthetic drugs.

Veterinary Microbiology and Immunology

VETMI 315 Basic Immunology (Undergraduate) (also Biological Sciences 305)
Fall. 3 credits. Strongly recommended: basic courses in microbiology, genetics, and biochemistry. S-U grades optional. J. A. Marsh.
A survey of immunology, with emphasis on the cellular and molecular bases of the immune response. More information is available at the biog305 courseinfo web site.

VETMI 320 Principles of Toxicology (Undergraduate) (also Biological Sciences 320 and Toxicology 320)
Spring. 3 credits. Prerequisites: one year each of introductory biology and chemistry, with lab; one semester of organic chemistry lecture or waiver by instructor. S-U grades optional. T R 1:25–2:40. S. Penningroth, R. Dietert, and S. Bloom.
An introduction to the interdisciplinary science of toxicology, drawing on material from biology, chemistry, pharmacology, ecology, earth science, risk analysis and policy studies. Basic principles of toxicological science are presented and illustrated by case examples, such as pesticide toxicity to wildlife reproduction and human health risk assessment at a Superfund hazardous chemical waste site. Chemical risk management is described as a sociopolitical process involving the integration of scientific, economic and cultural factors.

Independent student projects include a toxic chemical profile and a team analysis of hypothetical "environmental risk scenarios." Periodic talks by toxicology faculty acquaint students with basic research in this interdisciplinary branch of Biological Science. This is an introductory level course in toxicology. Format: lecture supplemented by case examples. One field trip to a hazardous chemical waste site. Appropriate for non-majors seeking basic literacy in environmental and human toxicology. "Gateway course" for students interested in 400 and 600 level toxicology courses.

[VETMI 404 Pathogenic Bacteriology and Mycology (also BIOMI 404)
Spring. 2 or 3 credits (3 credits with lecture and seminar). Prerequisites: BIOMI 290 and 291. Seminar is required of graduate students and open to undergraduates with permission of instructor. Seminar limited to 15 students. Letter grades only. Offered odd-numbered years. Not offered spring 2000. Microbiology faculty.
This is a course in medical microbiology, presenting the major groups of bacterial and mycotic pathogens important to human and veterinary medicine. The emphasis of this course is infection and disease pathogenesis. Topics include disease causality; interactions of host, pathogen, and environment, including immunity to bacteria and fungi; and principles of antimicrobial therapy and drug resistance. A companion seminar addresses the current and classic literature related to microbial pathophysiology on the cellular and molecular level.]'

VETMI 408 Viruses and Diseases I (also Biological Sciences 408)
Spring. 3 credits. Intended primarily for graduate and undergraduate microbiology majors. Prerequisites: Microbiology 290 and 291 (College of Agriculture and Life Sciences). Recommended: VETMI 315, Genetics 281. Letter grades only. Offered even-numbered years. J. W. Casey.
The course will cover basic concepts in virology with emphasis primarily on DNA virus-host interactions, strategies for gene regulation, and mechanisms of pathogenicity. Selected viral infections that result in immune dysfunction and neoplasia will be highlighted in the context of approaches to prevent or reduce the severity of diseases.

[VETMI 409 Viruses and Disease II (also BIOMI 409)
Fall. 2 credits. Prerequisites: BIOMI 290 & 291. Recommended BIOMI 408, BIOBM 330–332, BIOBM 432. Offered even-numbered years. Not offered spring 2000. G. Whittaker.
This course will be complementary to BIOMI 408, Viruses and Disease I, and will emphasize RNA viruses. The course will be complete in its own right. As such, completion of BIOMI 408 is not a requirement, but is

encouraged. The structure and classification of viruses entry, genome replication and virus assembly. Particular emphasis will be placed on virus-host cell interactions. Vaccinations, chemotherapy and evaluation of viruses will also be discussed.]

VETMI 431 Medical Parasitology (Undergraduate)
Fall. 2 credits. Prerequisites: zoology or biology; any of the following courses: BIOES 261, 263, 264, 267, 274, 275, 278; BIOG 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 170, 202, 207; BIOMI 192, 290, 398 or equivalent course. Letter grades only. D. D. Bowman.
A systematic study of arthropod, protozoan, and helminth parasites of public health importance, with emphasis on epidemiologic, clinical, and zoonotic aspects of these parasitisms.

VETMI 605 Special Projects in Microbiology (Undergraduate)
Fall, spring. 1–3 credits. By permission of the instructor. Prerequisite: a good background in microbiology or immunology. Preferably, students should have background in pathogenic microbiology and immunology. S-U grades only. Microbiology staff.
The course normally provides an opportunity for the student to work in a research laboratory or carry out a special project under supervision.

VETMI 700 The Biology of Animal Viruses (Graduate and Upper-level Undergraduate)
Fall. 2 credits. Letter grades only. Offered odd-numbered years. C. R. Parrish and staff.
This course will examine current topics in studies of animal viruses, with some comparisons with plant viruses where similar mechanisms apply. Selected topics will be examined in depth, and those will include the structures of viruses and their components, viral nucleic acids and replication strategies, details of the interactions between viruses and their host cell components and metabolism. Other topics to be covered will include the evolution and selection of viruses, and novel approaches to the prevention of virus infection, and methods for antiviral chemotherapy.

[VETMI 701 Pathogenesis of Viral Diseases (also VETMED 619)
Spring. 2 credits. Given during 8-week spring distribution period, January-March. Open to graduate students and advanced undergraduates with permission of instructor. Strongly recommended prerequisite: Immunology. Letter grades. Offered odd-numbered years. Not offered spring 2000. Microbiology faculty.
Course content and objectives: the course will focus on the balance between host defense against viral infections and the mechanisms by which viruses perpetuate themselves in human and animal populations. In the process, the mechanisms of cell and animal infection, spread between cells, disease mechanisms, and the roles of the immune response in enhancing and suppressing disease will be explored. This will include a systems-based approach exploring the pathogenesis of disease in the CNS, gastrointestinal, hepatic, tegumentary, respiratory and urogenital systems. The basic principles of virus taxonomy, structure and replication will be included to introduce various viral groups and their special properties. Methods of intervention (vaccination, antiviral drugs) will also be covered. Lectures are derived from relevant current literature, Nathanson's *Viral Pathogenesis*, 1997, and Field's *Virology*, third edition, 1996. Relevant materials will be placed on reserve in the veterinary library.]

VETMI 702 Molecular Biology and Immunology of Host-Parasite Interactions (Graduate) (also VETMED 620)
Spring. 2 credits. S-U grades optional. Offered even-numbered years. E. J. Pearce.
See description for VETMED 620.

VETMI 705 Advanced Immunology (Graduate) (also Biological Sciences 705)
Spring. 3 credits. Prerequisite: VETMI 315 Basic Immunology or permission of instructor. Letter grades only. Offered even-numbered years. R. G. Bell and staff.
Coverage at an advanced level of molecular and cellular immunology.

VETMI 706 Immunology Seminar Series (Graduate)
Fall, spring. No credit. Required of all graduate students in the Field of Immunology. S-U grades only. Fall, E. Pearce; spring, R. Dietert.
Presentations of research investigations by Cornell faculty members, postdoctoral fellows, and graduate students in the Field of Immunology and by invited speakers from other institutions.

VETMI 707 Advanced Work in Bacteriology, Virology, and Immunology (Graduate)
Fall, spring. 1–3 credits. By permission of the instructor. S-U grades optional. Microbiology staff.
This course is designed primarily for graduate students with a good background in pathogenic microbiology and immunology. It may be elected by veterinary students who are properly prepared.

VETMI 710 Microbiology Seminar (Graduate)
Fall, spring. 1 credit. Required of all graduate students in the Department of Microbiology and Immunology. S-U grades only. E. J. Pearce, C. R. Parrish.

[VETMI 719 Immunology of Infectious Diseases and Tumors (also Biological Sciences 706) (Graduate)
Spring. 2 credits. Prerequisite: VETMI 315 Basic Immunology or permission of instructor. S-U grades optional. Offered odd-numbered years. Not offered spring 2000. E. Y. Denkers and staff.
Coverage at an advanced level of the immunology of diseases caused by selected bacterial, viral, protozoan, and helminthic parasites, and tumor immunology.]

VETMI 737 Advanced Work in Animal Parasitology (Graduate)
Fall, spring. 1–3 credits. For advanced undergraduate, graduate, and veterinary students. Letter grades only. D. D. Bowman and other faculty.
This course is intended for advanced undergraduate, graduate, and veterinary students with interests in parasitology research.

VETMI 770 Advanced Work in Avian Diseases (Graduate)
Fall, spring. 1–3 credits. By arrangement with the instructor. Letter grades only. Microbiology faculty.

VETMI 772 Advanced Work in Aquatic Animal Diseases (Graduate)
Fall, spring. 1–3 credits. By arrangement with the instructor. S-U grades only. P. R. Bowser.

VETMI 783 Seminars in Parasitology (Graduate)
Fall, spring. 1 credit. Open to veterinary students or graduate students; others by permission of the instructor. S-U grades only. D. D. Bowman.
This is a seminar series designed to acquaint students with current research in the field of parasitology. The range of topics is determined, in part, by the interests of those participating and may include such topics as the ecology of parasitism, parasite systematics, wildlife parasitology, and parasitic diseases of plants and animals, including humans.

Veterinary Molecular Medicine

VETMM 470 Biophysical Methods (enroll in VETPR 470) (also A&EP 470)
Spring. 3 credits. By permission of the instructor. Letter grades only. M. Lindau.
An overview of the diversity of modern biophysical experimental techniques used in the study of biophysical systems at the cellular and molecular level. Topics covered will include methods that examine both structure and function of biological systems, with emphasis on the applications of these methods to biological membranes. The course format will include assigned literature reviews by the students on specific biophysics topics and individual student presentations on these topics. The course is intended for students of the engineering, physics, chemistry, and biological disciplines who seek an introduction to modern biophysical experimental methods. A solid knowledge of basic physics, and of mathematics through the sophomore level is expected. Some knowledge of cellular biology is helpful but not required.

[VETMM 610 Cellular and Molecular Pharmacology (enroll in VETPR 610)
Fall. 2 credits. By permission of the instructors. S-U grades optional. Offered even-numbered years. Not offered fall 1999. G. A. Weiland and pharmacology faculty.
A graduate-level course surveying the molecular and cellular aspects of receptor mechanisms, signaling pathways, and effector systems. Topics covered include drug-receptor interactions; ligand- and voltage-gated ion channels; G protein pathways; growth factor signaling; lipid signaling; calcium; nutrient and nitric oxide signaling; and mechanisms of receptor-mediated effects on neural excitability, electrical pacemakers, muscle contraction and gene expression.]

VETMM 611 Systems Pharmacology (enroll in VETPR 611)
Spring. 2 credits. By permission of the instructors. S-U grades optional. Offered even-numbered years. G. A. Weiland and pharmacology faculty.
A graduate-level course surveying system- and organ-related aspects of pharmacology. Topics covered include drug disposition; pharmacokinetics; autonomic pharmacology;

central nervous system pharmacology; pharmacology of inflammation, allergy and platelet function; cardiovascular, gastrointestinal and endocrine pharmacology; and chemotherapy, including antimicrobial agents and cancer chemotherapy.

VETMM 672 Protein Kinetics (enroll in VETPR 672) (also CHEM 672)
Fall. 4 credits. Prerequisite: CHEM 288 or 390, BIOBM 331 or permission of the instructor. S-U grades optional. 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.

VETMM 700 Calcium as a Second Messenger in Cell Activation (enroll in VETPR 700)
Spring. 2 credits. By permission of the instructor. Lecture-discussion. S-U grading only. Offered even-numbered years. C. M. S. Fewtrell.
Regulation of intracellular calcium and techniques for studying calcium movements and distribution in cells. Calcium channels and exchangers, calcium-binding proteins, and calcium stores. Phosphatidylinositol turnover, release of calcium from intracellular stores, and activation of calcium influx. Calcium gradients and oscillations. Mechanisms of exocytosis and the proteins involved. Each topic will be introduced with a lecture followed by discussion of recent papers from the literature.

[VETMM 701 Organ System Toxicology (enroll in VETPR 701) (also TOX 611)
Fall. 1 credit. For graduate students in environmental toxicology. S-U grades only. Offered even-numbered years. Not offered fall 1999. W. S. Schwark.
A minicourse on molecular mechanisms involved in chemical toxicity. Specific examples of toxicity in organ systems such as the nervous system, kidney, liver, respiratory tract, and cardiovascular system will be considered.]

VETMM 703 Receptor-Ligand Interactions (enroll in VETPR 703) (also BIONB 790–02)
Fall. 2 credits. By permission of the instructors. S-U grades optional. Offered odd-numbered years. R. E. Oswald, G. A. Weiland.
The course covers both the practical and theoretical tools for the study of ligand-receptor interactions, emphasizing the quantitative and physical chemical aspects of receptor theory. Topics discussed are basic methods of radioligand binding assays, including separation and measurement of bound and free ligand; characterization of receptor function; analysis of receptor structure; thermodynamic basis of the binding; methods of analyzing equilibrium binding; equilibrium binding for complex binding mechanisms; and kinetics of simple and complex binding mechanisms.

[VETMM 704 CNS Synaptic Transmission (enroll in VETPR 704)
Spring. 2 credits. Maximum enrollment: 20 graduate students and undergraduate seniors by permission of the instructor. S-U grades optional. Offered odd-numbered years. Not offered spring 2000. L. M. Nowak.
This is a survey course in vertebrate central nervous system physiology and pharmacology, and focuses on mechanisms of neurotransmitter action at the membrane and cellular levels. Roles of selected neurotransmitters in normal and dysfunctional brains are covered. Topics are introduced in lectures and followed up in discussions of recent journal articles.]

[VETMM 705 Molecular Mechanisms of Receptor-G Protein Coupled Signaling (enroll in VETPR 705)
Spring. 2 credits. S-U grades optional. Offered odd-numbered years. Not offered spring 2000. R. A. Cerione.
This course focuses on the mechanisms of action of GTP binding proteins. Several receptor-coupled signaling systems are examined, including adenylyl cyclase, vertebrate vision, phosphatidylinositol lipid turnover, receptor systems regulating various ion channels, and receptors involved in cell growth regulation.]

[VETMM 706 Growth Factor-Coupled Signaling (enroll in VETPR 706) (also BIOBM 734)
Spring. 0.5 credits. By permission of the instructor. S-U grades optional. Offered odd-numbered years. Not offered spring 2000. R. A. Cerione.
General theme will be mitogenic signaling pathways. Receptor tyrosine kinases, src, ras, and ras-regulatory proteins will be covered.]

[VETMM 707 Protein NMR Spectroscopy (enroll in VETPR 707) (also BIOBM 730)
Spring. 2 credits. S-U grades optional. Offered odd-numbered years. Not offered spring 2000. R. E. Oswald and L. K. Nicholson.
The fundamentals of NMR will be presented and the student will acquire the tools necessary to establish an in-depth understanding of multidimensional, multinuclear NMR experiments. Application of the technique to proteins for assignment of resonances, determination of structure, and characterization of dynamics will be presented. Special approaches for applying solution NMR techniques to large proteins will be discussed.]

VETMM 708 Lipid Second Messengers (enroll in VETPR 708)
Spring. 2 credits. Students with general biology background may enroll by permission of instructor. Lecture-discussion. S-U grades optional. Offered even-numbered years. H. Alex Brown.
This course covers the biochemical pathways involved in the production of lipid second messengers. These pathways function as essential elements of cellular signal transduction cascades. Topics include pathways of phospholipid synthesis, regulation of major mammalian phospholipases by receptors linked through G-proteins and tyrosine kinase receptors to intracellular cascades, and subsequent metabolism of lipid products. The roles of lipids in regulating cell processes, such as membrane structure, exocytosis, cell cycle, and apoptosis, are topics for discussion following reviews of recent publications. A background in general biochemistry is recommended.

VETMM 709 Cancer Cell Biology (enroll in VETPR 709) (also Biological Sciences 750) (Graduate)
Spring. 3 credits. Prerequisite: Biological Sciences 330 or 331 or equivalent. Recommended: graduate courses in biological sciences. Letter grade. Offered even-numbered years. J. L. Guan, R. A. Levine, B. U. Pauli, A. Yen.
This advanced graduate course will cover molecular, cellular, and genetic aspects of cancer. The course is divided into four sections. The first section will address tumor etiology, progression, and metastasis. Topics in this section will include causes of cancer, morphologic and genetic models of cancer progression, tumor angiogenesis, tumor invasion, and metastasis. The second section will discuss cell-matrix and cell-cell interactions in cancer. Topics will include the structure and function of the major matrix receptor integrin family of cell adhesion molecules, integrin interactions with the cytoskeleton, intracellular signaling pathways in cell-ECM interactions, integrin-mediated signaling in cellular growth regulation, changes of integrins in human tumors and metastasis, structure and function of cadherin family of cell-cell adhesion molecules, signaling mechanisms in cell-cell interactions in normal development and cancer. The third section will be on cell cycle. It will develop properties of the cell cycle, how its phases are measured, and changes associated with cell transformation. The fourth section will discuss the signaling pathways that regulate cell cycle progression and how oncogenes and tumor suppressor genes regulate cell proliferation, differentiation, and apoptosisis.

Special Projects and Research in Pharmacology

Fall, spring, summer. 1–3 credits. By arrangement with the instructor. S-U grades optional. Independent study or research. Pharmacology faculty.
These courses cover a variety of topics related to the research interests of the faculty.

VETMM 711 The Role of Calcium in Stimulus-Secretion Coupling (enroll in VETPR 711)
C. M. S. Fewtrell.

VETMM 713 Mechanisms of Growth-Factor Action (enroll in VETPR 713)
R. A. Cerione.

VETMM 714 Central Nervous System Neurotransmitters (enroll in VETPR 714)
L. M. Nowak.

VETMM 718 Structure-Function of the Nicotinic Acetylcholine Receptor (enroll in VETPR 718)
R. E. Oswald.

VETMM 720 Modulation of Nicotinic Acetylcholine Receptor Function (enroll in VETPR 720)
G. A. Weiland.

VETMM 724 The Control of Hormone Secretion (enroll in VETPR 724)
G. W. G. Sharp.

VETMM 730 Graduate Research in Pharmacology (enroll in VETPR 730)
Fall, spring, and summer. 1–12 credits. By permission of the instructor. S-U grades only. This course is offered by individual faculty members in the Department of Pharmacology for graduate students undertaking research toward M.S. or Ph.D. degrees.

Directed Readings in Pharmacology

Fall, spring, and summer. 1–3 credits each topic. By arrangement with the instructor. S-U grades optional. Pharmacology faculty. Reading and discussions.
These courses are offered to small groups or to individual students.

VETMM 742 Receptor Mechanisms (enroll in VETPR 742)
G. A. Weiland.

VETMM 745 Biochemical Neuropharmacology (enroll in VETPR 745)
G. A. Weiland.

VETMM 747 Amino Acid Neurotransmitters (enroll in VETPR 747)
L. M. Nowak.

VETMM 748 Stimulus-Secretion Coupling (enroll in VETPR 748)
C. M. S. Fewtrell.

VETMM 750 Cell Calcium (enroll in VETPR 750)
C. M. S. Fewtrell.

VETMM 760 Advanced Topics in Pharmacology (enroll in VETPR 760)
Pharmacology faculty.

Veterinary Population Medicine and Diagnostic Sciences

VETPMD 664 Introduction to Epidemiology (Graduate) (enroll in VETCS 664)
Fall. 3 credits. Prerequisites: Statistics and Biometry 601 (College of Agriculture and Life Sciences) may be taken concurrently or permission of the instructor. S-U grades optional. H. N. Erb.
Lectures and discussion deal with the fundamentals of epidemiology. Current topics in epidemiology from the fields of nutrition, infectious and chronic diseases, occupational medicine, and veterinary medicine will be reviewed to illustrate the principles and practice of epidemiology, especially of clinical-trial design and infectious-disease epidemiology.

VETPMD 665 Study Designs (Graduate) (enroll in VETCS 665)
Spring. 2 credits. Prerequisites: VETCS 664 and Statistics and Biometry 601 (College of Agriculture and Life Sciences). S-U grades optional. H. O. Mohammed.
Design and interpretation of cross-sectional, case-control, and cohort studies (including controlled clinical trial) are covered. Design issues will include sample size, bias, and relative advantages and disadvantages.

The course objectives are: 1) know the difference between different types of epidemiologic study designs and relative advantages and disadvantages of each; 2) given a problem (usually a field situation), be able to design an appropriate epidemiologic study; 3) be able to effectively analyze and criticize published epidemiologic studies.

The course will consist of lectures on the principles of epidemiologic study design and related issues (sample size calculations, validity and precision, and identification and minimizing of bias); basic analysis of epidemiologic data; and discussion of published epidemiologic studies. These studies include observational cohort studies (prospective and retrospective), cross-sectional studies, case-control studies, and hybrid studies (ambidirectional, and other hybrid designs).

VETPMD 666 Advanced Methods in Epidemiology (Graduate) (enroll in VETCS 666)
Fall. 3 credits. Prerequisites: VETCS 665 and Statistics and Biometry 602 (College of Agriculture and Life Sciences). S-U grades optional. M W F 8:45–9:35. Y. T. Grohn.
Concepts introduced in VETPMD 664 and VETPMD 665 are further developed, with emphasis on statistical methods. Topics include interaction, effect modification, stratified analysis, matching and multivariate (logistic regression) methods, survival analysis, and strategies for the analysis of epidemiologic data.

VETPMD 700 Special Projects in Diagnostic Endocrinology (enroll in VETDL 700)
Fall, spring. 1–3 credits. By permission of the instructor. Letter grades only. T. J. Reimers.
An independent study course. Students have the opportunity to research a particular topic in diagnostic/clinical endocrinology of animals.

VETPMD 701 Special Projects in Infectious Diseases (enroll in VETDL 701)
Fall, spring. 1–3 credits. By permission of the instructor. S-U grades optional. Diagnostic laboratory faculty.
This course provides laboratory experience with attention to specific aspects of infectious disease problems.

VETPMD 702 Special Topics in Infectious Diseases (enroll in VETDL 702)
Fall, spring. 1–3 credits. By permission of the instructor. S-U grades optional. Diagnostic laboratory faculty.
The objective of this course is to offer a broad exposure to various aspects of infectious diseases.

VETPMD 703 Doctoral-Level Thesis Research (Graduate) (enroll in VETDL 703)
Fall, spring. 6–9 credits. By permission of the instructor. S-U grades only. Diagnostic Laboratory faculty.
Research leading to a Ph.D. degree.

VETPMD 704 Master's – Level Thesis Research (Graduate) (enroll in VETDL 704)
Fall, spring. 1–3 credits. By permission of the instructor. S-U grades only. Diagnostic Laboratory faculty.
Research leading to an M.S. degree.

VETPMD 705 (enroll in VETDL 705)

[VETPMD 707 Clinical Biostatistics (Graduate) (enroll in VETCS 707)
Spring. 2 credits. For veterinary residents or graduate students. Letter grades only. Offered odd-numbered years. Not offered spring 2000. H. N. Erb, Y. T. Grohn, H. O. Mohammed, J. M. Scarlett.
The theory behind and interpretation of parametric and nonparametric statistical techniques commonly employed in research/clinical medicine will be explained. Students will analyze small data sets using a commercial statistical software package.]

VETPMD 708 Epidemiology Seminar Series (Graduate) (enroll in VETCS 708)
Fall, spring. 1 credit. S-U grades only. Epidemiology faculty.
Advanced theoretical and analytical epidemiologic concepts and techniques will be discussed.

VETPMD 766 Graduate Research (Graduate) (enroll in VETCS 766)
Fall, spring, and summer. Credit and hours to be arranged. Must be registered in masters of Ph.D. program in epidemiology and permission of the graduate faculty member concerned. S-U grades only. Epidemiology faculty.
This course enables students outside the section of Epidemiology to receive graduate research credits for projects with epidemiological components.

VETPMD 799 Independent Studies in Epidemiology (enroll in VETCS 799)
Fall, spring. 1–3 credits. H. N. Erb, Y. T. Grohn, H. O. Mohammed, J. M. Scarlett.
The purpose of this course is to investigate an epidemiologic topic with one of the instructors. It provides experience in problem definition, research design, and the analysis of epidemiologic data.

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. Assoc. Prof., Clinical Sciences
Antczak, Douglas F., Ph.D., U. of Cambridge (England). Dorothy Havemeyer McConville Professor of Microbiology and Immunology
Appel, Max J., Ph.D, Cornell U. Prof. Emeritus, Microbiology and Immunology
Appleton, Judith A., Ph.D., U. of Georgia. Assoc. Prof., Microbiology and Immunology
Avery, Roger J., Ph.D., U. of Newcastle-upon-Tyne (England). Prof., Microbiology and Immunology
Baines, Joel, Ph.D., Cornell U. Asst. Prof., Microbiology and Immunology
Barr, Stephen C., Ph.D., Louisiana State U. Assoc. Prof., Clinical Sciences
Battison, Andrea, L., D.V.M., U. of Saskatchewan. Instructor, Population Medicine and Diagnostic Sciences
Bell, Robin G., Ph.D., John Curtin School (Australia). Prof., Microbiology and Immunology
Bloom, Stephen E., Ph.D., Penn State U. Prof., Microbiology and Immunology
Blue, Julia T., D.V.M., OK State. Ph.D., U. of Pennsylvania. Assoc. Prof., Biological Sciences
Bowman, Dwight D., Ph.D., Tulane U. Assoc. Prof., Microbiology and Immunology
Bowser, Paul R., Ph.D., Auburn U. Prof., Microbiology and Immunology
Brown, H. Alex, Ph.D., U. of North Carolina at Chapel Hill. Asst. Prof., Molecular Medicine

Casey, James W., Ph.D., U. of Chicago. Assoc. Prof., Microbiology and Immunology
Center, Sharon A., D.V.M., U. of California at Davis. Prof., Clinical Sciences
Cerione, Richard A., Ph.D., Rutgers U. Prof., Molecular Medicine
Chang, Yung Fu, Ph.D., Texas A&M. Assoc. Prof., Population Medicine & Diagnostic Sciences
Clark, Theodore G., Ph.D., State U. of NY Stony Brook. Asst. Prof., Microbiology and Immunology
Cooley, Anjilla J., D.V.M., U. of Tennessee. Lecturer, Clinical Sciences
Cooper, Barry J., Ph.D., U. of Sydney (Australia). Prof., Biomedical Sciences
Davies, Christopher, Ph.D., D.V.M., Cornell U. Asst. Prof., Microbiology and Immunology
Denkers, Eric Y., Ph.D., U. of Wisconsin, Madison. Asst. Prof., Microbiology and Immunology
deLahunta, Alexander, Ph.D., Cornell U. James Law Professor of Veterinary Anatomy, Biomedical Sciences
Dietert, Rodney R., Ph.D., U. of Texas at Austin. Prof., Microbiology and Immunology
Divers, Thomas J., D.V.M., U. of Georgia. Prof, Clinical Sciences
Dubovi, Edward J., Ph.D, U. of Pittsburgh. Assoc. Prof., Population Medicine & Diagnostic Sciences
Ducharme, Normand G., D.V.M., U. of Montreal (Canada). Prof., Clinical Sciences
Dykes, Nathan L., D.V.M., Cornell U. Lecturer, Clinical Sciences
Erb, Hollis N., Ph.D., U. of Guelph (Canada). Prof., Population Medicine and Diagnostic Sciences
Evans, Howard E., Ph.D., Cornell U. Prof. Emeritus, Veterinary and Comparative Anatomy
Farnum, Cornelia, Ph.D., U. of Wisconsin-Madison. Prof., Biomedical Sciences
Fewtrell, Clare, D.Phil., U. of Oxford (England). Assoc. Prof., Molecular Medicine
Flanders, James A., D.V.M., U. of California at Davis. Assoc. Prof., Clinical Sciences
Fortune, Joanne E., Ph.D, Cornell U. Prof., Biomedical Sciences
Fox, Francis H., D.V.M., Cornell U. Prof. Emeritus, Clinical Sciences
French, Tracy W., D.V.M., Purdue U. Assoc. Prof., Biomedical Sciences
Fubini, Susan L., D.V.M., U. of Georgia. Prof., Clinical Sciences
Gilbert, Robert O., B.V.Sc., U. of Pretoria (South Africa). Assoc. Prof., Clinical Sciences
Gilmour, Robert F., Jr., Ph.D., SUNY—Upstate Medical Center. Assoc. Prof., Biomedical Sciences
Gleed, Robin D., B.V.Sc., U. of Liverpool (England). Assoc. Prof., Clinical Sciences
Grohn, Yrjo T., Ph.D., College of Veterinary Medicine, Helsinki (Finland). Prof., Population Medicine and Diagnostic Sciences
Guan, Jun-Lin, Ph.D., U. of California at San Diego. Assoc. Prof., Molecular Medicine
Guard, Charles L. III, Ph.D., Case Western Reserve U. Assoc. Prof., Population Medicine and Diagnostic Sciences
Habel, Robert E., D.V.M., M.Sc., M.V.D., Cornell U. Prof. Emeritus, Anatomy
Hackett, Mary S., D.V.M., Michigan State U. Lecturer, Biomedical Sciences
Hackett, Richard P., Jr., D.V.M., Ohio State U. Prof., Clinical Sciences
Harvey, H. Jay, D.V.M., Kansas State U. Assoc. Prof., Clinical Sciences
Henion, John D., Ph.D., SUNY at Albany. Prof., Analytical Toxicology, Population Medicine and Diagnostic Sciences
Hermanson, John W., Ph.D., U. of Florida. Assoc. Prof., Biomedical Sciences
Hornbuckle, William E., D.V.M., Oklahoma State U. Prof., Clinical Sciences
Houpt, Katherine A., Ph.D., U. of Pennsylvania. Prof., Biomedical Sciences
Houpt, T. Richard, Ph.D., U. of Pennsylvania. Prof., Biomedical Sciences
Irby, Nita L., D.V.M., U. of Georgia. Lecturer, Clinical Sciences
Jacobson, Richard H., Ph.D., Montana State U. Assoc. Prof., Population Medicine and Diagnostic Sciences
Kallfelz, Francis A., Ph.D., Cornell U. James Law Prof. of Medicine, Clinical Sciences
Kern, Thomas J., D.V.M., U. of Missouri. Assoc. Prof., Clinical Sciences
King, John M., Ph.D, Cornell U. Prof., Biomedical Sciences
Kollias, George V., Ph.D., U. of California at Davis. Jay D. Hyman Prof., Clinical Sciences
Krook, Lennart P., Ph.D., Royal Veterinary College at Stockholm (Sweden). Emeritus Prof., Pathology
Lein, Donald H., Ph.D., U. of Connecticut. Assoc. Prof., Population Medicine and Diagnostic Sciences
Levine, Roy A., Ph.D., Indiana U. Assoc. Prof., Molecular Medicine
Lewis, Robert M., D.V.M., Washington State U. Prof., Biomedical Sciences
Ludders, John W., D.V.M., Washington State U. Assoc. Prof., Clinical Sciences
Lust, George, Ph.D., Cornell U. Prof., Microbiology and Immunology
MacLeod, James N., V.M.D., Ph.D., U. of Pennsylvania. Asst. Prof., Biomedical Sciences
Marsh, James A., Ph.D., Northwestern U. Prof., Microbiology and Immunology
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McDonough, Sean P., Ph.D., U. of California. Asst. Prof., Biomedical Sciences
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Meyers-Wallen, Vicki N., Ph.D., U. of Pennsylvania. Assoc. Prof., Biomedical Sciences
Miller, William H., Jr., V.M.D., U. of Pennsylvania. Prof., Clinical Sciences
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Moise, N. Sydney, D.V.M., Texas A & M. Prof., Clinical Sciences
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Naqi, Syed A., Ph.D., Texas A & M U. Prof., Microbiology and Immunology
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Oswald, Robert E., Ph.D., Vanderbilt U. Prof., Molecular Medicine
Parrish, Colin R., Ph.D., Cornell U. Assoc. Prof., Microbiology and Immunology
Pauli, Bendicht U., Ph.D., U. of Bern (Switzerland). Prof., Molecular Medicine
Pearce, Edward, J., Ph.D., National Institute for Medical Research (England). Assoc. Prof., Microbiology and Immunology
Phemister, Robert D., Ph.D., Colorado State U. Prof., Pathology
Quimby, Fred W., Ph.D., U. of Pennsylvania. Prof., Biomedical Sciences
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Sack, Wolfgang O., D.V.M., Ph.D., U. of Edinburgh. Prof. Emeritus., Anatomy
Scarlett, Janet M., Ph.D., U. of Minnesota. Assoc. Prof., Population Medicine and Diagnostic Sciences
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Summers, Brian A., Ph.D., Cornell U. Prof., Biomedical Sciences
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Todhunter, Rory J., Ph.D., Cornell U. Asst. Prof., Clinical Sciences
Trotter, Eric J., D.V.M., U. of Illinois. Assoc. Prof., Clinical Sciences
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Winand, Nena J., Ph.D., Cornell U. Asst. Prof., Pathology
Winter, Lola, M.S., U. of Wisconsin. Lecturer, Microbiology and Immunology
Wootton, John F., Ph.D., Cornell U. Prof., Biomedical Sciences
Yen, Andrew, Ph.D., Cornell U. Prof., Biomedical Sciences

Joint Appointees

Beyenbach, Klaus W., Ph.D., Washington State U. Prof., Section of Physiology (CALS)/Biomedical Sciences
Corradino, Robert A., Ph.D., Cornell U. Assoc. Prof., Section of Physiology (CALS)/Biomedical Sciences
Loew, Ellis R., Ph.D., U. of California at Los Angeles. Assoc Prof., Section of Physiology (CALS)/Biomedical Sciences
Quaroni, Andrea, Ph.D., U. of Pavia (Italy). Prof., Section of Physiology (CALS)/Biomedical Sciences

COLLEGE OF ARTS AND SCIENCES

PROGRAM OF STUDY

Introduction

The College of Arts and Sciences—composed of those departments that comprise the humanities and the arts, the basic sciences, mathematics and computer science, and the social sciences and history—is a community of about 4,000 undergraduates and 600 faculty members. The college values intellectual breadty and rigor, individual choice and responsibility, imaginative curricula, and development of critical thinking and writing. The college is also a graduate school and research center attracting faculty whose research and scholarly and creative writing require first-rate academic facilities and who bring to all their students the profound questioning and the current ideas of contemporary scholarship. Finally, the college exists within a university of about 18,000 students and 1,630 faculty members. This wider community provides depth and diversity of applied and professional studies beyond what one undergraduate college alone can offer. Students may draw upon the knowledge and facilities of the other undergraduate colleges at Cornell to supplement their studies. Abundant variety and outstanding quality in many fields, including interdisciplinary fields, give the college its distinctive character.

The richness of the curriculum is extraordinary; there is no course that all students must take, and there are nearly two thousand from which they may choose. By choosing courses each semester, students design their own education. They strike a balance between developing known interests and exploring new subjects. They sharpen their verbal and quantitative skills. They also come to understand more thoroughly the Western tradition and learn something about the non-Western world and its peoples. An education in the liberal arts and sciences means honing one's critical capacities, learning about oneself in nature and culture, and gaining real experience with views of the world radically unlike one's own. All this is highly individual, and the college relies on each student and faculty adviser to design a sensible, challenging, and appropriate course of study.

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 clusters of disciplines in the natural sciences, the social sciences, and 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 the powers of imaginative and critical thinking as fully as possible. To accomplish these objectives, the college has certain requirements for graduation.

Summary of Requirements for the Bachelor of Arts degree

1) First-Year Writing Seminars: two courses. (See "John S. Knight Writing Program," p. 563.)
2) Foreign language: proficiency in one language or qualification in two; 0 to 4 courses. (See below.)
3) Distribution: nine courses, three of which are satisfied with a major in humanities or social sciences and four of which are satisfied with a major in sciences. (See below.)
4) Breadth: two courses (may be among courses for distribution, major, or electives). (See below.)
5) Major. (See below.)
6) Electives: four or five courses (at least 15 credits) in courses not used to fulfill other requirements and not in the major field.
7) Residence: eight full-time semesters, unless a student can successfully complete all other requirements in fewer than eight semesters and meet the additional criteria to accelerate graduation. (See below under "Acceleration.")
8) 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 below under "Courses and Credits.")
9) Credits: a total of 120 academic credits, of which 100 must be taken in the College of Arts and Sciences. (Note "Non-credit courses below.")
10) Physical education: completion of the university requirement (two one-credit non-academic courses). Please note that physical education credit does not count toward graduation or toward the 12-credit minimum required for good academic standing each semester. (See p. 13.)
11) Application to graduate. (See below under "Graduation.")

Foreign Language Requirement

The faculty considers competence in a foreign language essential for an educated person. Studying another language helps students understand the problematics of language itself, our fundamental intellectual tool, and more fully opens another culture for exploration. The sooner a 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. Courses in foreign languages and/or literature are taught in the College of Arts and Sciences by the following departments: Africana Studies and Research Center, Asian Studies, Classics, German Studies, Near Eastern Studies, Romance Studies, and Russian Literature.

The language requirement may be satisfied in one of two ways:

1) by attaining *proficiency* (competence at the intermediate level) in one language

or

2) by attaining *qualification* (mastery of an introductory seuqence) in two languages.

Proficiency

Proficiency may be attained in languages by passing an intermediate (usually 200-level) Cornell course (or Chinese or Japanese 161). Some introductory language courses are taught at the 300- or 400-level (for example, Near Eastern Studies 333–334); these do not confer proficiency. Proficiency can also be earned by examination. A score of 4 or 5 on an AP *language* exam earns three credits but does not carry with it proficiency. However, a student who received a score of 4 or 5 on an AP language exam can earn proficiency and an additional three credits by scoring high enough on the CASE (Cornell Advanced Standing Examination), which is given during orientation week. On the other hand, a score of 4 or 5 on an AP *literature* exam in French, German (German offers a combined language/literature exam), or Spanish earns proficiency, as well as three credits. Students with those scores should also take the CASE to see if they can earn an additional three credits. Students with appropriate scores on Cornell Language Placement tests or SAT II examinations are also eligible to take the CASE (see chart below). Native speakers and writers of a language other than English may earn proficiency and 6 credits by taking the CASE exam or an individual exam (if no CASE exam is available).

Qualification

Qualification may be attained in any of the following ways:

1) Three years of high school study in any one language gives qualification in that language. No demonstration of competence is necessary. Note, however, that this route to qualification does not guarantee entrance into an intermediate level course. Students who want to continue studying the language must be placed in the appropriate course through an examination. Being placed below the intermediate level does not cancel the qualification.
2) Passing the requisite Cornell course: 102, 123, or 134 in most languages; Chinese 110, 112, or 114; Japanese 160; Korean 102 or 110; Near Eastern Studies 102 in Hebrew, 112 in elementary Arabic; 118 in Elementary Turkish; Classics 103 or 104 in Greek, 106 or 107 in Latin; 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 600 in French, 580 in German, and 590 in Italian or Spanish on the SAT

II taken in high school or a score of 56 or higher on the appropriate Cornell LP (Language Placement) test.

Students may earn a score of 56 on the placement test 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 56, it may be worthwhile to take 123.

4) By departmental or (when no placement test is available) individual examination at Cornell.

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, who have been awarded credit for language work at another college or university, or who are native speakers, bilingual, or have spoken the language at home, 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 (SAT II, taken after the last course, or AP, if the score was 4 or 5) or at Cornell (LP test). Students may, but need not, retake a language test if a year or more has passed since last taking it. Being placed into a 200-level course does not earn credit toward the degree. Credit is earned only for high school work equivalent in level to language courses numbered 200 and above at Cornell.

Placement Tests and Advanced Placement Credit

The type of test depends upon the language and the student's level of achievement:

1) Eight languages offer scheduled placement and advanced standing tests at the beginning of each semester: Chinese, French, German, Italian, Japanese, Korean, Russian and Spanish. The schedule is available from Callean Hile, Department of Romance Studies, 283 Goldwin Smith Hall, CLH2@conrell.edu; it is also posted on the Web at: http://dml.cornell.edu/html/place/testschedule.html. Please note that the advanced standing examination in French, German, Italian, Russian, and Spanish, is called the CASE: Cornell Advanced Standing Examination. Eligibility for the CASE may be determined from the placement tables below. In Russian only, *all* students seeking placement take the CASE.

   Native speakers of Spanish who have completed their secondary education in a Spanish-speaking country do not take the CASE. For these students, the Spanish program offers a walk-in service, the Native Language Accreditation for Spanish, in the third week of September and the first week of February. Students interested in this service should contact either David Cruz de Jesús or Eleanor Dozier in 323 Morrill Hall. Spanish-English bilinguals who do not fit the definition of "native speakers," and whose test scores make them eligible, should take the CASE.

French

Placement Tests		*Language*	*Literature*
LPF	*SAT II*	*Courses*	*Courses*
below 37	below 410	121	
37-44	410-480	122	
45-55	490-590	123	
56-64	600-680	200 203 205 H Adm 266	
56-59	600-630		201
60 and above	640 and above		220 221
65 and above	690 and above		CASE required for placement in language.
AP 4 or 5 in language, 3 credits.			CASE required for placement in language.
AP 4 or 5 in litertaure, 3 credits and proficiency.			CASE required for placement in language.

German

Placement Tests		*Language*	*Literature*
LPG	*SAT II*	*Courses*	*Courses*
below 37	below 370	121	
37–44	370-450	122	
45–55	460-570	123	
56-64	580-670	200 205	200
65 and above	680 and above		CASE required for placement
AP 4 or 5, 3 credits and proficiency.			CASE required for placement

Italian

Placement Tests		*Language*	*Literature*
LPI	*SAT II*	*Courses*	*Courses*
below 37	below 370	121	
37–44	370-450	122	
45–55	460-580	123	
56–64	590-680	203	201
65 and above	690 and above		CASE recommended for placement*
AP 4 or 5 in language, 3 credits.			CASE recommended for placement*
AP 4 or 5 in literature, 3 credits and proficiency.			CASE recommended for placement*

* Students who have a score of 65 of higher on the LPI, or 690 or higher on the SAT II, or an AP score of 4 or 5 may enroll in Italian 201 or 203 without taking the CASE.

Spanish

Placement Tests		*Language*	*Literature*
LPS	*SAT II*	*Courses*	*Courses*
below 37	below 370	121	
37–44	370-450	112 122	
45–55	460-580	123	
56–64	590-680	200 203 213	201
65 and above	690 and above		CASE recommended for placement*
AP 4 or 5 in language, 3 credits.			CASE recommended for placement*
AP 4 or 5 in literature, 3 credits and proficiency.			CASE recommended for placement*

*Students who have a score of 65 of higher on the LPS, or 690 or higher on the SAT II, or an AP score of 4 or 5 may enroll in Spanish 200, 201, 203 or 213 without taking the CASE.

2) Arabic: departmental examination, Department of Near Eastern Studies, 360 Rockefeller Hall.

3) Greek, Ancient and Modern: departmental examination, Department of Classics, 120 Goldwin Smith Hall.

4) Hebrew: departmental examination, Department of Near Eastern Studies, 360 Rockefeller Hall.

5) Latin: departmental examination, Department of Classics, 120 Goldwin Smith Hall.

6) Persian: departmental examination, Department of Near Eastern Studies, 360 Rockefeller Hall.

7) Turkish: departmental examination, Department of Near Eastern Studies, 360 Rockefeller Hall.

8) Other languages: consult the list of contact persons, available from Callean Hile, Department of Romance Studies, 283 Goldwin Smith Hall, CLH2@conrell.edu; it is also posted on the Web at: http://dml.cornell.edu/html/place/contacts.html

Language Requirement Exemptions and Substitutions

Outright waivers of the requirement are never granted. However, rarely, but if appropriate, alternative courses are arranged. Legitimate requests for exemptions require evidence of inability to learn foreign languages in a classroom setting. Most students provide documentation of learning disabilities relating to foreign language acquisition (e.g., an auditory processing problem) to Student Disability Services, 234 Day Hall, 255–3976. Other students who may never have been tested for a disability reveal it through repeated and dedicated but vain attempts in formal language courses. A poor grade in a Cornell introductory langauge course or taking the LP exam repeatedly and unsuccessfully is not adequate evidence.

Students who wish to request a substitution for the normal requirement should meet with Dean Walbridge, Office of Admissions and Advising, 172 Goldwin Smith Hall. If Dean Walbridge determines that the request has merit, the student then meets with the Language Substitution Review Committee. This committee makes the final decision for or against a substitution. If a substitution is allowed, the committee then works with the student to select substitute courses.

Distribution Requirements

In satisfying the distribution requirements, students become acquainted with a broad range of subject matter and points of view among disciplines in the college and explore areas that may be entirely new to them. Although students may complete the requirements over the eight semesters, they can take advanced courses in subjects they find intriguing only if they have completed the introductory prerequisites.

Students must take a total of nine courses (of three or more credits each) for the distribution requirements: 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). Courses in the major may be applied to the distribution requirements.

1. Physical and Biological Sciences

In fulfilling the science distribution requirement, students must take at least one course from the primary list of courses and may select additional courses from the supplementary list.

Primary list:

Astronomy: all courses *except* 233

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), 208, 209, 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, 154, 170, 184, 192, 202, 207, 212, 240, 241, 264 plus 266, 275. *Note that introductory biology can count for distribution only when completed 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:

Animal Science: 100, 150, 212

Anthropology: 101, 208, 275, 371, 390, 474, 490

Applied and Engineering Physics: 110

Biology and Society: 301

Entomology: 212

Food: 200

Materials Science and Engineering: 277

Natural Resources: 201, 210, 301

Nutritional Science: 115

Plant Breeding: 225

Psychology: 223

Soils, Crops, and Atmospheric Sciences: 131, 231

2. Quantitative and formal reasoning

Biometry and Statistics: 215

City and Regional Planning: 320

Computer Science: 100, 211, 212

Economics: 319, 320, 321

Industrial & Labor Relations: 210, 211

Linguistics: 216

Mathematics: all courses *except* 101 and 109

Operations Research & Industrial Engineering: 115

Philosophy: 231, 331, 431, 436

Physics: 205, 209, 210

Psychology: 350

Sociology: 301

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 may not choose two beginning courses in statistics.

Under exceptional circumstances and upon petition, certain Cornell courses not listed above under Group 2 (courses such as those appearing on the following auxiliary list) may be used to satisfy the requirement in quantitative and formal reasoning. The petition should provide 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 312; Linguistics 421, 450; Psychology 472–473 (a sequence of two two-credit courses which may count only in its entirety as one course)

3. Social sciences and history

Africana Studies: 171, 172, 191, 204, 205, 220, 231, 271, 280, 283, 290, 300, 301, 311, 352, 370, 380, 381, 410, 420, 451, 459, 475, 478, 479, 483, 484

American Studies: 101, 102, 201, 202, 320

Anthropology: all courses except 101, 208, 275, 371, 390, 451, 452, 453, 474, 490

Archaeology: 100, 201, 202, 203, 204, 263, 275, 317, 353, 355, 362, 370, 405, 409, 458, 466, 467, 469, 493, 494

Asian Studies: courses in Asian anthropology, economics, government, history, linguistics, or sociology

Asian American Studies: 110

Biology and Society: 301, 342, 407, 427

City and Regional Planning: 100, 101

Cognitive Studies: 101, 201

Economics: all courses *except* 317, 318, 319, 320, 321

Engineering: 250, 292

Government: all courses

History: all courses

Linguistics: all courses *except* 131, 132, 236, 238, 251, 252, 315, 316

Near Eastern Studies: 244 and all other courses in Near Eastern archaeology and history

Psychology: all courses except 223, 307, 322, 324, 326, 332, 350, 361, 396, 410, 420, 422, 424, 425, 429, 431, 440, 441, 470, 471, 472, 473, 475, 478, 479, 491, 492

Religious Studies: 150, 203, 239, 244, 248, 251, 257, 258, 263, 264, 265, 320, 322, 335, 345, 350, 365, 368, 393, 442, 443, 451, 459

Science and Technology Studies: 201, 233, 250, 281, 282, 287, 292, 311, 350, 352, 355, 360, 391, 401, 407, 427, 433, 442, 444, 447, 467, 483, 490, 645, 687

Sociology: all courses except 301

Women's Studies: 206, 210, 211, 214, 218, 220, 227, 234, 238, 244, 269, 273, 277, 281, 285, 305, 307, 321, 344, 353, 357, 362, 368, 378, 380, 384, 406, 408, 416, 426, 438, 442, 444, 450, 455, 458, 459, 466, 467, 477, 478, 479, 493, 612

4. Humanities and the arts

Africana Studies: 202, 210, 211, 265, 285, 303, 304, 310, 422, 425, 431, 432, 435, 455

American Studies: 101, 102, 201, 202, 324

Anthropology: 290, 451, 452, 453, 455

Archaeology: 100, 221, 309, 321, 351, 352, 357, 366, 380, 423, 434, 435, 520, 629

Asian Studies: 208, 211, 212, 215, 218 and other courses in Asian art, literature, religion, or culture

Asian American Studies: 110

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: all courses

English: all courses at the 200-level and above

French Literature: all courses (not language courses)

German Studies: all courses except 121, 122, 123, 204, 205, 206, 303, 304, 305, 306

History of Art: all courses

Italian Literature: all courses *except* 205 (not language courses)

Music: one course of at least three credits, *excluding* musical performance, organizations, and ensembles. If a student chooses to satisfy part of the distribution requirement with more than one music course, an acceptable sequence may include four credits in musical performance, organizations, or ensembles combined with introductory, theory, or history and culture courses. (Students may count performance credits as only one course toward distribution.)

Near Eastern Studies: courses in Near Eastern civilization or literature, including 244 and language courses at the 200-level and above

Philosophy: all courses *except* 191 and courses in logic

Religious Studies: 101, 197, 198, 213, 223, 227, 229, 230, 231, 234, 239, 244, 250, 251, 252, 255, 262, 295, 297, 315, 328, 332, 333, 334, 337, 342, 344, 347, 350, 351, 352, 354, 355, 357, 358, 359, 360, 362, 395, 410, 420, 441, 449, 473, 531

Russian Literature: all courses

Science and Technology Studies: 205, 206, 286, 381, 384, 389, 390, 481, 681

Spanish Literature: all courses (not language courses)

Theatre, Film and Dance: all 3- or 4-credit courses at the 200-level or above *except* technical production studios

Women's Studies: 210, 211, 249, 251, 252, 263, 264, 294, 320, 341, 348, 349, 355, 358, 363, 370, 374, 381, 403, 404, 409, 413, 427, 431, 433, 445, 447, 448, 451, 461, 464, 465, 468, 470, 471, 475, 476, 481, 486, 491, 492, 493, 530, 594, 661

Restrictions on Applying Courses to the Distribution Requirements

1) Advanced Placement Credit and Credit from Other Institutions

Students may apply up to two courses of approved advanced placement or transfer credit towards distribution requirements in Groups 1 and 2 (physical/biological sciences and quantitative/formal reasoning), as long as they take at least one course from the primary list in science at Cornell. Transfer credit applied to distribution in Group 2 (quantitative/formal reasoning) must be in mathematics or computer science; it may not be in other quantitative subjects, for example, statistics or logic.

Students may apply no advanced placement or transfer credit from other institutions toward satisfaction of the distribution requirements in Groups 3 and 4 (social sciences/history and humantities/arts).

Students who transfer to the college from another institution or who enter through the Mid-Year Freshman Program are under the above rules for advanced placement credit, but are eligible to have credit for post high school coursework taken at their previous institution count towards all distribution requirements. Transfer students receive a detailed credit evaluation when they are accepted for admission.

2) Freshman writing seminars may not count towards any distribution requirement.

3) No single course may satisfy more than one distribution requirement. However, students may count courses in their major towards distribution. Courses offered or cross-listed by their major department may not be counted towards any distribution category beyond the usual category of the major department itself. For example, a history major may not count a course cross-listed between history and a literature department towards distribution in the humanities.

Breadth Requirements

Students must include in their undergraduate curricula at least one Arts and Sciences course that focuses on an area or a people other than those of the United States, Canada, or Europe, and one course that focuses on an historical period before the twentieth century. (Arts and Sciences courses about Native American cultures may count toward the geographic breadth requirement if they focus on the cultures themselves and not on interaction with European cultures.) Courses that satisfy the geographic breadth requirement are marked with an @ when described in this catalog. Courses that satisfy the historical breadth requirement are marked with a #. Many courses satisfy both requirements, and students may in fact use the same course to satisfy both. Students may use courses satisfying distribution, major, or elective but not writing requirements in satisfaction of either of the breadth requirements. They may also apply Cornell courses conferring proficiency in a non-Western language toward the geographical breadth requirement. They may not apply advanced placement or credit awarded by examination or, for students matriculating as freshmen (with the exception of students entering through the Mid-Year Freshman Program), transfer credit 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 does not define a student's intellect or character or lead directly to a lifetime's occupation, although it sometimes does some of each. By majoring, students focus and develop their imaginative and intellectual capacities through a subject they find especially interesting.

Most departments and programs specify certain prerequisites for admission to the major; they are found in the department and program descriptions on the following pages.

Students may apply for acceptance into the major as soon as they have completed the prerequisites. To apply, they take a copy of their transcript to an appointment with the director of undergraduate studies in their prospective major. Students must be accepted into a major before the beginning of the junior year. A department or program may refuse admission into the major if the applicant's performance does not meet established standards. A student without a major at the beginning of the junior year is not making satisfactory progress toward the degree, must meet with an advising dean, and may not be allowed to continue in the college.

Available majors

Majors are offered by each of the departments. There are also majors in American studies, archaeology, biology and society, religious studies, Russian and East European studies, science of earth systems 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." Whatever the major—chemistry, math, philosophy, or music—graduates from the College of Arts and Sciences earn the one degree the college awards, a Bachelor of Arts.

Double Majors

Only one major 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.

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 course of study. 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. Students may group electives to form a concentration separate from their major or even apply them to a second major. Since only one major is required, students may count courses in a second major as electives. Some students choose to explore a variety of subjects; some develop a concentration in a department or subject outside Arts and Sciences to gain practical training or specialized knowledge.

Residence

The College of Arts and Sciences is primarily a residential college for students who devote their energy and spirit to full-time study. The faculty believes that integrated, full-time study for a defined period best promotes intellectual and creative development and best prepares people for citizenship and careers.

Consequently, 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.

Transfer students from other institutions must spend a minimum of four semesters on the Cornell campus in Ithaca enrolled in the College of Arts and Sciences. 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.

Approved study abroad, SEA Semester, Urban Semester, and Cornell-in-Washington are considered semesters of residence, but not as semesters on the Cornell campus. Nonetheless, students may spend no more than two semesters on such programs and must be on campus during their last semester.

Semesters of extramural study in the Division of Continuing Education and Summer Sessions do not count as semesters of residence.

Freshmen occasionally enter with 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 Academic Advising Center, 55 Goldwin Smith Hall). Students may not, however, count such credit as part of the 100 credits required in the College of Arts and Sciences or use such credit to replace a term of residence. 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 compress the first four semesters and spend four full semesters in the major. Benefitting from opportunities for advanced, seminar, and independent (sometimes honors) work is what best characterizes undergraduate education in the college. Students considering acceleration should discuss their plans with their major advisor.

Accelerants apply to graduate two semesters before their intended new graduation date. They must obtain an "Application to Graduate" in the Office of Undergraduate Admissions and Advising, 55 Goldwin Smith Hall.

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 Cornell at "C" or above. Courses completed with a grade of "S" will count toward the 100 credits. Advanced placement credits do not count towards this requirement.
3. Students may not use credits earned while on leave of absence to reduce their terms of residence.
4. Accelerants may not finish the degree with credits earned in summer or winter session, through part-time study (unless they meet the guidelines for part-time study), or at an off-campus program, including Cornell-in-Washington, SEA Semester, Urban 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 a worthy academic plan for a full ninth or tenth semester is approved, the student enrolls in the college 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 part-time students paying pro-rated tuition. Students may spend a ninth term with Cornell aid only with permission of the Committee on Academic Records. Such permission is normally granted only to:

1. Students who have been ill or have an exceptionally compelling academic plan.
2. Students attracted late to a field with a hierarchical curriculum (for example, physics).
3. Students who were academically underprepared for the curriculum at Cornell and needed to begin with a lighter schedule of courses than normal. (See Dean Turner, Office of Undergraduate Admissions and Advising, 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 and credits from such semesters may not be used to reduce the terms of residence.

Part-time study in special circumstances

The college and university support students (with financial aid and services) as best they can to make full-time study possible. Occasionally, however, extraordinary but non-financial personal, academic, or medical circumstances make becoming a part-time student necessary and appropriate. Students in good academic standing who face extraordinary situations or who have documented disabilities may petition the Committee on Academic Records for part-time status and proration of tuition in the college.

Students requesting part-time status should discuss their situation with Dean Walbridge if their reason is a documented disability that, under the Americans with Disabilities Act, requires appropriate accommodations. Otherwise, students should meet with the dean of their class.

Part-time study in final semester

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 requirements by the end of the sixth or seventh term, met the criteria for accelerated graduation, and are remaining to complete study beyond what is required for the degree.
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 in the eighth semester and can complete all degree requirements by taking two courses, one of which is the thesis itself. They must register for the thesis and at least one additional course.

In all cases, approval of the dean of seniors must be sought in the semester *prior* to the part-time semester and the student must be enrolling for no more than 8 credits.

Courses and Credits

Counting 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 one-half course. Single-credit courses do not count as part of the 34 except in certain cases when they form a part of a series and two in the same series can be aggregated to count as one-half course (certain offerings in the Departments of Music and of Theatre, Film and Dance). Three one-credit courses do not aggregate to count as one course. A six-credit language course counts as 1 1/2 courses, while the summer Falcon Programs in Asian languages count as ten 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. AP exam scores that result in an award of 3 or 4 credits count as one course; those in language that result in 6 credits count as 1 1/2 courses; those in biology that result in 6 credits count as two courses; those that result in an award of 8 credits count as two courses.

Students must also complete 120 credits, 100 of which must be from courses taken in the

College of Arts and Sciences. Liberal arts 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 Cornell residential programs may be counted toward the 100 credits required within the college and also toward the required 34 courses. Credits earned in other colleges at Cornell, or in any subject at U.S. institutions other than Cornell, do not count as part of the 100 nor, for students matriculating in Fall 1994 or after, do advanced placement credits count as part of the 100. The only exceptions are for courses (usually no more than three) that certain departments accept from other colleges at Cornell as fulfilling major requirements and for no more than two courses that an advisor accepts as part of a completed and established cross-college, inter-disciplinary concentration.

Using courses towards more than one requirement

A course may fulfill more than one college requirement, under the following conditions:

1) A course may be used to fulfill a distribution requirement and also a major requirement.
2) A one-semester course in foreign literature (not language) 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.
4) Courses in a second major may count as electives.

Auditing

The college encourages its students to take advantage of its rich curriculum by sitting in on courses that interest them but that they cannot commit themselves to for credit. As long as the instructor agrees, students are welcome to visit courses. Small seminars and language courses are sometimes not open to visitors. Audited courses do not appear on the student's schedule or transcript.

Repeating courses

Students occasionally need to 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 considering repeating a course under this circumstance should discuss the matter with their adviser and an advising dean. Students who plan to repeat a course submit a petition to the college registrar. If the original course grade was F, no petition is necessary.

Non-credit courses

The college does not grant credit toward the degree for every course offered by the university. Courses in remedial or developmental reading, high school mathematics, supplemental science and mathematics offered by the Learning Strategies Center, keyboarding, shorthand, military training, training as emergency medical technician and service as a teaching assistant are among those for which degree credit is not given and that do not constitute part of the 12 credits required for good academic standing.

Students enrolled in courses for undergraduate teaching assistants may petition once to have the non-degree credits count towards good academic standing. This would allow continued eligibility for graduating with distinction in all subjects, but would disqualify the student from being on the dean's list that semester.

Examples of non-credit courses:

All courses numbered below 100 (with the exception of Computer Science 099)

All courses in Military Science, Naval Science, and Aerospace Studies

A&LS 134

Biology G 498

Communications 498

Education 498

Engineering 470

Hotel Administration 170

Human Development and Family Studies 403

Human Ecology 100, 101

Human Service Studies 403, 454

Mathematics 109

Nutritional Science 403

Psychology 498

Advanced placement credit

See p. 5. Advanced placement credit counts as part of the 120 credits and 34 courses required for the degree. It does not count as part of the 100 credits required in Arts and Sciences; its application to distribution requirements is restricted, as explained above under Distribution.

Summer session credit

A student may earn credit toward the degree by completing courses in Cornell's summer session or by petitioning to take summer courses at other colleges. Students should consult their advisers regarding summer study plans.

Credit for summer courses not taken at Cornell must be approved by the appropriate Cornell department. Approval forms and information are available in the Academic Advising Center, 55 Goldwin Smith Hall and from Robin Perry, Office of Admissions, 172 Goldwin Smith Hall. Credit earned in summer courses other than those at Cornell will not count toward the 100 credits required in the college (including summer or orientation programs abroad) and may be applied only to part of the Group 1 and 2 distribution requirements. Transcripts from other institutions must be sent to Robin Perry, 172 Goldwin Smith Hall.

Entering students who want to receive credit toward the degree for courses completed during the summer before matriculation in a summer session away from Cornell should obtain approval forms as soon as possible and have transcripts sent to Robin Perry, 172 Goldwin Smith Hall, during the summer before matriculation. Credits completed in Cornell summer sessions will be awarded automatically.

Summer session at Cornell or elsewhere does not count toward the eight-semester residence requirement.

Transferring credit earned away from Cornell while on leave of absence

Students may petition to transfer credits from other accredited institutions for work completed while on leave of absence. Petitions are available in 55 and 172 Goldwin Smith Hall. The relevant department will decide whether the course is comparable to Cornell courses. Credit approved for transfer counts as part of the 120 required for graduation and as part of the 34 courses. It does not count among the 100 credits required in Arts and Sciences and cannot be used toward graduation in fewer than eight semesters. Its application to distribution and breadth requirements is restricted as described above under Distribution.

Transferring credit (for transfer students from another institution or from another Cornell college)

Transfer students must successfully complete at least 60 credits and 16 courses at Cornell; they must be in residence in the college for four regular semesters (summer session does not count toward the residence requirement). The college evaluates credit earned either at another school or college at Cornell University or at another accredited institution of collegiate rank, including advanced placement credit awarded by those colleges, and determines the number of credits and courses the student may apply toward the various requirements for the Bachelor of Arts degree at Cornell. Evaluations of transfer credits are normally provided when students are notified of their admission.

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 academic standing each semester.

SPECIAL ACADEMIC OPTIONS

Degree Programs

The following five programs allow students to work toward more than one degree or to alter the regular college or major requirements.

Independent Major Program

The Independent Major Program allows students to design their own interdisciplinary majors and pursue a subject that cannot be found 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, Office of Undergraduate Admissions and Advising, 172 Goldwin Smith Hall, for further information. Deadlines for submitting independent major proposals are listed below 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 course of study. 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 permission from the program to accelerate, eight full terms of undergraduate study. They must complete the physical education requirement. All College Scholars must complete a senior project. They are not required to complete or fulfill the general education requirements, although members of the College Scholar Advisory Board believe that the spirit of those requirements 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 by that date in their first spring semester in the college. Students should contact the the director of the program, Office of Undergraduate Admissions and Adivising, 172 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 contact the Office of Admissions, 172 Goldwin Smith Hall.

Double Registration with and Early Admission to 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 occasionally possible. A very few exceptionally well-prepared students who have earned 105 credits before the start of the senior year and have been accepted by one of the above-named professional schools may be permitted to register simultaneously in the college and in one or another of these professional schools during the seventh and eighth terms. They earn the A.B. degree after the first year of professional school.

Students with eight or fewer credits and two or fewer courses to complete may apply to enter the Master's of Engineering program during (but no earlier than) the eighth semester; dual-degree students may enter this program no earlier than the ninth semester. They earn the bachelor degree(s) after one semester of graduate school.

Students interested in the joint program with the Law School or the Graduate School of Management, or in early admission to the Master's of Engineering program should apply to the relevant program. Students interested in the joint program with Cornell Medical College should contact the health careers coordinator, 203 Barnes Hall. All candidates should confirm their eligibilty with the dean of seniors, Office of Undergraduate Admissions and Advising, 172 Goldwin Smith Hall.

Double-registered students must, of course, complete all requirements for the A.B. degree, including 100 credits in Arts and Sciences courses.

Teacher Education in Agriculture, Mathematics and Science

Students at Cornell may pursue teaching credentials in agriculture, biology, chemistry, earth science, general science, mathematics, and physics. Teacher Education in Agriculture, Mathematics and Science (TEAMS) is a university program jointly conducted by the departments of education and mathematics. Although TEAMS offers options for undergraduate and graduate study, most students enroll in a five-year program, which combines an undergraduate major in mathematics or one of the sciences with a one-year Master of Arts in Teaching degree (MAT). Students from any college at Cornell are eligible to apply to the program as undergraduates, usually during their sophomore year.

For more information, contact the TEAMS student support specialist at 255–9255 or 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 programs.

Informal Minors

Some students organize electives within a discipline or department. Such informal minors can be developed with the help of the departmental directors of undergraduate studies, but are not noted on the transcript.

Concentrations

Established interdisciplinary concentrations, described in the pages following the descriptions of the departments and their curricula, provide structures for organizing electives. Completed concentrations are noted on the transcript.

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 independent 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 Academic Advising Center, 55 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

An excellent way to benefit from being an undergraduate at a research university, 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 earn independent study credit for what they learn and contribute. They sharpen their critical and creative abilities and test their interest in pursuing a research career. Sometimes they publish their work.

The Undergraduate Research Program 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 during the summer—and helps students prepare for research and presenting themselves as candidates for apprenticeships. Other students locate research opportunities independently through faculty whose courses they have taken, through their major departments, or through published materials.

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 Dean Williams, Office of Undergraduate Admissions and Advising, 55 Goldwin Smith Hall.

Language Study

FALCON (Full-Year Asian Language Concentration). FALCON allows 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 to pursue rapid and thorough beginning studies on campus with the objective of studying abroad later—in China, Japan, or Southeast Asia. Students interested in this program should contact the Department of Asian Studies, Rockefeller Hall; e-mail: falcon@cornell.edu.

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 Daniel Evett, 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 important that students plan a program in which they are interested and do well. Beyond that, students are advised to take courses that will develop 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 will impress law schools.

The adviser for students in the College of Arts and Sciences who are applying to law school is Dean Cox, Office of Undergraduate Admissions and Advising, 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 research. Such training has a profound effect on the doctor's usefulness to patients, and it affords the flexibility of mind that is needed for major research undertakings. Medical and dental schools do not prescribe or even prefer a particular major; they do, however, require particular undergraduate courses, 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 Dean Turner, Office of Undergraduate Admissions and Advising, 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

All students planning to study abroad apply through Cornell Abroad; please see the Cornell Abroad program description in the introductory section of *Courses of Study*.

Each year about 200 undergraduates in Arts and Sciences include semester- or year-long study abroad as part of their formal undergraduate 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 insists wherever possible on study at foreign institutions alongside their degree candidates rather than study in self-contained programs that offer courses specially designed for foreigners. The primary goals of this educational immersion are to learn firsthand the modes of inquiry, methods of analysis, and educational values of higher education offered to students of another country and to involve students in social relationships with peers who may hold a new and unexpected range of social attitudes.

Many students go abroad to pursue work in their majors. Focused academic work in an appropriate institution abroad can prepare students for advanced study or honors work in the final semesters back in Ithaca.

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 studying abroad; proficiency in the language is generally the prerequisite.** At least one area studies course or one course in the history, culture, economics, politics, or social relations of the country of destination must be part of every student's preparation for study abroad.

Students planning to study abroad need solid academic credentials to do so productively and successfully. The college requires a minimum overall grade point average 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 and 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. A maximum of 10 credits is awarded for each trimester of study. 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 academic 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, however, become part of the Cornell grade point average.

Students who transfer to Cornell must complete a minimum of four semesters 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 Dean Chametzky in the Office of Undergraduate Admissions and Advising, 55 Goldwin Smith. Although students investigate options for study abroad and submit final applications through the Cornell Abroad office, Arts and Sciences applicants submit to the college an essay describing the academic rationale for study abroad, an outline of prospective courses to be taken and any other relevant materials.

Summer Residential Programs in Archaeology

During the summer months students may participate in a Cornell-sponsored archaeological project. In recent years the program has organized archaeological projects in Central America, Greece, Israel, Italy and New York State. 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 Office of Undergraduate Biology 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 unique externship opportunities: 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. 20 or inquire at 471 Hollister Hall, 255–4090. 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 of seniors, Office of Undergraduate Admissions and Advising, 172 Goldwin Smith Hall.

Fieldwork

Sometimes it is appropriate for students to include fieldwork as part of their major. A three-member faculty committee helps the student plan the project, arranges for ongoing supervision, and evaluates the project at the end of the term. Fieldwork almost always involves writing a long paper or several short ones, as well as practical experience. All proposals for fieldwork must be presented in advance to the 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 Office of Undergraduate Admissions and Advising, 55 or 172 Goldwin Smith Hall.

ADVISING

The following advisers and offices provide academic advising or information on college procedures and regulations.

Faculty Advisers

Each new student is assigned a faculty adviser. Advisers help students plan programs of study and advise them about ways to achieve their academic goals. Advisers may also help students with study or personal problems or may direct them to other offices on campus where help is available. Academic difficulties may frequently be solved or avoided if students and advisers recognize and address problems early.

Advisers and new advisees meet first during orientation week to discuss course selection. 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. Advisers and advisees meet at least once each semester to discuss courses for the following term and whenever advisees wish to petition for an exception to college rules.

Student Advisers

Student advisers pass on lore about the college's requirements, courses, 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 shape and direct their course of study. 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.

Office of Undergraduate Admissions and Advising

This office, 55 Goldwin Smith Hall, 255–5004 and 172 Goldwin Smith Hall, 255–4833, offers 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, college scholar and independent major programs—255–3386

Robert Chametzky, sophomores and study abroad—255–5004

Gerry Cox, seniors, pre-law students, and national scholarships—255–4833

Ken Gabard, freshmen—255–5004

Lawrence Lamphere, internal transfers and minority students—255–4833

Maria S. Terrell, student advisors and ambassadors, Dean's scholars and Cornell research scholars—255–5004

Janice Turner, minority and pre-med students—255–5004

Peggy Walbridge, transfers and students with disabilities—255–4833

Catherine Wagner, juniors and mid-year freshmen—255–4833

Marilyn Williams, undergraduate research, careers, academic integrity—255–5004

REGISTRATION AND COURSE SCHEDULING

Enrollment in Courses in the College of Arts and Sciences

New Students

During orientation week, new students attend briefings and other information sessions, meet with faculty advisers, and sign into courses. The college reserves spaces in courses for its in-coming students.

Continuing Students

Continuing students select and schedule up to five courses during the semester prior to the one in which the courses will be taken. Students who do not "pre-register" during the designated period must wait until the beginning of the term and may have difficulty securing places in the courses they most want. Before signing into courses, students plan their programs and discuss long-range goals with their faculty advisers. In addition, all students are welcome to discuss programs and plans with an advising dean in the Office of Undergraduate Admissions and Advising, 55 Goldwin Smith Hall, or 172 Goldwin Smith Hall.

At the beginning of each term, students find their schedules and should confirm the accuracy of their records on "Just the Facts."

Limits on Numbers of 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 must average 15 credits per semester. (AP credit and/or summer credits may reduce the numbers of courses and credits.)

Minimum number of credits per semester

To maintain good academic standing as a full-time student, students must enroll in at least 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 freely given for first-semester students.

Maximum number of credits per semester

First-term freshmen must petition to register for more than eighteen credits; other students may register for more than eighteen credits only if their previous term's average was 3.0 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 receive approval for excess credits from the committee run the risk of having only 18 credits for the semester count toward the degree.

Attendance

Attendance in classes is a matter between students and their instructors. If a student cannot attend classes because of illness or family crisis, the Office of Undergraduate Admissions and Advising will notify instructors at the request of the student or the family. Nonetheless, the student must arrange to make up examinations or other work with each instructor. A student who will be absent because of religious holidays or athletic competitions must discuss arrangements for making up work with his or her instructors well in advance of the absence. A student who must miss an examination must also consult with the professor in advance. Alternative arrangements are at the discretion of the instructor.

Adding and Dropping Courses

After course enrollment (pre-registration), students may not adjust their schedules until the new term begins. During the first three weeks of the semester, students may change courses without petitioning. Add/drop forms are available in the Office of Undergraduate Admissions and Advising, 55 Goldwin Smith Hall.

After the third week of classes, students must petition to add courses. They may drop courses up to the seventh week of the term. 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) an advising dean approves. Students must meet with an advising dean to obtain petition forms.

Courses dropped after the seventh week will be noted on the transcript by a "W" where the grade would normally appear. No petitions to withdraw from courses may be submitted after the end of the twelfth week in the term. Deadlines for short courses will be adjusted according to the length of the courses.

Leaves of Absence

Taking time off from college to explore goals and direction, or to gain experiences or funds, is sometimes useful. Students in good academic standing who take a leave before 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,* usually for at least six months, are granted by the college only upon recommendation by a physician from University Health Services. In some cases, students must satisfy the UHS that the condition requiring the leave 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 upon return.

3) *Conditional leaves* may be granted by an advising dean if the student is not in good academic 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 Records 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 Office of Undergraduate Admissions and Advising, 55 or 172 Goldwin Smith Hall. On readmission, the student's graduation date will be recalculated.

Students who take courses elsewhere while on leave may petition to have credits transferred and applied toward the 120 credits needed for graduation, but not toward the 100 credits required in the college. Approval depends on acceptable grades and the judgment of the relevant departments about the quality of the courses. Credits earned during a leave do not count toward the eight semesters of residence and may not be used to reduce the terms of residence. See the section "Residence."

Withdrawals

A withdrawal is a permanent severance from the university and from status as a degree candidate. Students planning to withdraw should consult an advising dean. Students not requesting a leave and failing to register for a term will be withdrawn from the college. The Committee on Academic Records may require a student to withdraw for a highly unsatisfactory academic record.

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 in 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 a B average and without any grades of *Incomplete*, any S-U grades (unless only S-U grades are offered for that particular course), or any grades below C. Satisfying this minimum requirement does not, however, guarantee admission. Admission to the college is based on consideration of the student's entire record at Cornell and the high school record, not just the work of one semester. Interested students should see Dean Lamphere, 172 Goldwin Smith Hall.

ACADEMIC STANDING

Students are in good academic standing for the term if they successfully complete at least 12 degree credits by the end of the term and earn no more than one D and no F or U grades. If a student completes only three courses, all grades must be above D. In addition, students are expected to make acceptable 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. Courses listed above under "Noncredit courses" do not count towards good academic standing.

Academic Actions

Students who are not in good academic standing will be considered for academic action by the faculty Committee on Academic Records or by one of the deans of the college. Those 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. They must consult an advising dean about appealing.

Warning

Any student who fails to maintain good standing will, at a minimum, be warned. The warning may be given by an advising dean or by the faculty Committee on Academic Records. A warning is posted on a student's college record 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 always or necessarily, the Committee on Academic Records warns students before suspending them. Before being allowed to return and reregister in the college, students must describe what they did on leave and how they resolved their problems and submit a plan for completing the degree. In some cases students will be required to furnish evidence that they are ready to return or satisfy other conditions before being allowed to reregister in the college. Students who request to return in less than a year must present to the committee extraordinarily convincing evidence of their readiness to return. "Required leave" and the date are posted on the student's official 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 official transcript.

Academic Integrity

Cornell's Code of Academic Integrity and policy about acknowledging the work of others are among the documents new students receive. Students should read them carefully rather than assume they understand what integrity and cheating are and are not. Academic integrity implies more here at the university than it usually did in high school. The standards of integrity are those that prevail in professional life. This means that students must acknowledge and cite ideas they adopt from others (not just direct quotes) and help they receive from colleagues. With emphases on collaborative learning and writing, students must understand the general standards and policies about academic integrity and be sure they understand the expectations in individual courses as well. When in doubt, ask your instructor.

Forgery on Forms

Forging signatures or credentials on college forms is an academic offense; sometimes it constitutes academic fraud. In all cases of forgery on academic forms, the effect of the forged documents shall be negated. Students may then petition properly to do whatever they attempted to do improperly. Such incidents will be recorded in the Academic Integrity Hearing Board confidential file for forgeries. If a student forges more than once or if the forgery would advance the student's academic standing unfairly or fraudulently, or if for any other reason the situation requires some response in addition to the uniform penalty, the Academic Integrity Hearing Board might make a different recommendation, such as a notation on the student's transcript, suspension, or dismissal.

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 subjects relatively new to them without being under pressure to compete with better prepared students for high grades. It is not meant to allow students to reduce the amount of work they complete in a course or the amount of effort they devote to it. The S-U option is contingent upon the instructor's willingness to assign such grades. Students must select their grading option and obtain the instructor's approval for the S-U option during the first three weeks of the term (virtually no exceptions to this deadline are permitted). 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 and acceptable to the instructor. Students must have substantial (more than 50%) equity in the course; that is, they must be able to complete the remaining work without further registra-

tion 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 (or "frozen" incomplete) 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 (make up or "freeze") 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

Students should periodically check their courses and grades on "Just the Facts" to be sure that they are recorded correctly.

Class Rank

The college does not compute class rank.

Dean's List

Inclusion on the Dean's List for academic excellence is an honor bestowed by the dean of the college semester by semester. Based on grades, the criteria include about the top 30 percent of students and vary with the number of credits the student completes. The criteria are subject to slight changes from semester to semester and are available in the Office of Undergraduate Admissions and Advising, 55 Goldwin Smith Hall.

GRADUATION

The Degree

The College of Arts and Sciences grants only one degree (no matter what the student's major): the A.B. (or B.A.). A.B. is the abbreviation of the Latin name for the degree, "Artium Baccalarius," or translated into English, B.A., "Bachelor of Arts."

Application to Graduate

In the first semester of their senior year, students attend senior briefings and then complete an application to graduate. The application allows the college to 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. *Nonetheless, 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.

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 the following May.

Honors

Bachelor of Arts with Honors

Almost all departments offer honors programs for students who have demonstrated exceptional ability in the major and who have completed original independent 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 the 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.

CALENDAR SUPPLEMENT

All of the dates in the university calendar at the front of this volume apply to all Cornell students. Listed below are some additional dates that are of importance for students in the College of Arts and Sciences.

	Fall 1999	*Spring 2000*
Last day for adding courses without petition.	Sept. 17	Feb. 11
Last day for changing grade option to S-U or letter.	Sept. 17	Feb. 11
First deadline for submitting independent major requests. Go to Academic Advising Center, 55 Goldwin Smith Hall, for further information.	Sept. 28	Feb. 22
Last day for dropping courses without petition.	Oct. 15	March 10
Last day to petition to withdraw from a course.	Nov. 19	April 21
Second deadline for submitting independent major requests. Go to Academic Advising Center, 55 Goldwin Smith Hall, for further information.	Nov. 30	April 5
Deadline for requesting internal transfer to the College of Arts and Sciences for the following term.	Dec. 1	May 1
Deadline for applying to the College Scholar Program.		April 26
Deadline for applying to study abroad.	See Cornell Abroad, 474 Uris Hall	
Course enrollment (pre-registration) for the following term.	TBA	TBA

ADMINISTRATION

Philip E. Lewis, dean—255–4146

Biddy Martin, senior associate dean—255–4147

Lynne S. Abel, associate dean of admissions and undergraduate education—255–3386

Thak Chaloemtiarana, associate dean—255–7061

Jane V. Pedersen, associate dean of administration—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

P. S. Sangren, chair; T. Volman, director of undergraduate studies; R. Ascher, T. Bestor, J. Borneman, J. Fajans, D. Greenwood, J. Henderson, D. Holmberg, B. J. Isbell, A. T. Kirsch, B. Lambert, K. March, V. Munasinghe, N. Russell, V. Santiago-Irizarry, J. Siegel, M. Small, T. Turner. Emeritus: J. Murra, R. Smith.

Anthropology is one of the most diverse disciplines in the university. Spanning human evolution, the development and heterogeneity of language and culture, human history, and the diversity of cultures past and present, the field has broad scope, utilizes a variety of methods, addresses basic issues about human origins and human life, and maintains commitment to understanding social life and using this understanding to improve society. Anthropology is an ideal "liberal arts" major. It also serves as a major that, when well designed by the student with their adviser, prepares students for a wide range of professional careers, e.g., law, medicine, foreign service, social services, and business, among others.

Courses for non-majors: Anthropology welcomes non-majors into many of its courses. Unless prerequisites are explicitly stated, 200- and 300-level courses do not have formal prerequisites and can be taken by students without prior experience in anthropology. Such students are welcome in these upper-level courses. For additional information to assist non-majors and students from other colleges in selecting anthropology courses, see the Anthropology Department web page (http://falcon.arts.cornell.edu/~anthro/).

The Major

The range and complexity of the field of anthropology requires active collaboration between the student and a faculty adviser in developing an individualized program of study. To enter the anthropology major, a student must pass one course in each of the two broad introductory areas of anthropology: "Nature and Culture" and "Culture and History" listed below under the heading "Introductory Courses." Provisional acceptance into the major is possible before completing these courses, with permission from the Director of Undergraduate Studies in anthropology. When students first enter the major, they work with their adviser to develop a preliminary program of study built around their own interests and goals.

In the first semester of the junior year, the student and adviser formalize a concentration reflecting the special interests of the student and select a set of courses from those listed below as a program of study. Once the concentration is developed, they submit the plan to the Anthropology Curriculum Committee for comment and advice. Examples of possible concentrations are Latin American ethnohistory and contemporary identity politics, nature and culture in human history, prehistory of the Americas, anthropology and literature, anthropology and social change, ethnomusicology, anthropology and the arts, etc. The plan must include a minimum of eight courses in anthropology (including an Anthropology Senior Seminar) totaling 32 credit hours. When warranted, the adviser is free to approve up to two cognate courses from other departments totaling up to eight credit hours to fill this eight-course requirement. Students may revise their program of study in consultation with their adviser as they move through their studies. Our goal is to provide a close and supportive advising relationship and a strong and coherent structure for the student's major.

In their senior year, anthropology majors are required to take a Senior Seminar. These seminars meet weekly, are discussion-based, and are limited to anthropology majors. A professor serves as the coordinator for the group. Collaboratively, the students and the professor plan the semester to reflect the concentrations and/or research interests of the participating students. Thus, the Senior Seminar serves as a space where students develop their own synthesis of their undergraduate work in anthropology.

Study abroad and off-campus study programs: the Department of Anthropology encourages students to consider a semester of study abroad or off-campus study developed as an integral part of the student's major concentration and has designated Professor Viranjini Munasinghe as the Anthropology Study Abroad adviser.

The Cornell-Nepal Study Program: the Cornell-Nepal Study Program is a joint program of Cornell University and Tribhuvan University, the national university of Nepal. Qualified juniors, seniors, and first-or second-year graduate students work with faculty from both universities to prepare for and undertake field research projects in Nepal. Students receive 15 credits per semester; students may enroll for either fall or spring semester, or for the entire year; application is through Cornell Abroad. For further information, consult David Holmberg or Kathryn March in the Department of Anthropology.

Other antropologically-relevant study abroad options, using existing Cornell Abroad and off-campus options, can be worked out in consultation with the major adviser, the Anthropology Study Abroad adviser, and Cornell Abroad.

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 in their junior year. To qualify for entrance into the Honors Program, a student must have at least a 3.0 GPA overall and 3.3 GPA in the major, and the consent of a faculty member in anthropology who will guide the honors thesis. After applying to the program and being admitted as a candidate by the Honors Committee, the student will conduct research and write a 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. Honors candidates must start this process by consulting their major adviser about the honors program early in their junior year.

While working on the thesis during the senior year, students should make use of the Senior Seminar as a place to develop the ideas for their thesis. In addition, students may enroll in Anthropology 483 (fall or spring) "Honors Thesis Research." To complete the thesis, students must enroll in 491 (fall or spring) "Honors Thesis Write-up." Only Anthropology 483 may count toward hours for completion of the anthropology major requirements. The credit hours for these courses are variable, grades for these courses are given by the faculty research adviser, and they are based on performance during thesis research and writing.

Any honors candidate whose research directly involves working with human subjects must receive approval for the project from the Cornell University Committee on Human Subjects.

Special Programs and Facilities

Collections: the department has an extensive collection of archaeological and ethnological materials housed in the anthropology collections. A limited number of students can make arrangements to serve as interns in the anthropology collections. Olin Library houses some of the most extensive collections of materials on the ethnology of Southeast Asia, South Asia, East Asia, and Latin America to be found anywhere in the United States. The biological anthropology laboratory (McGraw B65) houses an extensive collection of materials for teaching purposes, including 1) human skeletal remains, 2) articulated skeletons and cranial casts of primates, and 3) casts of important fossils in the human lineage.

Independent Study: specialized individual study programs are offered in Anthropology 497, Topics in Anthropology, a course open to a limited number of juniors and seniors who have obtained consent and supervision of a faculty member. Undergraduates should note that many 600-level courses are open to them by consent of the instructor.

Colloquia: the Department of Anthropology holds colloquia almost every week of the semester on Friday at 3:30 in McGraw 215. Faculty members from Cornell and other universities participate in discussions of current research and problems in anthropology. Students are encouraged to attend.

For more complete information about the anthropology major, see the Director of Undergraduate Studies, pick up a copy of the major brochure (which includes descriptions of the courses not offered during 1999–2000), or visit the Anthropology Department web page (http://falcon.arts.cornell.edu/~anthro/).

I. Introductory Courses

A. Nature and Culture:

ANTHR 101 Introduction to Anthropology: Biological Perspectives on the Evolution of Humankind

Fall. 3 credits. M. Small.

The evolution of humankind is explored through the fossil record, studies of the biological differences among current human populations, and a comparison with our closest relatives, the primates. This course investigates the roots of human biology and behavior with an evolutionary framework. Fee for lab usage and maintenance, $5.

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 or prospective majors in anthropology. 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 203 Early People: The Archaeological and Fossil Record (also Archaeology 203) #
Spring. 3 credits. T. 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 that have enlivened the study of human evolution for more than a century. Critical evaluation of evidence and interpretation will be stressed. Demonstrations and films supplement the lectures.

ANTHR 211 Nature and Culture @
Spring. 4 credits. S. Sangren.
Sociocultural 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, the symbolic/biological, and the symbolic/moral worlds in which people live. This inquiry places anthropology squarely at the center of social theory, as most social theories and political ideologies are founded on premises regarding human nature. Through study of several conceptual categories which have been flashpoints for debates about nature and culture (e.g., gender, race, and sexuality), this course examines a variety of past and current attempts to explain the relationships between nature and culture in human life.

[ANTHR 275 Human Biology and Evolution (also Biological Sciences 275 and Nutritional Sciences 275)
Fall. 3 credits. Not offered 1999–2000.]

B. Culture and History:

ANTHR 100 Introduction to Archaeology (also Archaeology 100) #
Fall. 3 credits. J. Henderson.
A broad introduction to archaeology—the study of material remains to answer questions about the human past. Case studies highlight the variability of ancient societies and illustrate the varied methods and interpretive frameworks archaeologists use to reconstruct them. This course can serve as a platform for both Archaeology and Anthropology undergraduate majors.

ANTHR 102 Introduction to Anthropology: The Comparison of Cultures @
Spring. 3 credits. T. Bestor.
An introduction to cultural anthropology through ethnographies, or the descriptive accounts of anthropologists. Through readings and lectures, students acquaint themselves with a number of cultures from several parts of the world. The cultures range in form from those of small-scale tribal societies to those of state societies. Throughout the course, we attempt to make sense of exotic cultures in their own terms. Attention is focused on variation in cultural patterns as they are expressed in social, economic, and ritual practices. In this encounter, the principles of anthropology as a comparative enterprise that pose 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.
For course description, see section I.A.

ANTHR 200 Cultural Diversity and Contemporary Issues @
Fall. 3 credits. Staff.
This course will introduce students to the meaning and significance of forms of cultural diversity for understanding 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 critically examine 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.

[ANTHR 202 Interpretive Archaeology (also Archaeology 202) #
Fall. 3 credits. Not offered 1999–2000.]

[ANTHR 204 Ancient Civilizations (also Archaeology 204) @#
Fall. 3 credits. Not offered 1999–2000.]

ANTHR 215 Stone Age Art (also Archaeology 215) @ #
Fall. 3 credits. T. Volman.
When did "art," however defined, appear during the human career, how was it produced and for what purposes? These are some of the questions we will investigate through a survey of the discovery, validation, analysis, and interpretation of the earliest art. The course will cover a variety of finds from the Old World, including the well-known cave art of southwestern France and northern Spain, and also consider portable art and decoration. The contributions of new analytical techniques and interpretive approaches are highlighted.

[ANTHR 240 Old World Prehistory (also Archaeology 240) @ #
Fall. 3 credits. Not offered 1999–2000.]

II. Honors and Independent Study

ANTHR 483 Honors Thesis Research
Fall or 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 491 Honors Thesis Write-up
Fall or spring. Credit and hours to be arranged. Staff.

ANTHR 497 Topics in Anthropology
Fall or 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. Anthropology Major Senior Seminars

In the senior year, anthropology majors are required to take a Senior Seminar. These seminars meet weekly, are discussion-based, and are limited to anthropology majors. A professor serves as the coordinator for the group. Collaboratively, the students and the professor plan the semester to reflect the concentrations and/or research interests of the participating students. Thus the Senior Seminar serves as a space where students develop their own synthesis of their undergraduate work in anthropology.

ANTHR 489 Anthropology Senior Seminar
Fall or spring. 4 credits. Limited to 15 students. Prerequisite: anthropology majors only. Fall, V. Munasinghe; spring, D. Greenwood.
This course is a synthesis of each student's undergraduate concentration in the major. In collaboration, the instructor and the students will develop a series of topics representing the interests of the students. Students will be required to read extensively and present topics.

IV. Nature and Culture

Thinking about nature and culture and their interaction is central to contemporary anthropology. The courses in this section present a biological and evolutionary perspective on behavior, focus on the interplay between nature and culture, and discuss the controversies surrounding these relationships between these dimensions of human life.

[ANTHR 208 The Evolution of Human Mating
Spring. 4 credits. Not offered 1999–2000.]

ANTHR 211 Nature and Culture @
Spring. 4 credits. S. Sangren.
For course description, see section I.A.

[ANTHR 344 Male and Female in Chinese Culture and Society (also Women's Studies 344) @
Fall. 4 credits. Not offered 1999–2000.]

[ANTHR 370 Environmental Archaeology (also Anthropology 670 and Archaeology 370/670)
Fall. 4 credits. Not offered 1999–2000.]

ANTHR 371 Human Paleontology (also Biological Sciences 371) @ #
Fall. 4 credits. One year of introductory biology or Anthropology 101 or permission of instructor. Offered alternate years. K. Kennedy.
A broad survey of the fossil evidence for human evolution with special attention to

skeletal and dental anatomy, geological contexts, paleoecology, dating methods, archaeological associations, and current theories of human origins and physical diversity.

ANTHR 372 Hunters and Gatherers (also Anthropology 672) #
Spring. 4 credits. T. Volman.
A survey of contemporary and recent peoples with economies based completely or mainly on hunting and gathering. Selected societies from various parts of the world will be examined to compare aspects of technology, subsistence practices, organization and beliefs. The impact of contact with more economically advanced societies will be considered.

[ANTHR 390 Primate Behavior and Ecology
Spring. 4 credits. Not offered 1999–2000.]

ANTHR 409 Approaches to Archaeology (also Anthropology 609 and Archaeology 409/609)
Fall. 4 credits. N. Russell.
An exploration of the concepts that have shaped modern archaeology. The course briefly examines the history of theoretical orientations in archaeology, then considers the variety of perspectives and interpretive frameworks that guide present-day investigations. Case studies illustrate the implications of the nature of the archaeological record for reconstructing subsistence and economic systems, trade, social and political organization, demography, and ideology. An undergraduate seminar especially recommended for undergraduate majors and graduate archaeologists but open to anyone with a serious interest in archaeology.

[ANTHR 475 Evolutionary Theory and Human Behavior (also Anthropology 675)
Spring. 4 credits. Not offered 1999–2000.]

[ANTHR 490 Primates and Evolution
Spring. 4 credits. Not offered 1999–2000.]

V. Human History and Archeology

Archaeology 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, while also teaching field and laboratory methods for uncovering the human past.

ANTHR 203 Early People: The Archaeological and Fossil Record (also Archaeology 203) #
Spring. 3 credits. T. Volman.
For course description, see section I.A.

ANTHR 215 Stone Age Art (also Archaeology 215) @ #
Fall. 3 credits. T. Volman.
For course description, see section I.B.

[ANTHR 240 Old World Prehistory (also Archaeology 240) @ #
Fall. 3 credits. Not offered 1999–2000.]

[ANTHR 317 Stone Age Archaeology (also Archaeology 317)
Fall. 4 credits. Not offered 1999–2000.]

[ANTHR 355 Ancient Mexico and Central America (also Archaeology 355) @#
Spring. 4 credits. Not offered 1999–2000.]

[ANTHR 370 Environmental Archaeology (also Anthropology 670 and Archaeology 370/670)
Fall. 4 credits. Not offered 1999–2000.]

ANTHR 371 Human Paleontology (also Biological Sciences 371) #
Fall. 4 credits. One year of introductory biology or Anthropology 101 or permission of instructor. Offered alternate years. K. Kennedy.
For course description, see section IV.

ANTHR 372 Hunters and Gatherers (also Anthropology 672) #
Spring. 4 credits. T. Volman.
For course description, see section IV.

[ANTHR 405 Archaeological Research Design (also Anthropology 605 and Archaeology 405/605)
Spring. 4 credits. Not offered 1999–2000.]

ANTHR 409 Approaches to Archaeology (also Anthropology 609 and Archaeology 409/609)
Fall. 4 credits. N. Russell.
For course description, see section IV.

[ANTHR 456 Mesoamerican Religion, Science, and History @ #
Fall. 4 credits. Not offered 1999–2000.]

[ANTHR 458 Archaeological Analysis (also Anthropology 658 and Archaeology 458/658) @
Spring. 4 credits. Not offered 1999–2000.]

ANTHR 463 Zooarchaeological Method (also Archaeology 463) #
Fall. 5 credits. Limited enrollment due to limited lab space. N. Russell.
This is a hands-on laboratory course in zooarchaeological method: the study of animal bones from archaeological sites. It is designed to provide students with a basic grounding in identification of body part and taxon, aging and sexing, pathologies, taphonomy, and human modification. We will deal only with mammals larger than squirrels. While we will work on animal bones from prehistoric Europe, most of these skills are easily transferable to the fauna of other areas, especially North America. This is an intensive course that emphasizes laboratory skills in a realistic setting. You will analyze an assemblage of actual archaeological bones. It is highly recommended that students also take the course in Zooarchaeological Interpretation (Anthr/Arkeo 464) offered in the spring of 2000.

ANTHR 464 Zooarchaeological Interpretation (also Archaeology 464) #
Spring. 4 credits. N. Russell.
This course follows from last semester's Zooarchaeological Method. We shift our emphasis here from basic skills to interpretation, although you will continue to work with archaeological bones. We will begin by examining topics surrounding the basic interpretation of raw faunal data: sampling, quantification, taphonomy, seasonality. We will then explore how to use faunal data to reconstruct subsistence patterns, social structure, and human/animal relations.

[ANTHR 466 Humans and Animals (also Anthropology 666 and Archaeology 466/666) #
Fall. 4 credits. Not offered 1999–2000.]

[ANTHR 467 Origins of Agriculture (also Archaeology 467) #
Spring. 4 credits. Not offered 1999–2000.]

[ANTHR 469 Gender and Age in Archaeology (also Anthropology 669 and Archaeology 469/669) #
Spring. 4 credits. Not offered 1999–2000.]

[ANTHR 493 Seminar in Archaeology (also Archaeology 493) @ #
Fall. 4 credits. Not offered 1999–2000.]

ANTHR 494 Seminar in Archaeology: The Archaeology of Human Origins (also Archaeology 494) @ #
Fall. 4 credits. N. Russell.
An exploration of the archaeological record associated with early modern and near-modern humans as well as their non-modern contemporaries, such as the Neanderthals. Major issues include: what behaviors and capabilities are indicated for various populations, and how and why did these change over the course of the later Pleistocene? To what extent does the archaeological record support the "Out-of-Africa" hypothesis of a recent, African origin for all modern humans?

VI. Anthropological Thought and Method

As a form of inquiry, anthropology has a long and complex history and utilizes a wide variety of theories and methods. In this section, topics in the history of anthropological thought and a wide variety of anthropological approaches are presented, along with courses focused on the design of anthropological research projects.

ANTHR 215 Stone Age Art (also Archaeology 215) @ #
Fall. 3 credits. T. Volman.
For course description, see section I.B.

ANTHR 291 Filming Other Cultures (also Anthropology 691 and Theatre Arts 291/691) @
Spring. 3 credits. Limited to 20 students. Preference given to students who have taken either Anthropology 102 or Theatre Arts 474. 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? In this discussion course, responses to this question are examined through the study of short, representative films and related readings. The discussions are framed and informed by ideas from anthropology and film studies. For example, we consider: aesthetics, ethics, and responsibility in filming and editing; connections between sound—or lack of it—and image; the implications of film as a product of Euroamerican culture; cultural assumptions in camera movements, film color, and film pace; indigenous people's presentations of themselves and Euroamerican representations of others; and the blurry, ever changing space that separates fiction from non-fiction film. For one meeting each week, two students, in cooperation with the instructor, are responsible for leading the discussion.

[ANTHR 306 Ethnographic Description
Fall. 4 credits. Not offered 1999–2000.]

[ANTHR 324 Anthropology Amongst the Disciplines
Fall. 4 credits. Not offered 1999–2000.]

ANTHR 362 Democratizing Society: Participation, Action, and Research (also Anthropology 662)
Fall. 4 credits. D. J. Greenwood.
This course poses an alternative to distanced, "objectivist" social science by reviewing some of the numerous approaches to socially engaged research. Among the approaches discussed are those centering on the pedagogy of liberation, feminism, the industrial democracy movement, "Southern" participatory action research, action science, and participatory evaluation. There are no prerequisites and undergraduates are welcome.

[ANTHR 368 Marx: An Overview of His Thought (also Anthropology 668)
Spring. 4 credits. Not offered 1999–2000.]

ANTHR 372 Hunters and Gatherers (also Anthropology 672) #
Spring. 4 credits. T. Volman.
For course description, see section IV.

[ANTHR 400 The Craft of Anthropology: Ethnographic Field Methods
Fall. 4 credits. Not offered 1999–2000.]

[ANTHR 405 Archaeology Research Design (also Anthropology 605 and Archaeology 405/605)
Spring. 4 credits. Not offered 1999–2000.]

[ANTHR 412 Contemporary Anthropological Theory @
Spring. 4 credits. Not offered 1999–2000.]

ANTHR 420 Development of Anthropological Thought
Spring. 4 credits. B. Lambert.
An examination of the history and development of anthropological theory and practice. The course will focus on the differences and continuities among the various national and historical approaches that have come to be regarded as the schools of anthropology.

[ANTHR 453 Visual Anthropology
Spring. 4 credits. Not offered 1999–2000.]

[ANTHR 458 Archaeological Analysis (also Anthropology 658 and Archaeology 458/658) @
Spring. 4 credits. Not offered 1999–2000.]

ANTHR 463 Zooarchaeological Method (also Archaeology 463) #
Fall. 5 credits. Limited enrollment due to limited lab space. N. Russell.
For course description, see section V.

ANTHR 464 Zooarchaeological Interpretation (also Archaeology 464) #
Spring. 4 credits. N. Russell.
For course description, see section V.

[ANTHR 466 Humans and Animals (also Anthropology 666 and Archaeology 466/666) #
Fall. 4 credits. Not offered 1999–2000.]

[ANTHR 467 Origins of Agriculture (also Archaeology 467) #
Spring. 4 credits. Not offered 1999–2000.]

[ANTHR 474 Laboratory and Field Methods in Human Biology (also Biological Sciences 474)
Spring. 5 credits. Not offered 1999–2000.]

ANTHR 487 Field Research Abroad @
Fall or spring. Credit to be arranged. Intended for undergraduate students only. Staff.
Field research abroad as part of the Cornell-Nepal Studies Program, the Cornell-Honduras Program, or other departmentally-approved programs. Topics are selected and project proposals prepared by students in consultation with faculty. Fieldwork typically involves extended research (usually 4–6 weeks) in a foreign setting with faculty supervision, culminating in a major paper or report.

ANTHR 494 Seminar in Archaeology: The Archaeology of Human Origins (also Archaeology 494) @#
Fall. 4 credits. T. Volman.
For course description, see section V.

[ANTHR 495 Classic Theorists Seminar
Spring. 4 credits. Not offered 1999–2000.]

VII. Understanding Cultures

Anthropologists examine the diversity of human behaviors, social relationships and structures, economies, political and legal orders, worldviews, logics, languages, symbols, myths, and religions among the many other means human beings invent to create and reproduce social life around the world. Anthropologists work from a holistic perspective to account for differences and similarities across cultures. Anthropologists also take small-scale societies and local sociocultural systems as the object of analysis. They collect data primarily through ethnographic fieldwork, that is, months or years of participating in and observing of the societies they study. Anthropologists see inherent linkages between the practical and the meaningful dimensions of human existence.

A. Anthropological Approaches to Economy, Society, Law, and Politics:

The courses below take as their starting point what are usually defined as the social, political, legal, and economic practices and structures of human life and show how they are shaped culturally and how they shape culture.

ANTHR 217 Nationalism and Revivalism
Fall. 4 credits. A. Willford

[ANTHR 305 Emotion, Gender, and Culture (also Women's Studies 305) @
Spring. 4 credits. Not offered 1999–2000.]

[ANTHR 313 Anthropology of the City @
Spring. 4 credits. Not offered 1999–2000.]

ANTHR 321 Sex and Gender in Cross-Cultural Perspective (also Anthropology 621 and Women's Studies 321/631) @
Fall. 4 credits. K. March.
An introduction to the study of sex roles cross-culturally and to anthropological theories of sex and gender. The course examines various aspects of the place of the sexes in social, political, economic, ideological, and biological systems to emphasize the diversity in gender and sex-role definition around the world.

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 to its fate in utopian communities.

[ANTHR 326 Economic Anthropology @
Fall. 4 credits. Not offered 1999–2000.]

ANTHR 328 Conflict, Dispute Resolution, and Law in Cultural Context @
Fall. 4 credits. V. Santiago-Irizarry.
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 refigured by these interpretive frames.

[ANTHR 380 State, Nation, and Everyday Life
Spring. 4 credits. Not offered 1999–2000.]

[ANTHR 426 Ideology and Social Reproduction @
Spring. 4 credits. Not offered 1999–2000.]

[ANTHR 460 Culture and International Order
Fall. 4 credits. Not offered 1999–2000.]

[ANTHR 470 Anthropology, Theory, Politics, Performance (also Government 470)
Fall. 4 credits. Not offered 1999–2000.]

[ANTHR 479 Ethnicity and Identity Politics: An Anthropological Perspective
Fall. 4 credits. Not offered 1999–2000.]

[ANTHR 481 Sex, Money, and Power: Topics in Kinship Theory
Fall. 4 credits. Not offered 1999–2000.]

[ANTHR 485 Mothers, Priests, Rebels, and Indian Chiefs: New Social Movements in Latin America (also Anthropology 685) @
Spring. 4 credits. Not offered 1999–2000.]

B. Interpretive Approaches in Cultural Anthropology:

These courses stress symbolic or textual approaches to human society. They take as their object of analysis structures of meaning in such diverse areas as performance and text, myth and religion, views of the self, gender, and the sociology of knowledge. These same topics arise in many of the area-focused courses as well (Section D), but take center stage in the following courses.

ANTHR 291 Filming Other Cultures (also Anthropology 691 and Theatre Arts 291/691) @
Spring. 3 credits. Limited to twenty students. Preference given to students who have taken either Anthropology 102 or Theatre Arts 474. Fee for film screening and maintenance, $35. R. Ascher.
For description, see section VI.

ANTHR 320 Myth, Ritual, and Symbol (also Religious Studies 320) @
Spring. 4 credits. D. Holmberg.
This course examines how systems of thought, symbolic forms, and ritual practice are formulated and expressed in primarily non-Western societies. It focuses on anthropological interpretations of space, time, cosmology, myth, classificatory systems (such as color, totems, food, dress, kinship), taboo, sacrifice, witchcraft, sorcery, and rites of passage (birth, initiation, marriage, death). It will examine both the roles of specialists (spirit mediums, curer, priests, ascetics, etc.) and nonspecialists in producing these cultural forms.

ANTHR 322 Magic, Myth, Science, and Religion (also Religious Studies 322) @
Fall. 3 credits (4 by arrangement with instructor). Staff.
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 379 Culture, Language, and Thought
Spring. 4 credits. V. Santiago-Irizarry.
The relationship among culture, language, and thought has been a core concern in anthropology. Language and culture are commonly defined as processes that are public and shared yet they also operate within and upon subliminal experiential realms. In this course we shall examine how anthropologists have explored this relationship, which is engendered in the interaction between culture and language as parallel mediating devices for the constitution, interpretation, and expression of human experience.

[ANTHR 406 The Culture of Lives (also Women's Studies 406) @
Spring. 4 credits. Not offered 1999–2000.]

[ANTHR 408 Gender Symbolism (also Women's Studies 408) @
Spring. 4 credits. Not offered 1999–2000.]

[ANTHR 417 Person, Gender, and Song (also Women's Studies 416) @
Spring. 4 credits. Not offered 1999–2000.]

[ANTHR 432 Culture and Performance, and Performing Culture @
Spring. 4 credits. Not offered 1999–2000.]

[ANTHR 453 Visual Anthropology
Spring. 4 credits. Not offered 1999–2000.]

[ANTHR 456 Mesoamerican Religion, Science and History @ #
Fall. 4 credits. Not offered 1999–2000.]

[ANTHR 460 Culture and International Order
Fall. 4 credits. Not offered 1999–2000.]

[ANTHR 469 Gender and Age in Archaeology #
Spring. 4 credits. Not offered 1999–2000.]

C. Cultures in Anthropological Perspective:

Anthropology constructs its theories in the comparison of different social and cultural systems and thus depends integrally on knowledge about particular places. The courses below are all focused on the cultures and societies of particular areas of the world and organize knowledge about these areas in reference to key anthropological questions. Students without prior experience in anthropology are welcome in these courses.

[ANTHR 221 Anthropological Representation: Ethnographies on Latino Culture (also Latino Studies Program 221 and American Studies 221)
Fall. 3 credits. Not offered 1999–2000.]

ANTHR 224 The French Experience (also French Literature 224)
Fall. 3 credits. J. Siegel, A. Berger.
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.

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 have occurred during the period of European-Indian contact.

ANTHR 280 Intercultural Ethnoscapes: Spain and America (also Latino Studies 280)
Fall. 3 credits. M. Buxo i Rey.
This course is based on combined research in Spain, the U.S. Southwest, and Latin America and takes advantage of combined work in cultural anthropology, ethnic and gender studies, and the long-term study of information systems. It is intended as an introductory course and does not assume background in anthropology. Readings will be in English.

ANTHR 303 Asians in the Americas: A Comparative Perspective (also Asian American Studies 303) @
Fall. 4 credits. V. Munasinghe.
The common perception of ethnicity is that it is a "natural" and an inevitable consequence of cultural difference. "Asians" overseas, in particular, have won repute 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.

[ANTHR 316 Power, Society, and Culture in Island Southeast Asia @
Fall. 4 credits. Not offered 1999–2000.]

ANTHR 333 Ethnology of the Andean Region @ #
Spring. 4 credits. B. J. Isbell.
Cultural continuities in the development of Andean societies. The ecological, archaeological, ethnohistorical, and contemporary ethnological record. The Andean heritage as a resource for "modernization."

ANTHR 335 Subsistence, Polity, and Worldview in Mainland Southeast Asia @
Spring. 4 credits. Limited to 12 students. Prior course work in Anthropology or Asian Studies encouraged but not required. Staff.
A survey of the peoples and cultures of Mainland Southeast Asia from prehistoric to contemporary times. The course examines the social-cultural implications of the subsistence forms found in the region: foraging, swidden horticulture, irrigated rice cultivation, capitalist developments, and current trends toward a globalized economic order. We examine how these subsistence forms relate to sustainable population size, societal complexity, and forms of governance ranging through "band" societies, "galactic polities" and contemporary "nation-states." The grounding of these forms of subsistence, governance, and social organizations in indigenous and supra-national religious values and worldviews is of special concern in the course.

[ANTHR 336 Change and Continuity in the Pacific Islands @
Fall. 4 credits. Not offered 1999–2000.]

[ANTHR 337 Gender, Identity, and Exchange in Melanesia
Fall. 4 credits. Not offered 1999–2000.]

ANTHR 339 Peoples and Cultures of the Himalayas @
Spring. 4 credits. K. 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 1999–2000.]

[ANTHR 344 Male and Female in Chinese Culture and Society (also Women's Studies 344) @
Fall. 4 credits. Not offered 1999–2000.]

ANTHR 345 Japanese Society @
Fall. 4 credits. T. Bestor.
A survey of the patterns of social structure and cultural identity in contemporary Japan, including ethnographic perspectives on: family; community; individual lifecourse (including gender, education, career, and aging); workplace, markets and economic organization; and public culture.

[ANTHR 350 Topics in the Anthropology of Europe
Spring. 4 credits. Not offered 1999–2000.]

[ANTHR 355 Ancient Mexico and Central America (also Archaeology 355) @ #
Spring. 4 credits. Not offered 1999–2000.]

ANTHR 377 The United States (also Latino Studies Program 377 and American Studies 377)
Fall. 4 credits. V. Santiago-Irizarry.
The anthropological inquiry into one's own culture is never a neutral exercise. This course will explore issues in the cultural construction of the United States as a "pluralistic" society. We will look at the ideological context for the production of a cultural profile predicted upon ideas that are intrinsic to American images of identity such as individualism, freedom, and equality and the way these are applied in practice. The course readings will include historic documents and accounts, popular writing, and recent ethnographies on the United States.

[ANTHR 433 Andean Thought and Culture @ #
Spring. 4 credits. Not offered 1999–2000.]

[ANTHR 443 Religion and Ritual in Chinese Society (also Religious Studies 443) @
Fall. 4 credits. Not offered 1999–2000.]

[ANTHR 444 Japanese Social Organization @
Spring. 4 credits. Not offered 1999–2000.]

[ANTHR 456 Mesoamerican Religion, Science, and History @ #
Fall. 4 credits. Not offered 1999–2000.]

[ANTHR 477 Ethnology of Island Southeast Asia @
Fall. 4 credits. Not offered 1999–2000.]

[ANTHR 493 Seminar in Archaeology (also Archaeology 493) @ #
Fall. 4 credits. Not offered 1999–2000.]

Relevant courses in other departments

ASIAN 601 Seminar: Indonesia
Fall. 4 credits. J. Siegel.

BIOPL 247 Ethnobiology
Fall. 3 credits. D. Bates.

BIOPL 348 The Healing Forest
Spring 2000. 2 credits. D. Bates, E. Rodriquez.

[BIOPL 442 Current Topics in Ethnobiology
Fall. 2 or 4 credits. Not offered 1999–2000. D. Bates, E. Rodriquez.]

GOVT 444 Afrocentism
Spring. 4 credits. M. Bernal.

GOVT 454 The Herodotean Moment: The Uses and Abuses of 'Western Civilization' (also History 454)
Spring. 4 credits. M. Bernal.

MUSIC 101 Popular Music in America, 1850–1985
Fall. 3 credits. M. Hatch.

MUSIC 103 Introduction to the Musics of the World
Spring. 3 credits. M. Hatch.

MUSIC 245 Gamelan in Indonesian History and Cultures
Fall or spring. 3 credits. M. Hatch.

MUSIC 445–446 Cornell Gamelan Ensemble
445 fall; 446 spring. 1 credit. Prerequisite: permission of instructor. M. Hatch.

NS/HD 347 Human Growth and Development: Biological and Behavioral Perspectives
Spring. 3 credits. J. Haas, S. Robertson.

VIII. Graduate Seminars

The graduate program in anthropology is described in much greater detail in the Graduate Program brochure which is available through the Director of Graduate Studies. This document is also found on the Anthropology Department web page (http://falcon.arts.cornell.edu/~anthro/). The seminars described immediately below pertain to the program in socio-cultural anthropology. For information about graduate study in archaeology and biological anthropology, see the Anthropology Department web page.

A core set of seminars is required of all graduate students in socio-cultural anthropology: Anthropology 600, 601, and 602. Anthropology 603 is strongly recommended. These courses are open to graduate students from other related fields. This sequence, and the graduate curriculum in general, is premised on the idea that anthropology is best defined as the comparative study of human social life. This definition resists institutional pressures in the academy to distinguish social science from humanistic or cultural studies and scholarly from more worldly applications. Our most important method, ethnography, is at once scientific and humanistic; disciplinary aspirations refuse to view cultural interpretation and analytic explanation as separable values. Furthermore, theory in anthropology is directly related to practice in the world whether in relation to research or more action-oriented pursuits. Consequently, the core sequences as well as most other courses for graduate students are oriented explicitly toward subverting an ideological construction of social life as separable into cultural and social (or political-economic) domains.

ANTHR 600 Proseminar: Culture and Symbol
Spring. 6 credits. D. Holmberg.
This course focuses on an appreciation of symbolic, expressive, and representational forms and processes both as producers and products of social activities. Through the study of symbolic anthropology, structuralism, exchange, myth and ritual, religion, gender, personhood, linguistics, semiology, etc., we will investigate how identity and meaning are linked to the practical exigencies of social life. While emphasizing aspects of the discipline generally associated with cultural anthropology, the course will endeavor to set the stage for a dialectical understanding of social, political, economic, and symbolic activities as interrelated phenomena. The works of de Saussure, Levi-Strauss, Dumont, Geertz, Victor Turner, Sahlins, among others, as well as contemporary theories are given careful attention.

ANTHR 601 Proseminar: Social Organization
Fall. 6 credits. S. Sangren.
This course focuses on linkages between culture and social institutions, representations and practices. The nature of these linkages is debated from strongly contesting points of view in social theory (structuralist, poststructuralist, utilitarian, hermeneutic, Marxist). Unlike debates in critical theory where the form of contestation has been mainly philosophical, in anthropology, these issues have developed in ethnographic analyses. The course briefly surveys kinship theory and economic anthropology with a focus on implications for general issues in social theory. Discussion of attempts to develop dialectical syntheses around the motion of "practice" follows. The issues addressed in this section carry over into the next, colonialism and post-colonialism, in which poststructuralist readings of history are counterposed to Marxism ones. Finally, Lacanian and Marxist visions of ideology as they relate to anthropological theory and ethnographic analysis are examined with particular emphasis on the cultural and social production of persons.

ANTHR 602 The Practices of Anthropology
Fall. 4 credits. D. Greenwood.
The course builds on the foundation of the proseminars but broadens the concept of anthropological practices to include issues about the relations between theory and method, practice/theory relationships, the ethnography of anthropological practices themselves, the examination and critique of the concept of "participant observation," and a consideration of "ethical practices" in anthropology. The centerpiece of the seminar is the connection between the students' own intellectual and existential commitments and their anthropological "practices" and between these and their own emerging research projects.

[ANTHR 603 Research Design
Spring. 4 credits. Not offered 1999–2000.]

[ANTHR 604 Praxis and Culture
Spring. 4 credits. Not offered 1999–2000.]

[ANTHR 605 Archaeological Research Design (also Anthropology 405 and Archaeology 405/605)
Spring. 4 credits. Not offered 1999–2000.]

ANTHR 607 Special Problems in Anthropology
Fall or spring. Credit and hours to be arranged. Intended for graduate 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.

ANTHR 609 Approaches to Archaeology (also Anthropology 409 and Archaeology 409/609)
Fall. 4 credits. N. Russell.
For course description, see section IV.

[ANTHR 610 Language and Myth
Fall. 4 credits. Not offered 1999–2000.]

[ANTHR 614 Reading in the Ethnographic Tradition (1880–1960)
Fall. 4 credits. Not offered 1999–2000.]

[ANTHR 615 Reading Contemporary Ethnographies (1960–1990)
Fall. 4 credits. Not offered 1999–2000.]

[ANTHR 616 Cultural Production of the Person
Spring. 4 credits. Not offered 1999–2000.]

ANTHR 619 Anthropological Approaches to the Study of Buddhisms in Asia
Spring. 4 credits. Staff.
This seminar will examine the various conceptual and analytical strategies employed by social scientists in the study of Buddhism especially in South and Southeast Asia. Problems of religious complexity, the social correlates of Buddhism, and the role of Buddhism in social change will be explored.

ANTHR 621 Sex and Gender in Cross-Cultural Perspective (also Anthropology 321 and Women's Studies 321/631)
Fall. 4 credits. Time to be arranged. Graduate section of Anthr 321. K. March.
For course description, see Anthr 321, section VII.A.

[ANTHR 629 Chinese Ethnology
Spring. 4 credits. Not offered 1999–2000.]

[ANTHR 632 Andean Symbolism
Spring. 4 credits. Not offered 1999–2000.]

ANTHR 635 Southeast Asia: Readings in Special Problems
Fall or spring. Credit and hours to be arranged. Staff.
Independent reading course on 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.

[ANTHR 636 Cognition and Classification
Fall. 4 credits. Not offered 1999–2000.]

[ANTHR 637 Theorizing Social Movements, Human Rights and Democracy in Latin America
Spring. 4 credits. Not offered 1999–2000.]

[ANTHR 639 The Feminine Symbolic
Spring. 4 credits. Not offered 1999–2000.]

ANTHR 641 South Asia: Readings in Special Problems
Fall or spring. Credit and hours to be arranged. Staff.
Independent reading course in topics not covered in regularly scheduled courses. Students select a topic in consultation with the faculty member who has agreed to supervise the course work.

[ANTHR 645 Japanese Ethnology
Fall. 4 credits. Not offered 1999–2000.]

[ANTHR 647 Death of the Father
Spring. 4 credits. Not offered 1999–2000.]

[ANTHR 648 Marriage and Death
Fall. 4 credits. Not offered 1999–2000.]

[ANTHR 649 Narrative and the Analysis of Culture
Spring. 4 credits. Not offered 1999–2000.]

ANTHR 653 Myth Onto Film (also Theatre Arts 653)
Spring. 4 credits. Enrollment limited by available studio space and equipment. Some knowledge of one of the following: anthropology, filmmaking, mythology, graphics, drawing, or painting is required. Open to undergraduates and graduate students with permission of instructor. Fee for film screening and maintenance, $50. R. Ascher.
In myths, whales fly, pebbles throw themselves across streams, and trees are transformed into women. Toward the end of visualizing myths—in particular the myths of other people—we explore the possibilities of animated film. The technique used is cameraless animation; that is, we draw and paint, frame by frame, directly onto movie film. The intellectual problem is to visualize the myths of others so that they are comprehensible to us but are not thought to be of us. Reading includes introductory works on both myth and animation and there is background reading on the particular myth that is committed to film.

ANTHR 655 East Asia: Readings in Special Problems
Fall or spring. Credit and hours to be arranged. Staff.
Independent reading course in topics not covered in regularly scheduled courses. Students select a topic in consultation with the faculty member who has agreed to supervise the course work.

[ANTHR 656 Maya History
Fall. 4 credits. Not offered 1999–2000.]

[ANTHR 658 Archaeological Analysis (also Anthropology 458 and Archaeology 458/658)
Spring. 4 credits. Not offered 1999–2000.]

ANTHR 660 Language, Ideologies and Practices (also Latino Studies Program 660)
Spring. 4 credits. V. Santiago-Irizarry.
Cultural identity and citizenship in the United States have often been organized around linguistic difference and the issues this raises in an English-dominant society. Drawing from anthropological theories on language, this course will look at the place of language as a signifying practice in the U.S. by focusing on the experience of Latino communities. Topics to be explored include linguistic diversity and change, accommodation and resistance, language maintenance and shift, linguistic ideologies, the production of language hierarchies, and institutional applications of language.

ANTHR 662 Democratizing Society: Participation, Action, and Research (also Anthropology 362)
Fall. 4 credits. D. J. Greenwood.
For description, see ANTHR 362, Section VI.

ANTHR 663 Action Research
Spring. 4 credits. D. Greenwood.
This seminar is a practicum in action research (AR) in which the semester becomes a self-managing learning environment for the exploration of the techniques and group processes involved in AR, including co-generative learning, searching, and AR facilitation. Participation in a seminar-centered LISTSERV on the Internet is expected.

[ANTHR 665 Topics in Native American Societies and Cultures
Spring. 4 credits. Not offered 1999–2000.]

[ANTHR 666 Humans and Animals (also Anthropology 466 and Archaeology 466/666) #
Fall. 4 credits. Not offered 1999–2000.]

[ANTHR 669 Gender and Age in Archaeology (also Anthropology 469 and Archaeology 469/669) #
Spring. 4 credits. Not offered 1999–2000.]

[ANTHR 670 Environmental Archaeology (also Anthropology 370 and Archaeology 370/670)
Fall. 4 credits. Not offered 1999–2000.]

ANTHR 672 Hunters and Gatherers (also Anthropology 372) #
Spring. 4 credits. T. Volman.
For course description, see section IV.

[ANTHR 673 Human Evolution: Concepts, History and Theory (also Biological Sciences 673)
Fall. 4 credits. Not offered 1999–2000.]

[ANTHR 675 Evolutionary Theory and Human Behavior (also Anthropology 475)
Spring. 4 credits. Not offered 1999–2000.]

[ANTHR 680 Theory and Ethnography in the Anthropology of Southeast Asia
Fall. 4 credits. Not offered 1999–2000.]

[ANTHR 682 Perspectives on the Nation (also Asian American Studies 682)
Spring. 4 credits. Not offered 1999–2000.]

[ANTHR 685 Mothers, Priests, Rebels, and Indian Chiefs: New Social Movements in Latin America
Spring. 4 credits. Not offered 1999–2000.]

[ANTHR 690 Ritual and Myth: Structure, Process, Practice
Spring. 4 credits. Not offered 1999–2000.]

ANTHR 691 Filming Other Cultures (also Anthropology 291 and Theatre Arts 291/691)
Spring. 4 credits. Fee for film screening and maintenance, $35.
For description, see Anthropology 291 and Theatre, Film and Dance 291. Graduate students who register in this course attend the meetings of 291. In addition, they write in-depth studies of one or more films in consultation with the instructor.

ARABIC AND ARAMAIC

See under Department of Near Eastern Studies.

ARCHAEOLOGY

See under Special Programs and Interdisciplinary Studies.

ASIAN AMERICAN STUDIES

See under Special Programs and Interdisciplinary Studies.

ASIAN STUDIES

E. M. Gunn, chair (388 Rockefeller Hall, 255–5095); B. R. Anderson, W. Bailey, R. Barker, S. Bedi, M. G. Bernal, T. Bestor, D. Boucher, K. Brazell, R. Bullock, T. Chaloemtiarana, A. Chi, S. Cochran, A. Cohn, R. D. Colle, E. W. Coward, Jr., B. de Bary, H. Diffloth, C. d'Orban, E. C. Erickson, S. Feldman, G. Fields, J. W. Gair, D. Gold, M. Hatch, R. Herring, D. Holmberg, N. Jagacinski, Y. Katagiri, M. Katzenstein, Y. Kawasaki, K. A. R. Kennedy, A. T. Kirsch, J. V. Koschmann, F. Kotas, J. M. Law, L. C. Lee, T. Lyons, B. G. MacDougall, K. March, K. McGowan, F. Mehta, T. L. Mei, C. Minkowski, S. Mohanty, N. Nakada, Y. Nakamishi, V. Nee, S. J. O'Connor, S. Oja, A. Pan, C. A. Peterson, J. R. Piggott, T. Poleman, A. Riedy, N. Sakai, P. S. Sangren, K. Selden, Y. Shirai, V. Shue, J. T. Siegel, R. J. Smith, R. Suckle, D. Sudan, H. Tao, K. Taylor, Q. Teng, S. Tian, T. Tranviet, S. Tun, N. Uphoff, J. Whitman, L. Williams, J. U. Wolff, D. Wyatt, M. W. Young

The Department of Asian Studies encompasses the geographical areas of East Asia, South Asia, and Southeast Asia and offers courses in most of the disciplines of the social sciences and the humanities. Asian studies courses through the 400 level (ASIAN is the prefix) are taught in English and are open to all students in the university. Some of these courses may be counted toward majors in other departments; others fulfill the humanities distribution requirement. Courses listed under Asian Studies offered through other departments may fulfill distribution requirements in history, social sciences, and arts.

The Major

A student majoring in Asian studies normally specializes in the language and culture of one country and often chooses an additional major in a traditional discipline.

Majors complete two courses at the 200 level (a minimum of 6 credits with a grade of C or better) in one of the Asian languages offered at Cornell. The major consists of at least 30 additional credits (which may include up to 6 credits of further language study) selected by the student in consultation with his or her adviser from among the courses listed under the Department of Asian Studies and numbered 250 and above.

The applicant for admission to the major in Asian studies must have completed at least one area studies course selected from among those listed under the Department of Asian Studies and must receive permission for admission to the major from the director of undergraduate studies. The student must have received a minimum grade of C in this course and in all other courses counted toward the major.

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, Japan and Southeast Asia must also complete Asian Studies 611, 612 or 613 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.

Concentration in South Asia Studies

A candidate for the Bachelor of Arts or Science degree at Cornell may take a concentration in South Asian Studies by completing at least 18 credits of course work in South Asian studies, including Asian Studies 215 (Introduction to South Asia) and four courses or seminars at the intermediate or advanced levels, two of which may be South Asian language courses.

Students taking a concentration in South Asian studies are considered members of the South Asia Program and will have an adviser from the program faculty. (This adviser will be for the student's concentration and is not a substitute for a student's academic adviser in his or her major.)

One South Asian graduate course may be taken for the concentration with consent of both the instructor and the adviser. The same applies for one South Asia-related course with a research paper on a South Asian subject. Additional courses may be added if offered with comparable South Asia content.

Concentration in Southeast Asia Studies

A candidate for the Bachelor of Arts or Bachelor of Science degree at Cornell may take a concentration in Southeast Asian studies by completing 18 credits of course work. A recommended plan would include Asian Studies 208 and four courses at the intermediate or advanced stage, two of which could be a Southeast Asian language. Students taking a concentration in Southeast Asian studies are members of the Southeast Asia Program and are assigned an adviser from the program faculty. Such students are encouraged to commence work on a Southeast Asian language either at the 10-week intensive courses offered by the Southeast Asia Studies Summer Institute (SEASSI) 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.

Intensive Language Program (FALCON)

The FALCON Program offers intensive instruction in Japanese, Chinese, or Indonesian. The program is still the only one in the world offering a full year of intensive instruction, except perhaps for the exclusive language schools of some government agencies. Students must formally apply to the program, but the application process is simple and admissions is open to all students. (Applications available for FALCON from the secretary, room 414 Morrill Hall, or visit website http://dml.cornell.edu./FALCON/ and apply on-line). Students may take the entire sequence of 160, 161, 162, or any other portion of the program is they have necessary background (to be determined by placement test). The courses are full-time intensive language study; the degree of intensity required does not allow students to enroll simultaneously in other course or to work, except perhaps on weekends.

Study Abroad

Cornell is a member of the Inter-University Center for Chinese Language Study in Taipei 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 one or two semesters in Japan studying both language and culture.

Cornell is a class-A member of the American Institute of Indian Studies, which offers fellowships in India for intensive language study in Hindi, Bengali, and Tamil.

Cornell and the central campus of the Nepalese national university—Tribhuvan—at Kirtipur, Kathmandu, cosponsor an academic semester or year in Nepal.

Other opportunities include a junior year abroad at IKIP-Malang, in Indonesia, or at the School of Oriental and African Studies, University of London. Many other options for study in Asia exist, including in Indonesia, Thailand, and Vietnam through the Council for International Educational Exchange. Undergraduates should consult Cornell Abroad; graduate students should inquire at the East Asia Program, the South Asia Program, or the Southeast Asia Program offices.

General Education Courses

ASIAN 203 Introduction to Comparative Literature (also ComL 203)
Fall. 4 credits. Team.
See ComL 203 for description.

ASIAN 204 Global Fictions (also ComL 204)
Spring. 4 credits. N. Melas.
See ComL 204 for description.

ASIAN 206 The Occidental Tourist: Travel Writing and Orientalism in Southeast Asia (also History 207)
Spring. 4 credits. T. Loos.
See HIST 206 for description.

ASIAN 208 Introduction to Southeast Asia @
Spring. 3 credits. T. Chaloemtiarana.
This course is for anyone curious about the part of Asia with the most diversity; it defines Southeast Asia both as the nation-states that have emerged since 1945 (Brunei, Burma, Cambodia, Indonesia, Laos, Malaysia, Philippines, Singapore, Thailand, and Viet Nam) and as a larger cultural world extending from southern China to Madagascar and Polynesia. Students will find a serious, organized introduction to a variety of disciplinary and topical approaches to this region, including geography, linguistics, history, religion and ideology, anthropology, marriage and family systems, music, literacy

and literature, art and architecture, agriculture, industrialization and urbanization, politics and government, warfare and diplomacy, ecological and human degradation, business and marketing. The course aims to teach both basic information and different ways of interpreting that information.

ASIAN 211 Introduction to Japan: Japanese Texts in History @ #
Fall. 3 credits. B. de Bary.
An interdisciplinary introduction to Japanese Studies especially designed for non-majors. The course takes up a diverse series of cultural artifacts and demonstrates how, against the background of simultaneous and successive rises and falls of polities on the Japanese archipelago, the meanings and readings generated by these artifacts have changed dramatically over time. We will consider verbal and visual, fictional and historical, canonical and non-canonical texts, including the eighth century *Kojiki*, the courtly narrative *Tale of Genji*, eighteenth century puppet theater, modern Ainu autobiography, and films and comic books dealing with themes of nuclear warfare and apocalypse.

ASIAN 212 Introduction to China @
Spring. 3 credits (4 credits with a special project; consult instructor for information). S. Tian.
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. C. Minkowski.
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 (also History 218 and Government 218) @
Fall. 3 credits. J. Choi.

Asia—Literature and Religion Courses

The following courses are taught entirely in English and are open to any Cornell student.

ASIAN 250 Introduction to Asian Religions (also Religious Studies 250) @ #
Spring. 3 credits. D. Boucher.
This course will explore a range of religious traditions in South Asia (Pakistan, India, and Sri Lanka) and East Asia (China and Japan) including Hinduism, Buddhism (South and East Asian), Confucianism, Daoism, and Shinto. We will concentrate on these religions in traditional times in order to understand better the historical foundations that have influenced much of what these cultures are today. We will attempt to inquire collectively into the nature of religious impulses among peoples who are in some fundamental ways both very much like us and very much different from us. The course format will include lectures and discussion sections.

ASIAN 277 Meditation in Indian Culture @ #
Spring. 3 credits. D. Gold.
This course probes the truths behind traditional claims of the priority of internal practice in Indian traditions. We will examine both practices themselves—techniques of meditation and contemplation, religious ways of using intellect, forms of chant and ritual—and the dynamics through which these have left a wider mark on South Asian civilization. These dynamics include not only the evident reverberations of practice in philosophical reflection and socioreligious institutions, but also wide-ranging processes of stylization, elaboration, and popularization found throughout South Asian culture. In order to get a sense of the experiences treated in classical religious texts, students will be expected to experiment with some basic meditation practices. At least as important for the work of the course (and much more important for the grade) will be the ways in which students situate these practices within larger South Asian world views as suggested by doctrines, rituals, iconic forms, and literary texts. To keep the interaction between internal practice and broader world views central, we will examine both Hindu and Buddhist sources, consistently examining the ways in which similar practices are given distinct shapes by the two religious traditions.

[ASIAN 291 Classical Indian Narrative (also Classics 291) @ #
Spring. 3 credits. Not offered 1999–2000. C. Minkowski.
Reading in translation from the principal story collection of ancient India. Sources will include the Vedas, the Sanskrit epics, the Buddhist Jatakas, the Kathasaritsagara, the Pancatantra, and related collections. Attention will be given to comparisons with Greek narrative, and to the diffusion of Indian narratives into the world's literature.]

ASIAN 298 The U.S.-Vietnam War (also History 289) @
Spring. 3 credits. K. Taylor.
This course will survey events in Vietnam, the U.S., and elsewhere related to the US policy of intervention in Vietnam between 1954 and 1975. Readings will include historical narratives, memoirs, and literature. The courses will evaluate the standard winner (Hanoi) and loser (U.S.) narratives and how they have silenced southern Vietnamese voices.

ASIAN 299 Buddhism (also Religious Studies 361) @ #
Fall. 4 credits. D. Boucher.
This course will explore the Buddhist tradition from its origins in ancient India to its migrations throughout Asia and eventually to the West. The first half of the course will deal with Indian Buddhism: the Buddha, the principal teachings and practices of his early followers, and new developments in spiritual orientation. We will then turn to the transmission of Buddhism to Central and East Asia, including China, Japan, and Tibet, concentrating on those traditions in traditional times. From there we will look at the southern migration to Sri Lanka and Southeast Asia and conclude with an examination of Buddhism in America.

ASIAN 300 Premodern Chinese Literature in Translation @ #
Fall. 4 credits. S. Tian.
This course is an introduction to classical Chinese literature. A variety of forms and genres, such as poetry, fiction, essays and historical writings, are chosen and arranged in chronological order as well as by general topics and issues, so as to present an overview of how the Chinese literary tradition evolves and to show the interplay of Chinese literature, culture, and history.

[ASIAN 311 Modern Korean Culture and Literature @
Spring. 4 credits. Not offered 1999–2000. Staff.
A survey of the literature of the Post-Liberation period (1945-present), with an emphasis on the development of modern Korean poetry and its relation to the intellectual history of this time. Students will read major poetic texts of each period in English translation as well as writings on cultural movements and major arguments in intellectual history.]

ASIAN 314 Europe & Its Others (also Comparative Literature 304)
Fall. 4 credits. N. Melas.
See ComL 304 for description.

[ASIAN 347 Tantric Traditions (also Religious Studies 349) @ #
Fall. 4 credits. Not offered 1999–2000. D. Gold.
This course treats the development of tantric traditions in the Indian subcontinent and beyond. Philosophical, socio-religious, cultic, and visionary dimensions of tantra will be discussed. We study different Hindu and Indo-Tibetan traditions, with some attention also paid to tantric developments in East Asian Buddhism.]

ASIAN 348 Indian Devotional Poetry (also Religious Studies 348) @ #
Fall. 4 credits. D. Gold.
A survey of Indian devotional genres, with particular attention to the medieval vernacular literatures. Consideration will be given to social and ritual contexts of the texts, the ways in which their literary conventions work, and their contemplative uses. The predominant focus will be on Hindu traditions, but some Buddhist and Islamic works will also be read. Readings will be in translation.

[ASIAN 351 The Religious Traditions of India (also Religious Studies 351) @ #
Spring. 4 credits. Not offered 1999–2000. D. Gold.
A study of the relationships between the main currents of Indian religion. The course will first focus on the Hindu tradition and its holistic worldview within the context of the caste system. It will then describe the rise of Jainism and Theravada and Mahayana Buddhism, as well as Hindu and Buddhist Tantrism, as religious phenomena reflecting the emergence of individualism.]

[ASIAN 354 Indian Buddhism (also Religious Studies 354) @ #
Fall. 4 credits. Not offered 1999–2000. C. Minkowski.
A survey of Buddhist tradition in India from the life of the Buddha through the formation of the early schools, to the development of the Mahayana and the emergence of tantric Buddhism. Topics to be considered will include Buddhist concerns of human suffering and spiritual liberation, the nature of reality and human understanding, and the importance of compassion and emptiness. Attention will be paid to the institutional identity and social function of the Buddhist movements in classical India.]

[ASIAN 355 Japanese Religions (also Religious Studies 355) @
Fall. 4 credits. Not offered 1999–2000. J. M. Law.
This course addresses the complexity of religion in Japanese history through a focus on the dominant ideological system of Japanese religious practice and thought—that system commonly referred to as Shinto. In this course, we are interested in understanding the general methodological issues surrounding tradition formation, continuity, change, and revision. The Shinto case reveals the complexity of a given religious system which simultaneously serves as both a cultural ideology and a path for individual spiritual cultivation. A study of Shinto allows us to develop the intellectual frameworks for understanding the dynamics of religious traditions in societies. We will explore the Shinto tradition by looking at 1) the means by which a central corpus of values, tastes, practices, beliefs and concerns have been formulated and how this system has interacted with other religious systems in Japan so as to maintain its right to represent the "authentic Japanese spirit;" 2) the academic sources for the study of the Shinto tradition which have also contributed to its identity and continuity; 3) the view of this religious system from the perspective of those who are actively shaping its discourse; 4) the view of this religious system from the perspective of those peripheralized by its ideologies; 5) the issue of personal cultivation and aesthetic taste in the tradition and 6) the relationship between this religious system and imperialism, war, and historical revisionism.]

ASIAN 357 Chinese Religions (also Religious Studies 357) @ #
Spring. 4 credits. D. Boucher.
This course will present a broad survey of Chinese religions from the earliest historic records through the late imperial and modern periods, from highbrow philisophical movements to local deity cults. Our survey will focus intensively on the great traditions of Confucianism, Taoism, and Buddhism as well as the lesser known practices that often fall through the cracks. Our goal in part will be to trace patterns of continuity among competing and sometimes acrimonious voices.

[ASIAN 358 Chinese Buddhism (also Religious Studies 356) @ #
Fall. 4 credits. Not offered 1999–2000. D. Boucher.]

[ASIAN 359 Japanese Buddhism: Texts in Context (also Religious Studies 359) @ #
Spring. 4 credits. Not offered 1999–2000. J. M. Law.]

[ASIAN 360 Buddhist and Confucian Cultures of Asia @ #
Spring. 4 credits. Not offered 1999–2000. K. Taylor.
Confucius and Buddha were contemporaries 2,500 years ago. Teachings attributed to them spread over large parts of Asia and were used to formulate expressions of cultural authority in many times and places. This course surveys historic themes in Buddhist and Confucian studies, such as Theravada and Mahayana, Pure Land, Zen, and other forms of Buddhist thought and practice, including interaction with and adaption to local religions; Confucius and Mencius, Han eclectic Confucianism, Song Chu Hsi Confucianism, and dissenting or variant forms of Confucian thought. This course explores and compares specific examples of these themes in Japan, Korea, China, Vietnam, Thailand, and Burma. This course is intended for Asian studies majors and other interested students. Premodern focus.]

[ASIAN 363 Contemporary Mass Culture in Japan and the U.S. (also Comparative Literature 343) @
Fall. 3–4 credits. Not offered 1999–2000. 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 373 Twentieth-Century Chinese Literature @
Fall. 4 credits. E. Gunn.
A survey of the principal works in English translation, the course introduces fiction, drama, essays, and poetry of China beginning with the Republican era and continuing up to the present in the People's Republic and Taiwan, with attention to social and political issues and literary theory.

ASIAN 374 Chinese Narrative Literature (also Comparative Literature 376) @ #
Spring. 4 credits. E. Gunn.
Selected works in classical Chinese fiction are read in translation. Major novels, such as *The Dream of the Red Chamber* and *Water Margin*, are emphasized.

[ASIAN 375 Japanese Poetry and Poetic Prose @ #
Spring. 4 credits. Alternates with ASIAN 377. Not offered 1999–2000. K. Brazell.]

[ASIAN 376 Modern Japanese Literature: From Meiji through the Pacific War (also Comparative Literature 369) @
Fall. 4 credits. Not offered 1999–2000. B. de Bary.
We will read Japanese works of fiction, poetry, and critical theory written from the Meiji Restoration into the Showa Period. The course will take up such issues as modernization and the narrative of discovery, imperialism and the non-Western novel, the politics of visibility, gender and representation, and Japanese colonialism. We will consider how writings of critics like Karatani, Fujii, and Layoun have complicated modernizationist schemas of literary development. We will also attempt to explore what Nagahara Yutaka has called the "phenomenology of discrimination" in relation to Japanese literary texts, pursuing contradictions between egalitarianism and discrimination in the legacy of Meiji Enlightenment thought. Reading of non-Japanese (other Asian, as well as African, American, and European) texts raising pertinent theoretical perspectives will be integrated into the course work.]

[ASIAN 377 Japanese Tales of Love, War, and the Supernatural @ #
Spring. 4 credits. Alternates with ASIAN 375. Not offered 1999–2000. K. Brazell.
The romantic adventures of the Shining Prince Genji, the battles of 12th-century samurai clans, the ghosts and demons of folklore, and the adventures of Saikaku's men and women who "loved love" are still very much alive in modern Japanese mass culture—in films, comic books, commercials, TV programs, and video games. This course will survey the original tales (in English translation) to introduce students to this rich array of literature. We will explore some of the changes in the representations of sex and gender, death and dying, and supernatural forces that occurred between the 9th and the 19th centuries.]

ASIAN 383 Introduction to the Arts of China (also Art History 380 and Archaeology 380)
Fall. 4 credits. A. Pan.
See ART H 380 for description.

ASIAN 388 Theorizing Gender & Race in Asian Histories & Literatures @
Fall. 4 credits. N. Sakai.
In recent years some studies have been published about the questions of gender and race in the fields related to East Asia. Yet, compared with the accumulated factual knowledge about these topics, little attention has been paid to how to conceptualize gender and race, how to analyse the mutual implication of sexism and racism, and how to understand the relationships of these topics to the broader contexts of colonialisms, imperialisms and nationalisms. This course is designed to offer a series of discussions about the following problems: 1) the historically specific modes of sexism and racism in social spaces which are related to Japan and other areas in East Asia. 2) the mutual implication of sexism and racism in various contexts including those of colonialism, imperialism and nationalism. 3) the roles of gender and race in the production of knowledge about Japan and East Asia in general. 4) the conceptions of gender and race in the social formations particular to East Asia. The assigned readings include both English and Japanese materials. However, those who register in AS 388 are exempt from reading the Japanese materials*.

*Students are allowed to take this course either as AS 388 or as AS 688, although those who have studied Japanese for more than four years are strongly encouraged to register in AS 688. Those who register in AS 688 have to spend additional time in class in order to deal with texts in Japanese.

[ASIAN 390 The Sanskrit Epics @ #
Spring. 4 credits. Not offered 1999–2000. C. Minkowski.
Readings in translation from the two Sanskrit epics, the Mahabharata and the Ramayana, supported by a study of the reception of the epics in later Indian imaginative literature. Attention will also be given to comparitive theories of the epic in ancient Indo-European languages.]

[ASIAN 395 Classical Indian Philosophical Systems (also Classics 395 and Religious Studies 395) @ #
Fall. 4 credits. Prerequisite: some background in philosophy or in classical culture. Not offered 1999–2000. C. Minkowski.]

ASIAN 396 Southeast Asian History from the Eighteenth Century (also History 396)
Spring. 4 credits. T. Loos.
See HIST 396 for description.

ASIAN 400 Tibetan Buddhism (also Religious Studies 400) @#
Fall. 3 credits. Prerequisites: at least one course on Buddhism or Asian religions, or the permission of the instructor. Class size is limited to 15. J. M. Law.
This course is an exploration of the development of the Vajrayana tradition through a focus on the myths and stories about, and writings by central figures in, what is known in the west as Tibetan Buddhism. Following an overview of the historical development of this tradition, we will explore the contributions made by several (mythico-historical) seminal thinkers in the tradition including Atisa, Naropa, Marpa, Milarepa, and Tsongkapa, and explore how their life works reflect the process of adapting Buddhism to the Tibetan context. (We will also include myths and stories about the mythical founder Padmasambhava.) Readings will include primary source religious works written by or attributed to these figures, hagiographical accounts of their lives (their "biographies" and "autobiographies" and tributes to them by their disciples), and treatises and commentaries on their works which are influential in the formulation of the various schools of Tibetan Buddhism. In the final segment of the course, we will explore the implications of exile for Tibetan Buddhism, and will read several popular works by the Ven. Tenzin Gyatso (the fourteenth Dalai Lama), to show the dramatic changes made in the tradition as it reformulates itself in a more global context. Throughout this course, we will be directing our attention to dynamics of tradition formulation, articulation and reformation as it changes throughout Tibetan history. In addition to two short writing assignments and a final research project, we will also take field trips to two regional Tibetan monasteries.

[ASIAN 406 Contemporary Literary Criticism in Korea
Spring. 4 credits. Not offered 1999–2000. Staff.
A survey of literary criticism and theory from the liberation in 1945 to the 1990s, including the KAPF (engagement movement of nationalism) versus belletristic movement, new criticism, nationalism based upon realism, grass-roots literature movements, postmodernism and the heteroglossia of critical theories. Major arguments of each of these movements will be covered. Also covered will be current movements in Korean literary criticism influenced by the globalized industry of critical theories, including deconstruction, postmodernism, poststructuralism, postcolonialism, cultural studies, feminism, and new historicism.]

ASIAN 407 Religion and Human Rights (also Religious Studies 407)
Spring. 3 credits. J. M. Law.

[ASIAN 410 Chinese Performing Arts @
Spring. 4 credits. Not offered 1999–2000. E. Gunn.
The course will survey drama, music theater, and film in twentieth-century China. Some material will require knowledge of Chinese.]

ASIAN 411 History of the Japanese Language (also Linguistics 411)
Fall. 4 credits. J. Whitman.
See LING 411 for description.

ASIAN 412 Linguistic Structure of Japanese (also Linguistics 404)
Spring. 4 credits. J. Whitman.
See LING 404 for description.

ASIAN 415 Virtual Orientalisms (also SHUM 415 and ComL 418) #
Spring. 4 credits. Enrollment limited to 25 students. B. de Bary.
A comparative study of representations of Japan in postwar French, American, and Japanese cultures. The course will be particularly concerned with the role of virtual technologies in representations of Japan, as well as with a proliferation of late twentieth century representations of Japan as a site of utopic or dystopic virtuality. Positing Orientalism as a broadly-based, but definitely not monolithic, ensemble of representational and regulatory practices, we will attend to differences in the historical context. Examples include; Roland Barthes' figuring of Japan as a "possibility of difference," or of "the very fissure of the symbolic" in post-1968 France, and Michael Crichton's more recent superimposition of a "Rising Sun" over processes of American racial hybridization, high-tech reproduction and alteration of images, and trade imblances. Ambiguously represented as a culture of both the "chrysanthemum" (the hyper-aesthetic) and the "sword" (the hyper-phallic), with the advent of what some have called "techno-orientalism," Japan has increasingly become a preoccupation of technological and futurological imagination. We will consider literary, filmic, and theoretical texts, as well as science fiction, video games, and fanzines.

ASIAN 416 Undergraduate Seminar on Gender & Sexuality in Southeast Asian History (also History 416)
Fall. 4 credits. T. Loos.
See HIST 416 for description.

ASIAN 417 Second Language Acquisition (also LING 415)
Spring. 4 credits. Y. Shirai.
See LING 415 for description.

ASIAN 429 Structure of the Chinese Language (also LING 429)
Fall. 4 credits. H. Tao.
See LING 429 for description.

ASIAN 430 Structure of Korean (also LING 430)
Spring. 4 credits. J. Whitman.
See LING 430 for description.

[ASIAN 441 Mahayana Buddhism (also Religious Studies 441) @ #
Spring. 4 credits. Not offered 1999–2000. D. Boucher.
By reading successive examples of Mahayana Buddhist literature, we will study the formation and evolution of the ideal of the bodhisattva; the understanding of transcendental wisdom and the concept of emptiness; and the workings of both the conscious and subconscious mind in the course of spiritual practice. We will include discussion of major philosophical schools, as well as issues of social setting and popular religious practice, in both India and East Asia.]

ASIAN 449 History and Methods of the Academic Study of Religion (also Religious Studies 449) #
Spring. 4 credits. D. Gold.
See RELST 449 for description.

ASIAN 460 Indian Meditation Texts (also Religious Studies 460) @ #
Fall. 4 credits. D. Gold.
Because texts that record visionary experience prescribe the practice of contemplation, and present enigmatic utterances are highly valued in Indian tradition, they need to be taken seriously by students of Indian and world civilizations. Yet the special problems of interpretation that they present have often caused meditation texts to be passed over in embarrassed, sometimes reverent silence. In this course we will draw on approaches from literary criticism, anthropology, and religious studies to explore a number of the problems to which these texts give rise: in what ways are the apparent differences in experience presented in meditation texts shaped by different cosmologies and ritual practice? Do different literary genres have particular religious implications? What are the relations between convention and experience in the creation of the texts? Readings will be drawn from the Upanishads and Tantra, devotional verse in the vernaculars, and the classical meditation manuals of Hinduism and Buddhism. Some attention may be given to Indian Sufi materials. No knowledge of Indian languages is required.

[ASIAN 463 Readings in Hindi and Urdu Literature @
Spring. 4 credits. Not offered 1999–2000. 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 464 Readings in Urdu Literature @
Spring. 2–4 credits. Not offered 1999–2000. D. Gold.
Selected topics in Urdu literature, with readings in the original; discussions in Urdu and English.]

[ASIAN 470 The Japanese Noh Theater and Modern Dramatists (also Comparative Literature 470 and Theater Arts 470) @ #
Fall. 4 credits. Alternates with ASIAN 471. Not offered 1999–2000. K. Brazell.
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, text, 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. Not offered 1999–2000. K. Brazell.
A study of traditional forms of Japanese theatre. Topics will include ritual and theatre, noh and kyogen, kabuki, and the puppet theatres, and contemporary theatrical use of the traditional forms. Special emphasis will be placed on dramaturgy, acting styles, perfor-

mance aesthetics, and theories of performer training.]

[ASIAN 481 Translation and Identities @
Fall. 4 credits. Not offered 1999–2000. N. Sakai.]

[ASIAN 483 Internationalism, Nationalism, and Modern Japanese Discursive Space @
Fall. 3 credits. Not offered 1999–2000. N. Sakai.
The late 19th century marks 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 490 Tales of the Heike (also History 490) @ #
Fall. 4 credits. Brazell, Piggott.
See HIST 490 for description.

[ASIAN 496 Tokugawa Literature and Thought @ #
Spring. 4 credits. Not offered 1999–2000. 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 understood cultural activities and literature during the Tokugawa period.]

Asia—Graduate Seminars

For complete descriptions of courses numbered 600 or above, consult the director of graduate studies.

ASIAN 601 Southeast Asia Seminar: Indonesia (also Government 652)
Fall. 3–4 credits. J. Siegel.
The course will serve as an introduction to Indonesia, considered in several dimensions: nationalist Indonesia, ethnic Indonesia, the recent history of nationalism and the politics of the present, minority problems, etc. No knowledge of Indonesian is required.

ASIAN 602 Southeast Asia Seminar: Cambodia
Spring. 4 credits. D. Chandler.

ASIAN 603 Southeast Asia Topical Seminar: Sociology of Natural Resources & Development (also Rural Sociology 607)
Fall. 3 credits. P. Gellert.
Building on theories in the sociology of development, this seminar will examine the role of natural resource extraction, processing, and exports to global markets in the development trajectories of nations in Asia, Africa and Latin America. This course engages students in both theoretical debates and practical implications of resource access, control, and conflict amongst various social stakeholders. Detailed historical cases will be examined, primarily from Southeast Asia (Indonesia, Malaysia, Philippines).

ASIAN 604 Southeast Asia Topical Seminar
Spring. 3–4 credits. Staff.

ASIAN 605–606 Master of Arts Seminar in Asian Studies
605, fall; 606, spring. 2–4 credits. Staff.

ASIAN 607–608 The Plural Society Revisited (also Government 653)
607, fall; 608, spring. 4 credits. 607 may be taken independently for credit; 607 is a prerequisite for 608. B. Anderson.
See GOVT 653 for description.

ASIAN 609 Modern Japanese Studies: The Formation of the Field in History and Literature (also History 609)
Spring. 4 credits. N. Sakai, J. V. Koschmann, B. de Bary.
See HIST 609 for description.

ASIAN 610 SLA and the Asian Languages (also LING 609)
Fall. 4 credits. Y. Shirai.
See LING 609 for description.

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. F. Kotas.

ASIAN 613 Southeast Asian Bibliography and Methodology
Fall. 1 credit. Prerequisite: permission of instructor. A. Riedy.
This course is designed to instruct students in methods of identifying and locating resources for the study of Southeast Asia. Emphasis will be on the practical aspects of using various types of bibliographical tools to identify both primary and secondary sources in Southeast Asian and Western languages. Electronic databases and online services as well as traditional printed resources will be covered. Relevant arcana of library science will be explained as necessary. Required of honors students and Master of Arts candidates. No foreign language competence is required but a reading knowledge of at least one Southeast Asian language or other Asian language (especially Chinese or Japanese) and a major European language (especially French, Spanish, or Dutch) is highly desirable.

[ASIAN 621–622 South Asia Seminar: Topic to be announced
621, fall; 622, spring. 4 credits. Not offered 1999–2000.]

[ASIAN 623–624 Topics in South Asia
623, fall; 624, spring. 1 credit. Not offered 1999–2000. Staff.
A series designed to introduce as well as enhance and build on students' knowledge of various topics of importance to South Asia (Bangladesh, India, Nepal, Pakistan, and Sri Lanka). Weekly lectures will survey contemporary themes in South Asian scholarship where visiting scholars and members of the Cornell community will discuss a multidisciplinary range of issues. These may include science and nation building; ritual power and resistance; tribal communities and the environment; industrial and agrarian relations; gender and the media; and economic liberalization. A short essay will be required at the end of the course.]

ASIAN 630 Seminar on Vietnamese Historiography of the 16th-18th Centuries
Spring. 4 credits. Permission of instructor required. K. Taylor.
A survey of texts and secondary literature about Vietnamese speakers from the Hong Duc era (end of 15th century) to the founding of the Nguyen dynasty (beginning of 19th century). Required work will include class presentations, short essays, and a seminar paper representing new research.

ASIAN 676 Southeast Asia Research Training Seminar
Fall or spring. 3–4 credits. Staff.

ASIAN 688 Theorizing Gender & Race in Asian Histories and Literatures @
Fall. 4 credits. N. Sakai.
In recent years some studies have been published about the questions of gender and race in the fields related to East Asia. Yet, compared with the accumulated factual knowledge about these topics, little attention has been paid to how to conceptualize gender and race how to analyse the mutual implication of sexism and racism, and how to understand the relationships of these topics to the broader contexts of colonialisms, imperialisms and nationalisms. This course is designed to offer a series of discussions about the following problems: 1) the historically specific modes of sexism and racism in social spaces which are related to Japan and other areas in East Asia. 2) The mutual implication of sexism and racism in various contexts including those of colonialism, imperialism and nationalism. 3) The roles of gender and race in the production of knowledge about Japan and East Asia in general. 4) The conceptions of gender and race in the social formations particular to East Asia. The assigned readings include both English and Japanese materials. However, those who register in AS388 are exempt from reading the Japanese materials*.

*Students are allowed to take this course either as AS 388 or as AS 688, although those who have studied Japanese for more than four years are strongly encouraged to register in AS 688. Those who register in AS 688 have to spend additional time in class in order to deal with texts in Japanese.

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. 1–4 credits. Staff.

ASIAN 899 Masters Thesis Research
Fall, spring. 2–4 credits. Staff.

ASIAN 999 Doctoral Dissertation Research
Fall, spring. 2–4 credits. Staff.

Honors 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: admission 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. 1–4 credits. Prerequisite: permission of instructor. Open to majors and other qualified students. Intensive reading under the direction of a member of the staff.

Bengali

BENGL 121–122 Elementary Bengali
121, fall; 122, spring. 4 credits each term. Prerequisite: for Bengali 122, Bengali 121 or examination. D. Sudan.
The emphasis is on basic grammar, speaking, and comprehension skills; Bengali script will also be introduced.

BENGL 201–202 Intermediate Bengali Reading @
201, fall; 202, spring. 3 credits each term. Prerequisites: for Bengali 201, Bengali 122 or examination; for Bengali 202, Bengali 201 or examination. D. Sudan.
Continuing instruction in grammar with attention to speaking and reading skills.

BENGL 203–204 Intermediate Bengali Composition and Conversation @
203, fall; 204, spring. 3 credits each term. Prerequisites: for Bengali 203, Bengali 122 or examination; for Bengali 204, Bengali 203 or examination. D. Sudan.
Continuing instruction in grammar with attention to writing skills.

BENGL 300 Directed Studies
Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. D. Sudan.
Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

BENGL 303–304 Bengali Literature I, II
303, fall; 304, spring. 4 credits each term. Prerequisites: Bengali 203–204 or equivalent. D. Sudan.
An introduction to noted Bengali writers. Selections of works by Rabindranath Tagore and Abanindranath Tagore and short stories by Bonophul will be covered. The course will be devoted to reading these works and developing literary criticism and creative writing in Bengali.

Burmese

NOTE: Contact S. Tun in Morrill Hall 405 before classes begin for placement or other testing and organizational information.

BURM 103–104 Burmese Conversation Practice
103, fall; 104, spring. 2 credits each term. Prerequisites: 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 104/122 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 123; for Burmese 202, Burmese 201. S. Tun.
Continuing instruction in Burmese, with emphasis on consolidating and extending conversational skills, and on extending reading ability.

BURM 300 Directed Studies
Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. S. Tun.
Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

BURM 301–302 Advanced Burmese @
301, 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 on conversational and literary skills, but with special emphasis on reading. Students encounter various genres and styles of written Burmese. Readings will include articles on current events, and either several short stories or a novel. Focus is on developing reading skills, particularly on vocabulary development, consolidating and expanding grammar, and appreciating stylistic and cultural differences.

BURM 303–304 Advanced Burmese II
303, fall or spring; 304, fall or spring. 3 credits each term. Prerequisite: for Burmese 303, Burmese 202 or permission of instructor; for Burmese 304, Burmese 303. S. Tun.
This is a course for students who have good conversational ability in Burmese and some familiarity with Burmese culture, but who need to strengthen reading skills and further enrich their vocabulary. Students will, in consultation with the instructor, be able to select reading materials. There will also be an opportunity for those who need it, to strengthen listening skills, through the study of current films, TV and radio programs in Burmese.

BURM 401–402 Directed Individual Study
401, fall; 402, spring. 2–4 credits variable each term. Prerequisite: permission of instructor. S. Tun.
This course is designed to accommodate the needs of advanced or specialized students, and faculty interests. Topics of reading and discussion are selected on the basis of student need.

Cambodian

See Khmer.

Chinese

NOTE: Testing for placement, except for those with near-native abilities (particularly those schooled in a Chinese setting up until the age of about 12) takes place in registration week, before classes begin. Time and place will be posted on the web at http://dml.cornell.edu and the Chinese bulletin board opposite Morrill 416. Students with some Chinese schooling who want to obtain 3 or 6 credits for their proficiency will be tested at the beginning of the second week of classes. Again, the time and place will be announced.

CHIN 101–102 Elementary Standard Chinese ('Mandarin')
101, fall; 102, spring. 6 credits each term. Prerequisite: for Chinese 102, Chinese 101 or equivalent. Since each section is limited to 10–12 students, students missing the first two class meetings without a university excuse are dropped so others may register. No student will be added after the second week of classes. Satisfactory completion of Chinese 102 fulfills the qualification portion of the language requirement. 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 characters should take 109–110. Students who read Chinese, but who speak 'dialects,' such as Cantonese or Amoy, should consult with the staff before enrolling.

CHIN 109–110 Beginning Reading and Writing (Standard Chinese)
109, fall; 110, spring. 4 credits each term. Prerequisites: for Chinese 109, basic conversational Chinese ('Mandarin'); if in doubt, take the placement examinaton; for Chinese 110, Chinese 109 or equivalent. Students who complete Chinese 110 normally continue with Chinese 209 and 210. Because of high demand for this course, students missing the first two meetings without a university excuse are dropped so others may register. Satisfactory completion of Chinese 110 fulfills the qualification portion of the language requirement. F. Lee Mehta.
This course is intended primarily for students who speak some Chinese (e.g., at home), but who have had little or no formal training. The focus is on characters, reading comprehension, basic composition, standard grammar, and reading aloud with standard Chinese ('Mandarin') pronunciation.

CHIN 111–112 Beginning Cantonese (Spoken)
111, fall; 112, spring. 3 credits each term. Prerequisite: for Chinese 112, Chinese 111 or equivalent. Chinese 111–112 only satisfies the qualification portion of the language requirement if the student can also demonstrate a comparable reading ability. Staff.
A course in conversational standard Cantonese (as spoken in Hong Kong and Canton) for beginners. Students need not have a Mandarin background to take this course, but those with elementary reading skills will also be introduced to Cantonese (character) writing.

CHIN 113–114 Beginning Reading for Cantonese Speakers
113, fall; 114, spring. 3 credits each term. Prerequisite: everyday conversational ability in Cantonese. Completion of 114 satisfies the qualification portion of the language requirement. Staff.
This course is intended primarily for students who speak some Cantonese (e.g., at home), but who have had little or no formal training in writing. The focus is on characters, reading comprehension, standard grammar, and reading aloud with Cantonese pronunciation.

CHIN 201–202 Intermediate Standard Chinese ('Mandarin') @
201, fall or summer; 202, spring or summer. 4 credits each term. Prerequisites: for Chinese 201, Chinese 102 with a grade of C+ or above or equivalent; for Chinese 202, Chinese 201 or equivalent. Satisfactory completion of Chinese 201 fulfills the proficiency portion of the language requirement. Section 1, Q. Teng; Section 2, H. Wang.
Continuing instruction in written and spoken Chinese with particular emphasis on consolidating basic conversational skills and improving reading confidence and ability.

CHIN 209–210 Intermediate Reading and Writing @
209, fall; 210, spring. 4 credits each term. Prerequisites: for Chinese 209, Chinese 110 or equivalent; Chinese 210, Chinese 209. Satisfactory completion of 209 fulfills the proficiency portion of the language requirement. After completing 210, students may only take 400-level courses in Chinese. X. Sun.
Continuing focus on reading and writing for students with spoken background in standard Chinese; introduction of personal letter writing and other types of composition.

[CHIN 215 Mandarin for Cantonese Speakers
Fall or spring. 3 credits each term. Not offered 1999–2000.]

CHIN 300 Directed Studies
Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. Staff.
Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

CHIN 301–302 High Intermediate Chinese
301, fall; 302, spring. 4 credits each term. Prerequisites: for Chinese 301, Chinese 202 or equivalent; for Chinese 302, Chinese 301. F. Lee-Mehta.
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. Prerequisite: Chinese 201–202 or equivalent or permission from instructor. S-U grades only. Not offered 1999–2000. Staff.
Conversation and reading practice for students who wish to maintain language skills. Guided conversation and oral composition and translation. Corrective pronunciation drills.]

CHIN 411–412 Advanced Chinese: Fiction, Reportage, Current Events
411, fall; 412, spring. 4 credits each term. Prerequisites: for Chinese 411, Chinese 302 or equivalent; for Chinese 412, Chinese 411. Q. Teng.
Reading, discussion, and composition at advanced levels.

[CHIN 413–414 Advanced Chinese: Focus on Current Events
413, fall; 414, spring. 3 credits each term. Prerequisites: for Chinese 413, Chinese 412 or equivalent or permission of instructor; for Chinese 414, Chinese 413. S-U grades only. Not offered 1999–2000.
Reading and discussion, with a focus on current events. One of the goals of this course is to build reading confidence and speed. The content will partially be determined by student need and interest.]

CHIN 425 Special Topics
Fall or spring, according to demand. 4 credits. Prerequisite: permission of instructor. S. Wen.
A number of different topics in advanced Chinese language, advertised the previous semester, will be offered under this title to accommodate the needs of advanced or specialized students, and take advantage of faculty interests. Topics include: correspondence and composition, excerpts from classical novels, Ch'ing documents, xiesheng comedy routines, etc. May be repeated for credit.

FALCON (Full-year Asian Language CONcentration)

For full information, brochures, etc., see the FALCON secretary 414 Morrill Hall (e-mail: falcon@cornell.edu).

CHIN 160 Introductory Intensive Mandarin
Summer only. 8 credits. Completion of 160 fulfills the qualification portion of the language requirement. Staff.
Introduction to spoken and written Mandarin. Lectures on linguistic and cultural matters, intensive practice with native speakers, and laboratory work. Students who complete this course with a grade of at least B are normally eligible to enroll in Chinese 201.

CHIN 161–162 Intensive Mandarin @
161, fall; 162, spring. 16 credits each term. Prerequisites: for Chinese 161, Chinese 160 or equivalent or permission of instructor; for Chinese 162, Chinese 161. Satisfactory completion of Chinese 161 fulfills the proficiency portion of the language requirement. Staff.

Literature in Chinese

CHLIT 213–214 Introduction to Classical Chinese @ #
213, fall, T. L. Mei; 214, spring, S. Tian. 3 credits each term. Prerequisite: qualification in Chinese or permission of instructor. May be taken concurrently with Chinese 101–102, 201–202, 301–302.

CHLIT 420 T'ang and Sung Poetry @ #
Spring. 4 credits. Prerequisite: permission of instructor. T. L. Mei.
Readings in the original Chinese, together with secondary works by Chinese and Western critics.

CHLIT 421–422 Directed Study
Fall or spring. 2–4 credits each term. Prerequisite: permission of instructor. Staff.

CHLIT 423 Readings in Chinese History
Fall. 4 credits. W. Shizhen.
Selected Readings.

[CHLIT 424 Readings in Literary Criticism
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. T. L. Mei.]

[CHLIT 426 History of the Chinese Language (also CHIN 403) @ #
Fall. 4 credits. Prerequisite: reading knowledge of Chinese. Not offered 1999–2000. T. L. Mei.
This course explores the development of the Chinese language from its Sino-Tibetan beginnings to the present. Topics covered include changes in sound, vocabulary and grammatical structure, external influences, Old Chinese, Middle Chinese and historical origins of modern dialects.]

CHLIT 435 Chinese Buddhist Texts @ #
Fall. 4 credits. Prerequisite: one year of literary Chinese or permission of the instructor. D. Boucher.
This seminar is designed to introduce students to the idiom of Buddhist Chinese. We will start by reading selections from the early translations to gain a grounding in the vocabulary and syntax that came to characterize literary Buddhism in China. From there we will survey some of the so-called apocryphal texts (Buddhist "sutras" produced in China) and look at samples from important writers and schools, depending on student interests. This course is open to students in any area of East Asia with an interest in developing skills in Buddhist texts.

CHLIT 603 Seminar in Chinese Fiction and Drama
Fall. 4 credits. Prerequisite: permission of instructor. E. Gunn.

[CHLIT 605 Seminar in Chinese Fiction and Drama
Spring. 4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. Staff.]

CHLIT 607 Early Medieval Chinese Poetry
Spring. 4 credits. S. Tian.
By reading the poetry, criticism, and discursive prose of the 1st to 6th centuries AD, we will consider the changing roles and development of Chinese poetry.

[CHLIT 610 Chinese Cultural Criticism
Fall. 4 credits. Not offered 1999–2000. E. Gunn.]

CHLIT 621–622 Advanced Directed Reading: Chinese Historical Syntax
621, fall; 622, spring. 2–4 credits. Prerequisite: permission of instructor. Staff.

Hindi

HINDI 101–102 Elementary Hindi-Urdu
101, fall; 102, spring. 6 credits each term. Prerequisite: for Hindi 102, Hindi 101 or equivalent. Staff.
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. Students who have had exposure to Hindi-Urdu or a closely related language in the home or otherwise should generally take Hindi 109–110. Check with instructor regarding placement.

HINDI 109–110 Accelerated Elementary Hindi-Urdu
109, fall; 110, spring. 3 credits each term. Prerequisite for Hindi 110: Hindi 109 or equivalent. Staff.
An entry-level sequence for students with some prior exposure to Hindi-Urdu or a closely related language. This course sequence will provide a thorough grounding in all the language skills: listening, speaking, reading, and writing. Completion of this sequence, including satisfactory performance on an examination given at the end of Hindi 110, will constitute a level of performance equal to that of the 101–102 sequence, and will thus be considered to fulfill qualification for the language requirement plus eligibility for 200-level Hindi-Urdu courses. Check with instructor regarding placement.

[HINDI 201–202 Intermediate Hindi Reading @
201, fall; 202, spring. 3 credits each term. Prerequisites: for Hindi 201, Hindi 102; for Hindi 202, Hindi 201 or permission of instructor. Not offered 1999–2000. Staff.]

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. Staff.
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 300 Directed Studies
Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. Staff.
Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

[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 1999–2000. Staff.
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. Staff.

[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 1999–2000.
Intended for those who wish to do readings in history, government, economics, etc., instead of literature.]

Indonesian

For students who have completed Indonesian 121–122–123 or its equivalent there is the option of a one-semester program in Malang, East Java, during the junior year. The program combines a variety of cultural and artistic options with area course work and advanced language study. Complete information is available through Cornell Abroad.

Students who have completed a minimum of 18 credits or the equivalent are eligible to apply for a summer program in the Advanced Indonesian Abroad Program. Further information is available from Professor John Wolff (307 Morrill Hall, 255–0733).

INDO 121–122 Elementary Indonesian
121, fall; 122, spring. 4 credits each term. Prerequisite: for Indonesian 122, Indonesian 121. Staff.
A thorough grounding is given in basic speaking and listening skills with an introduction to reading.

INDO 123 Continuing Indonesian
Fall. 4 credits. Prerequisite: Indonesian 122 or equivalent. Satisfactory completion of Indonesian 123 fulfills the qualification portion of the language requirement. J. Wolff and staff.
Improves speaking skills, such as fluency and pronunciation, focusing on verbal communication skills; offers a wide range of readings and sharpens listening skills.

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 205–206 Intermediate Indonesian @
205, fall; 206, spring. 3 credits each term. Prerequisites: for Indonesian 205, Indonesian 123 or equivalent; for Indonesian 206: Indonesian 205 or equivalent. Satisfactory completion of Indonesian 205 fulfills the proficiency portion of the language requirement. Staff.
This course develops all four skills: reading, writing, speaking, and comprehension.

INDO 300 Directed Studies
Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. J. Wolff.
Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

INDO 301–302 Advanced Readings in Indonesian and Malay
301, fall; 302, spring. 4 credits each term. Prerequisites: for Indonesian 301, Indonesian 205–206 or equivalent; for Indonesian 302, Indonesian 301. J. Wolff and staff.

INDO 303–304 Advanced Indonesian Conversation and Composition
303, fall; 304, spring. 4 credits each term. Prerequisites: for Indonesian 303, Indonesian 206; for Indonesian 304, Indonesian 303 or equivalent. J. Wolff and staff.

INDO 305–306 Directed Individual Study
305, fall; 306, spring. 2–4 credits. Prerequisites: Indonesian 301–302 and 303–304 or equivalent knowledge of Indonesian or Malay. Staff.
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 1999–2000. J. Wolff and staff.]

FALCON (Full-year Asian Language CONcentration)

INDO 161–162 Intensive Indonesian
161, fall; 162, spring. 16 credits each term. Prerequisite: permission of instructor. J. Wolff and staff.

Japanese

JAPAN 101–102 Elementary Japanese
101, fall; 102, spring. 6 credits each term. Prerequisite for Japanese 102: Japanese 101 or placement by the instructor during registration period. Intended for beginners or for those who have been placed in the course by examination. Y. Nakanishi-Whitman, R. Sukle and staff.
A thorough grounding in all four language skills—speaking, hearing, reading, writing—at the beginning level, but with a special emphasis on oral communication and actual use of the language in social context. Homework for the course is largely work on the skill aspects of language through practice in the language lab with tapes or CD-ROM. The lecture provides explanation, analysis, and cultural background necessary for successful interaction with Japanese people. The sections are conducted entirely in Japanese. Materials covered are not the same as for Japanese 141–142.

JAPAN 121 Continuing Japanese
Fall. 6 credits. Prerequisite: placement by the instructor at beginning of semester. Y. Nakanishi.
Accelerated training in listening, speaking, reading, and writing with special emphasis on oral communication. For students who have already acquired a limited facility in Japanese through residence in Japan or through brief formal study and require fewer contact hours per week.

JAPAN 141–142 Beginning Japanese at a Moderate Pace
141, fall; 142, spring. 4 credits each term. Prerequisite for Japanese 142: Japanese 141 or placement by instructor during registration period. Y. Shirai and staff.
Beginning level training in listening, speaking, reading, writing, with more emphasis on written skills than Japanese 101–102. Classroom activities focus on oral communication skills. Homework for the course is largely written exercises. Fewer credits and fewer class contact hours than Japanese 101–102; the course meets 5 hours per week (MTWRF). Materials covered are not the same materials as Japanese 101–102.

JAPAN 201–202 Intermediate Japanese Conversation @
201, fall and summer; 202, spring and summer. 4 credits each term. Prerequisites: for Japanese 201, Japanese 102 or placement by the instructor during registration; for Japanese 202, Japanese 201 and 203 or placement by the instructor during registration. Y. Katagiri.

JAPAN 203–204 Intermediate Japanese Reading I @
203, fall; 204, spring. 2 or 3 credits each term. Prerequisites: for Japanese 203, Japanese 102, Japanese 142 or placement by the instructor during registration; for Japanese 204, Japanese 203 or placement by the instructor during registration. N. Nakada.
Reading of elementary texts emphasizing practical materials, with development of writing skills.

JAPAN 241–242 Intermediate Japanese at a Moderate Pace @
241, fall; 242, spring. 4 credits each term. Prerequisites: for Japanese 241, Japanese 142 or placement by instructor, for Japanese 242, Japanese 241 or placement by instructor. Y. Kawasaki and K. Selden.
Training in listening, speaking, reading, and writing for those students who have acquired a basic beginning-level command.

[JAPAN 251–252 Elementary/ Intermediate Japanese @
251, fall; 252, spring. 4 credits each term. Prerequisites: for Japanese 251, Japanese 160 or placement by instructor during registration period; for Japanese 252, Japanese 251, 102 or placement by instructor during registration period. Not offered 1999–2000. Y. Nakanishi-Whitman.
Training in listening, speaking, reading, and writing for those students who have acquired a basic beginning-level command. Provides an alternate choice for students who find it difficult to schedule the more intensive Japanese 201/203 and 202/204 into their schedules: MBA students, engineering students, hotel school students, arts college students, and others identical with 541–552. Can be followed by Japanese 351–352.]

JAPAN 300 Directed Studies
Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. Staff.
Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

JAPAN 301–302 Communicative Competence @
301, fall; 302, spring. 3 credits each term. Prerequisites: for Japanese 301, Japanese 202 and preferably Japanese 204, Japanese 242 or placement by the instructor during registration; for Japanese 302, Japanese 301 or placement by the instructor during registration. Y. Katagiri.
This is a course for students who have learned basic Japanese grammar and oral skill and would like to utilize the language for natural conversation and effective oral communication. The course is intended: 1) to expand vocabulary for daily life use; 2) to brush up on knowledge of basic grammar for fluency; and 3) to develop communicative skills for varied situations.

JAPAN 303–304 Intermediate Japanese Reading II @
303, fall; 304, spring. 4 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. K. Selden.
Reading of selected modern texts with emphasis on expository style.

[JAPAN 351–352 Advanced Japanese at a Moderate Pace @
351, fall; 352, spring. 4 credits each term. Prerequisites: for Japanese 351, Japanese 252 or placement by instructor during registration period; for Japanese 352, Japanese 351 or placement by instructor during registration period. Not offered 1999–2000.
Training in intermediate to advanced listening and speaking, and continued work on reading and writing. Provides an alternate choice for students who find it difficult to schedule the more intensive Japanese 201/203 and 202/204 into their schedules: MBA students, engineering students, hotel school students, arts college students, and others. Also highly recommended for those with prior background in the language who are weak in the more complex and difficult grammar patterns.]

JAPAN 401–402 Oral Narration and Public Speaking
401, fall; 402, spring. 2 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. N. Nakada.
Instruction in making and delivering socially appropriate and effective speeches, with emphasis on both the construction of discourse and Japanese patterns of oral delivery.

JAPAN 403–404 Advanced Japanese Reading @
403, fall; 404, spring. 4 credits each term. Prerequisite: Japanese 304 or permission of instructor.
Section I: Area of Humanities. Cannot be used for distribution. K. Selden. Reading of selected modern texts with emphasis on expository style.

Section II: Area of Economics and Social Science. Cannot be used for distribution. Y. Kawasaki. Reading of selected modern texts with emphasis on expository style.

JAPAN 410 History of the Japanese Language (also Linguistics 411) @ #
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 414 Linguistic Structure of Japanese (also Linguistics 404) @
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 421–422 Directed Readings
421, fall; 422, spring. Credit to be arranged. Limited to advanced students. Prerequisite: placement by the instructor during registration. K. Selden.
Topics are selected on the basis of student needs.

[JAPAN 551–552 Intermediate Japanese for Business School Students
551, fall; 552, spring. 4 credits each term. Prerequisites: for Japanese 551, Japanese 160, and permission of instructor or placement by instructors during registration period; for Japanese 552, Japanese 551, 102, or placement by instructors during registration. Not offered 1999–2000. Y. Nakanishi-Whitman.
Training in listening, speaking, reading, and writing for students who have already acquired a basic oral proficiency. Course times are arranged to accommodate those in the MBA program, but the material is oriented toward any student. Particularly suited to students who find it difficult to schedule the more intensive 201/203 or 202/204 courses into their schedules.]

[JAPAN 555–556 Advanced Japanese for Business School Students
555, fall; 556, spring. 4 credits each term. Prerequisites: for Japanese 555, Japanese 552 or placement by instructors during registration period; for Japanese 556, Japanese 555 or placement by instructors during registration period. Not offered 1999–2000. Staff.
Training in listening and speaking at intermediate to advanced level; continued work on reading and writing at intermediate level. Course times are arranged to accommodate those in the MBA program, but the material is oriented toward any student. Particularly suited to students who find it difficult to schedule the more intensive 202/204 courses into their schedules.]

FALCON (Full-year Asian Language CONcentration)

Director: R. Sukle, 412 Morrill Hall; FALCON Secretary 414 Morrill Hall, 255–6457.

There are three small interactive classes per day conducted entirely in Japanese and one lecture conducted in English and Japanese. The interactive classes are conducted by experienced and highly trained native teachers; the lecture is conducted by an expert in Japanese language structure. Two one-

hour sessions in the language lab are required daily. Additional preparation time in the language lab is necessary in the evenings. Exposure to the language exceeds that of even students living and studying in Japan, providing over 1200 hours of exposure throughout the full-year program. The extensive exposure and intensive work on the language allows students to develop a level of fluency, accuracy and control of the language not achieved in any other type of academic settings. The course is designed to develop 'copability' in the students by bringing them up to the level where they will be able to successfully make further progress in the language on their own even if they do not have further formal instruction. The intensive nature of the program allows graduate students to complete their language work in minimal time and undergraduates, including freshmen, to achieve levels of Japanese that are far beyond what is normally achieved in a four-year program, provided they continue their study of Japanese after FALCON.

JAPAN 160 Introductory Intensive Japanese (FALCON)
Summer only. 8 credits. R. Sukle and staff.
(See general description above). This is the first term of the FALCON Program. It is a full-time, intensive, nine-week course which begins at the absolute beginning level, in speaking as well as rudimentary reading and writing. Formal application must be made to the program (see above), but admission is open to all students, not just those planning to take the full-year program. Students completing this course can move smoothly in the academic year to Japanese 251–252 or 551–552 for part-time work, or continue full time with Japanese 161–162.

JAPAN 161–162 Intensive Japanese (FALCON)
161, fall; 162, spring. 16 credits each term. Prerequisites: for Japanese 161, Japanese 160, or Japanese 102 at Cornell, or placement by FALCON staff prior to beginning of fall term; for Japanese 162, Japanese 161, or placement by FALCON staff prior to beginning of spring term. Students must apply formally to program (see above); application open to all Cornell students and students from other institutions.
(See general description above). Work on spoken and written Japanese from an intermediate level to an advanced level. This is a full-time program and full academic load; the demands of the program do not normally permit students to take other courses simultaneously. With a sequence of 160–161–162, in only one calendar year a student can complete as much Japanese as would be contained in three or more years of regular study at most academic institutions. This course sequence also serves to fulfill the language requirement for the MA in Asian Studies and the joint MBA/MA in Asian Studies.

Literature in Japanese

JPLIT 406 Introduction to Classical Japanese @#
Fall. 4 credits. Prerequisite: permission of instructor. K. Brazell.

[JPLIT 407 Advanced Classical Japanese
Spring. 4 credits. Prerequisite: JPLIT 406 or permission of instructor. Not offered 1999–2000. K. Brazell.]

JPLIT 421–422 Directed Readings
421, fall; 422, spring. 2–4 credits. Prerequisite: for JPLIT 421, Japanese 402 or equivalent; for JPLIT 422, Japanese 421 or equivalent. Staff.

[JPLIT 611 Seminar in Classical Japanese Literature
Spring. 2–4 credits. Prerequisite: permission of instructor. Offered alternate years. Not offered 1999–2000. K. Brazell.]

[JPLIT 612 Seminar in Medieval Genres
Spring. 2–4 credits. Prerequisite: permission of instructor. Offered alternate years. Not offered 1999–2000. K. Brazell.
This seminar will explore medieval literary genres in terms of the contemporary religious, social, political, and aesthetic discourses. Readings will be in classical and modern Japanese as well as in English.]

JPLIT 613 Seminar in Tokugawa Culture and Thought
Spring. 2–4 credits. Prerequisite: permission of instructor. Offered alternate years. N. Sakai.
This seminar will examine a variety of texts written during the Tokugawa period. The topics discussed in these are many: from the conceptualization of the virtue in the Confucian tradition, to the composition of Waka poetry. The texts are not selected from one school or from one teaching but encompass a wide range of intellectual trends including Neo-Confucianism, the Kogaku and the Kokugaku. In addition to the original texts of the Tokugawa period, we are going to read a few works of modern historiography on Tokugawa thought and culture. I do not think that these works necessarily represent the standard of the present-day Tokugawa studies, but they clearly show different approaches. In this seminar, we will evaluate critically these works through a careful reading of the original texts of the Tokugawa period.

JPLIT 614 Seminar in Modern Japanese Literature (also ComL 695)
Fall. 4 credits. Prerequisite: permission of instructor. B. deBary.
How might postmodern debates on language and difference transform our understanding of the project of cross-cultural learning institutionalized in postwar American area studies? Intended as an introductory course for graduate students, this class will emphasize weekly readings of important texts which have grappled with, or attempted to challenge, epistemological assumptions, categories, and processes which have informed modern disciplinary knowledge of cultural others. All readings will be done in English, and will attempt to trace the contours of debate over broad theoretical issues whose relevance is by no means confined to the question of area studies. Readings will include texts by Rosi Braidotti, Rey Chow, James Clifford, Jacques Derrida, Gilles Deleuze, William Haver, Luce Irigaray, Alice Jardine, and others.

Graduate-Level Reading Courses

[JPLIT 621 Advanced Readings in Pre-Modern Japanese Narrative Literature
Fall or spring. 2–4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. K. Brazell.]

[JPLIT 622 Advanced Readings in Pre-Modern Japanese Poetry
Spring. 2–4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. K. Brazell.]

[JPLIT 623 Advanced Readings in Pre-Modern Drama
Fall or spring. 2–4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. K. Brazell.]

JPLIT 624 Advanced Readings in Modern Japanese Literature
Spring. 4 credits. Prerequisite: permission of instructor. Offered alternate years. B. deBary.
The course will consider representations of the body and eroticism in fiction, poetry, film, and theoretical writings from the Taisho through early Showa periods (1912 to the late 1930's). Special attention will be given to writings about the "New Woman" and "Modern Girl," to sexuality in modernist cinematic and literary experiments, and to reciprocal relations between colonial and metropolitan culture. All readings will be done in Japanese.

JPLIT 700 Seminar: Reading of Historical Materials. Japanese imperial nationalism and its literature
Spring. 4 credits. N. Sakai.

Javanese

[JAVA 131–132 Elementary Javanese
131, fall; 132, spring. 3 credits each term. Prerequisite: for Javanese 132, Javanese 131 or equivalent. This language series (131–132) cannot be used to satisfy the language requirement. Not offered 1999–2000. 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. Satisfactory completion of Javanese 134 fulfills the qualification portion of the language requirement. Not offered 1999–2000. 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. Not offered 1999–2000. 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.]

[JAVA 300 Directed Studies
Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. Not offered 1999–2000. J. Wolff.
Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.]

Khmer (Cambodian)

[KHMER 101–102 Elementary Khmer
101, fall; 102, spring. 6 credits each term. Prerequisite: for Khmer 102, Khmer 101 or equivalent. Not offered 1999–2000. Staff.
A course for beginners or for those who have been placed in the course by examination. The course gives a thorough grounding in speaking and reading.]

[KHMER 201–202 Intermediate Khmer Reading @
201, fall; 202, spring. 3 credits each term. Prerequisites: for Khmer 201, Khmer 102; for Khmer 202, Khmer 201. Not offered 1999–2000. Staff.
Continuing instruction in spoken and written Khmer.]

[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. Not offered 1999–2000. Staff.
Letter writing and other forms of composition.]

[KHMER 300 Directed Studies
Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. Not offered 1999–2000. Staff.
Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.]

[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. Not offered 1999–2000. Staff.
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. Not offered 1999–2000. Staff.
Various topics according to need.]

Korean

KOREA 101–102 Elementary Korean
101, fall; 102, spring. 6 credits each term. Satisfactory completion of Korean 102 fulfills the qualification portion of the language requirement. H. Diffloth and staff.
Covers basics of speaking, reading, and writing. Introduces Hangul writing system and grammar.

KOREA 109–110 Elementary Reading
109, fall; 110, spring. 3 credits each term. Prerequisite: permission of instructor. Satisfactory completion of Korean 110 fulfills 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 limited or nonexistent. If in doubt about eligibility, see instructor.

KOREA 201–202 Intermediate Korean @
201, fall; 202, spring. 4 credits each term. Prerequisites: for Korean 201, Korean 102 or permission of instructor; for Korean 202, Korean 201. Satisfactory completion of Korean 201 fulfills the proficiency portion of the language requirement. 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. Prerequisites: for Korean 209, Korean 110 or permission of instructor; for Korean 210, Korean 209 or permission of instructor. Satisfactory completion of Korean 209 fulfills the proficiency portion of the language requirement. 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 300 Directed Studies
Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. H. Diffloth.
Taught on a specialized basis to address particular student needs. Times will be arranged with 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.
Reading of advanced texts, including newspapers and Chinese character material, together with advanced use of the spoken language.

[KOREA 430 Structure of Korean (also Linguistics 430)
Spring. 4 credits. Offered alternate years. Not offered 1999–2000. J. Whitman.
See description under Ling 430.]

Literature in Korean

[KRLIT 405 Readings in Korean Literature
Fall. 4 credits. Not offered 1999–2000.]

[KRLIT 406 Korean Literature Translation Workshop @
Spring. 2–3 credits. Prerequisite: Korean 301–302 or equivalent; permission of instructor. Not offered 1999–2000.]

Nepali

Study Abroad in Nepal

Cornell and the central campus of the Nepalese national university—Tribhuvan—at Kirtipur, 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, 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.

NEPAL 101–102 Elementary Nepali
101, fall; 102, spring. 6 credits each term. Prerequisite: for Nepali 102, 101 or examination. S. Oja.
Intended for beginners. The emphasis is on basic grammar, speaking and comprehension skills, utilizing culturally appropriate materials and texts. Devanagari script for reading and writing is also introduced.

NEPAL 160 Intensive Nepali
Summer only. 10 credits. Intended for beginners. Offered alternate years. S. Oja.
Emphasis will be on the spoken language, in dialogues, exercises, and conversation practice. In addition, however, special attention is given to assisting students to develop vocabularies and abilities appropriate to their unique professional needs. Reading and writing practice use both colloquial and scholarly materials in the Nepali (Devanagari) script.

NEPAL 201–202 Intermediate Nepali Conversation @
201, fall; 202, spring. 3 credits each term. Prerequisites: for Nepali 201, Nepali 102 or examination; for Nepali 202, Nepali 201 or examination. S. Oja.
Intermediate instruction in spoken grammar and verbal comprehension skills, with special attention to developing technical vocabularies and other verbal skills appropriate to students' professional fields.

NEPAL 203–204 Intermediate Nepali Composition @
203, fall; 204, spring. 3 credits each term. Prerequisites: for Nepali 203, Nepali 102 or examination; for Nepali 204, Nepali 203 or examination. S. Oja.
A systematic review of written grammar and reading comprehension, with special attention to the technical vocabularies, necessary writing skills, and published materials typical of advanced students' professional fields.

NEPAL 300 Directed Studies
Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. S. Oja.
Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

NEPAL 301–302 Advanced Nepali
301, fall; 302, spring. 3 credits each term. Prerequisite: Nepali 204 or permission of instructor. S. Oja.
Reading of advanced texts, together with advanced drill on the spoken language.

Pali

See also courses listed in this section under South Asian Languages.

[PALI 131–132 Elementary Pali
131, fall; 132, spring. 3 credits each term. This language series cannot be used to satisfy the language requirement. Not offered 1999–2000. J. Gair.
131 is an introduction to the language of the canonical texts of Theravada Buddhism. Reading of authentic texts of Theravada Buddhism. Emphasis on both content and grammatical structure. Familiarity with Sanskrit is not required. 132 is a continuation of 131 with further readings.]

PALI 300 Directed Studies
Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. J. Gair.
Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

Sanskrit

SANSK 131–132 Elementary Sanskrit (also Classics 131–132 and Linguistics 131–132)
131, fall, C. Minkowski; 132, spring, staff. 4 credits each term.
An introduction to the essentials of Sanskrit grammar. Designed to enable the student to read classical and epic Sanskrit as quickly as possible.

[SANSK 251–252 Intermediate Sanskrit (also Classics 251–252 and Linguistics 251–252) @ #
251, fall; 252, spring. 3 credits each term. Prerequisite: Sanskrit 132 or equivalent. Not offered 1999–2000. A. Nussbaum, fall; C. Minkowski, spring.
Readings from the literature of classical Sanskrit. Fall: selections from the two Sanskrit epics, the Mahabharata and the Ramayana. Spring: more selections from the epics and selections from either Sanskrit story literature or from Sanskrit dramas.]

Literature in Sanskrit

[SNLIT 467–468 Reading in Sanskrit Literature: The Vedas @#
Spring. 3 credits. Prerequisite: permission of instructor. Not offered 1999–2000. C. Minkowski.]

Sinhala (Sinhalese)

SINHA 101–102 Elementary Sinhala
101, fall; 102, spring. 6 credits each term. Prerequisite: for Sinhala 102, Sinhala 101 or equivalent. Staff.
A semi-intensive course for beginners.
A thorough grounding is given in all the language skills; listening, speaking, reading, and writing.

SINHA 160 Intensive Sinhala
Summer only. 10 credits. Intended for beginners. Offered alternate years.
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. Staff.

[SINHA 203–204 Intermediate Composition and Conversation @
203, fall; 204, spring. 3 credits each term. Prerequisites: for Sinhala 203, Sinhala 102 or permission of instructor; for Sinhala 204, Sinhala 203 or equivalent. Not offered 1999–2000. Staff.]

SINHA 300 Directed Studies
Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. Staff.
Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

[LING 341 India as a Linguistic Area (also Linguistics 341)
Spring. 4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. J. W. Gair.
A basic introduction to the linguistic and sociolinguistic character of the subcontinent, with special attention to cross-linguistic family influences and convergence.]

[LING 440 Dravidian Structures (also Linguistics 440)
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. J. W. Gair.
A comparative and contrastive analysis of the structures of several Dravidian languages.]

[LING 442 Indo-Aryan Structures (also Linguistics 442)
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. J. W. Gair.
Typological discussion of the languages of the subfamily. Specific topics and emphasis may vary depending on the interest of the student.]

Southeast Asian Languages

[LING 230 Introduction to Southeast Asian Languages and Linguistics
Fall. 3–4 credits variable. For non-majors or majors. Not offered 1999–2000. A. Cohn, 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) sociolinguistic and ethnolinguistic issues of language and politics, language and culture, and language use; 2) language structures and typological patterns of the area's languages; 3) historical linguistics, as well as the linguistic effects of language contact and linguistic evidence for prehistory.]

[LING 653–654 Seminar in Southeast Asian Linguistics
653, fall; 654, spring. 4 credits each term. Prerequisite: permission of instructor. Language 653 isn't a prerequisite for Language 654. Not offered 1999–2000. Staff.
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 (also Linguistics 655–656)
655, fall; 656, spring. 4 credits each term. Prerequisites: for 655, permission of instructor, for 656, Language 655. Not offered 1999–2000. J. Wolff.
Descriptive and comparative studies of Malayo-Polynesian languages.]

[LING 657–658 Seminar in Austoasiatic Linguistics (also Linguistics 657–658)
657, fall; 658, spring. 4 credits each term. Prerequisite: permission of instructor. Not offered 1999–2000. Staff.
Descriptive and comparative studies of Austroasiatic languages.]

Tagalog

TAG 121–122 Elementary Tagalog
121, fall; 122, spring. 4 credits each term. Prerequisite: for Tagalog 122, Tagalog 121. Staff.
A thorough grounding is given in basic speaking and listening skills with an introduction to reading.

[TAG 123 Continuing Tagalog
Fall. 4 credits. Prerequisite: Tagalog 122 or equivalent. Satisfactory completion of Tagalog 123 fulfills the qualification portion of the language requirement. Not offered 1999–2000. J. Wolff and staff.
Improves speaking skills, such as fluency and pronunciation, focusing on verbal communication skills; offers a wide range of readings; and sharpens listening skills.]

TAG 205–206 Intermediate Tagalog @
205, fall; 206, spring. 3 credits each term. Prerequisites: for Tagalog 205, Tagalog 123 or equivalent; for Tagalog 206, Tagalog 205 or equivalent. Satisfactory completion of Tagalog 205 fulfills the proficiency portion of the language requirement. Staff.
This course develops all four skills: reading, writing, speaking, and comprehension.

TAG 300 Directed Studies
Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. Staff.
Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

Thai

THAI 101–102 Elementary Thai
101, fall; 102, spring. 6 credits each term. Prerequisite: for Thai 102, Thai 101 or equivalent. Intended for beginners or students placed by examination. N. Jagacinski.

A thorough grounding is given in all the language skills: listening, speaking, reading, and writing.

THAI 201–202 Intermediate Thai Reading
201, fall; 202, spring. 3 credits each term. Prerequisites: for Thai 201, Thai 102; for Thai 202, Thai 201 or equivalent. N. Jagacinski.

THAI 203–204 Intermediate Composition and Conversation @
203, fall; 204, spring. 3 credits each term. Prerequisites: for Thai 203, Thai 102; for Thai 204, Thai 203. N. Jagacinski.

THAI 301–302 Advanced Thai @
301, fall; 302, spring. 4 credits each term. Prerequisite: Thai 202 or equivalent. N. Jagacinski.
Selected readings in Thai writings in various fields.

THAI 300 Directed Studies
Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. N. Jagacinski.
Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

THAI 303–304 Thai Literature
303, fall; 304, spring. 4 credits each term. Prerequisite: Thai 302 or equivalent. N. Jagacinski.
Reading of significant novels, short stories, and poetry written since 1850.

THAI 401–402 Directed Individual Study
401, fall; 402, spring. 4 credits each term. For advanced students or students with special problems or interests. Prerequisite: permission of instructor. N. Jagacinski.

Urdu

See listings under Hindi.

Vietnamese

VIET 101–102 Elementary Vietnamese
101, fall; 102, spring. 6 credits each term. Prerequisite: for Vietnamese 102, Vietnamese 101 or equivalent. Intended for beginners or students placed by examination. Satisfactory completion of Vietnamese 102 fulfills the qualification portion of the language requirement. T. Tranviet.
A thorough grounding is given in all language skills: listening, speaking, reading, and writing.

VIET 201–202 Intermediate Vietnamese
201, fall; 202, spring. 3 credits each term. Prerequisites: for Vietnamese 201, Vietnamese 102 or equivalent; for Vietnamese 202, Vietnamese 201. T. Tranviet.
Continuing instruction in spoken and written Vietnamese.

VIET 203–204 Intermediate Vietnamese Composition and Reading @
203, fall; 204, spring. 3 credits each term. Prerequisite: permission of instructor only. T. Tranviet.
Designed for students and "native" speakers of Vietnamese whose speaking and listening are at the advanced level, but who still need to improve writing and reading skills.

VIET 300 Directed Studies
Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. T. Tranviet.
Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

VIET 301–302 Advanced Vietnamese @
301, fall or spring; 302, fall or spring. 3 credits each term. Prerequisites: for Vietnamese 301, Vietnamese 202 or permission of instructor; for Vietnamese 302, Vietnamese 301. T. Tranviet.
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. T. Tranviet.
Various topics according to need.

[VTLIT 222–223 Introduction to Classical Vietnamese @ #
222, fall; 223, spring. 3 credits. Prerequisite: qualification in Vietnamese or permission of instructor. Not offered 1999–2000. K. Taylor.
This is the first semester of a two-semester sequence of courses introducing students to Han (Classical Chinese as used in the Vietnamese language) and Nom (vernacular Vietnamese character writing). Students will learn to read Han and Nom texts, mostly from the 17th through 19th centuries, including historical records, prose writings, and poetry.]

VTLIT 224 Continuing Classical Vietnamese @ #
Fall. 3 credits. K. Taylor.
This course continues study for students who have completed VTLIT 222–223 "Introduction to Classical Vietnamese."

Related Courses in Other Departments and Colleges

Check the primary department section for the offering status of the following courses. Courses in other colleges will count as College of Arts and Sciences credit only for Asian Studies majors.

Asia/General Courses

ARME 464 Economics of Agricultural Development (also ECON 464)

ARME 665 Food and Nutrition Policy (also NS 685)

ARME 666 Economics of Development (also ECON 466)

[ARME 667 Topics in Economic Development (also Economics 770)]

COMM 424/624 Communication in the Developing Nations

COMM 685 Training and Development: Theory and Practice (also INTAG 685 and EDUC 685)

[CRP 777 Theories of Development and Underdevelopment]

ECON 473 Economics of Export-Led Development @

[GOVT 348 Politics of Industrial Societies]

[GOVT 349 Political Role of the Military]

[GOVT 648 Graduate Seminar in Political Economy of Change: Rural Development in the Third World]

GOVT 674 Theory and Practice of Nationalism

ART H 280 Introduction to Art History: Approaches to Asian Art @#

ART H 580 Problems in Asian Art

ILRIC 637 Labor Relations in Asia

R SOC 205 Rural Sociology and International Development

China—Area Courses

ANTHR 655 East Asia: Readings in Specific Problems

ART H 380 Introduction to the Arts of China

ECON 469 Economy of China @

ECON 772 Economics of Development

[GOVT 334 Political Economy of East Asia]

[GOVT 347 Government and Politics of China @]

[GOVT 438 Contemporary China: Political Economy]

GOVT 645 Chinese Politics

HDFS 467 Psych & Social Issues of Asian American Identity

HIST 243 China and the West before Imperialism @ #

HIST 293 History of China up to Modern Times @ #

HIST 492 Undergraduate Seminar in Medieval Chinese History @ #

HIST 791–792 Seminar in Medieval Chinese History

ART H 481 The Arts in Modern China @

ILRIC 332–532 Labor in Developing Economies

Japan—Area Courses

ANTHR 345 Japanese Society

ANTHR 655 East Asia: Readings in Specific Problems

ARCH 339 Elements, Principles, and Theories in Japanese Architecture

HIST 230 Japan and the Pacific War

HIST 298 State, Society, and Culture in Modern Japan @

HIST 420 Tale of Genji in Historical Perspective @ #

HIST 497 Premodern Japan-Historical Perspectives @ #

HIST 709 Seminar in History and Memory: The Asia-Pacific War

HIST 798 Seminar in Japanese Thought

ILRHR 656 International Human Resource Management

ILRHR 690 Comparative Human Resource Management

ILRIC 333/533 Western Europe, United States, and Japan in a Changing World Economy

LING 115 Language and Culture

LING 314 Introduction to Historical Linguistics

MUSIC 481 Japanese Music: Style and Tradition
NBA 580 Strategies for Global Competitiveness
NBA 589 Business in Japan

South Asia—Area Courses

[ANTHR 275 Human Biology and Evolution (also BIOES 275 and NS 275)]
ANTHR 321 Sex and Gender
ANTHR 339 Peoples and Cultures of the Himalayas @
ANTHR 406 Culture of Lives
ANTHR 621 Sex and Gender
ANTHR 640–641 South Asia: Readings in Specific Problems
[ANTHR 673 Human Evolution: History, Concepts, and Theory (also BIOES 673)]
ARCH 342 Architecture as a Cultural System
ARCH 386 India the Visual Tradition
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 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
CRP 671 Seminar in International Planning
ECON 475 Economic Problems of India
HDFS 436 Language Development (also PSYCH 436 and LING 436)
HDFS 633 Seminar on Language Development
LING 701–702 Directed Research

Southeast Asia—Area Courses

ANTHR 322 Magic, Myth, Science, and Religion (also RELST 322) @
ANTHR 335 People and Cultures of Mainland Southeast Asia @
ANTHR 420 Development of Anthropology Thought
[ANTHR 424 Anthropology Amongst Disciplines @]
ANTHR 619 Anthropology Approaches to Study of Buddhism(s) in Asia
[ANTHR 628 Political Anthropology: Indonesia]
ANTHR 634–635 Southeast Asia: Readings in Special Problems
HIST 244 History of Siam and Thailand
HIST 396 Southeast Asian History from the Eighteenth Century @
HIST 695 Early Southeast Asia: Graduate Proseminar
HIST 696 Modern Southeast Asia: Graduate Proseminar
HIST 795–796 Seminar in Southeast Asian History
ART H 395 The House and The World: Architecture in Asia
ART H 490 Art and Collecting: East and West
LING 230 Introduction to Southeast Asian Languages and Linguistics @
LING 301 Phonology I (general linguistics)
LING 405–406 Sociolinguistics
LING 600 Field Methods
LING 601 Topics in Phonology (general linguistics)
LING 701–702 Directed Research
MUSIC 245 Gamelan in Indonesian History and Cultures @
MUSIC 445–446 Cornell Gamelan Ensemble
MUSIC 604 Ethnomusicology

ASTRONOMY

J. F. Veverka, chair (312 Space Sciences Building, 255–6920); M. P. Haynes, director of undergraduate studies (530 Space Sciences Building 255–0610); J. F. Bell, J. A. Burns, D. B. Campbell, D. F. Chernoff, J. M. Cordes, M. M. Davis, S. S. Eikenberry, E. E. Flanagan, P. J. Gierasch, R. Giovanelli, P. F. Goldsmith, T. L. Herter, J. R. Houck, D. Lai, R. V. E. Lovelace, P. D. Nicholson, C. J. Salter, S. W. Squyres, G. J. Stacey, Y. Terzian, S. A. Teukolsky, J. F. Veverka, I. M. Wasserman. Emeritus: T. Gold, T. Hagfors, M. O. Harwit, E. E. Salpeter

Cornell's astronomy faculty, research staff, and graduate students are active in diverse areas of modern astronomy ranging from theoretical astrophysics and general relativity to radio and radar astronomy, infrared and optical astronomy, and the exploration of the solar system. Cornell operates two local optical observatories, the world's largest radio telescope at Arecibo, Puerto Rico, and with two other institutions, the 200-inch optical telescope at Mt. Palomar in California. The department faculty are also Principal Investigators on several major NASA space and planetary exploration missions.

The department offers a number of courses to satisfy a general interest in astronomy. These courses have few or no prerequisites and are not intended for the training of professional astronomers. Among the introductory courses, several choices are available, depending on background and on the requirements to be fulfilled. The 100-level courses are designed primarily for non-science majors. The alternative introductory sequence Astronomy 211–212 is geared toward sophomore physical science and engineering majors and requires coregistration in beginning calculus. Astronomy 201 and 202 are intended for students with an interest in astronomy but no scientific background; they are topical rather than survey-oriented. Astronomy 332 is designed for physical science and engineering majors as an introduction to astrophysics. Other courses at the 200 and 300 levels may appeal to students of various backgrounds and interests, as indicated in the individual course descriptions.

Courses numbered above 400 are intended for students who have had two to three years of college physics and at least two years of college mathematics. Astronomy 440, Independent Study, permits students to engage in individual research projects under the guidance of a faculty member.

Interested students are encouraged to become members of the undergraduate Cornell Astronomy Club. The club has access to the Fuertes Observatory on campus and conducts regular observing and astrophotography sessions. All students are invited to visit the Space Sciences Building, see the exhibits on display there, and consult a faculty member about career plans or choice of courses.

The Major

The purpose of the major in astronomy is to provide in-depth knowledge and education about the nature of the universe. Astronomy relies heavily on preparation in physics and mathematics. Consequently, many courses in these fields are included as prerequisites. In preparation for the major, a student would normally elect the introductory physics sequence Physics 112–213–214 or 116–217–218 and the complementary pathway in mathematics, Mathematics 111–122–221–222 or 191–192–293–294 (or equivalent). Students who anticipate undertaking graduate study are urged to elect the honors physics sequence Physics 116–217–218–318–327 if possible. The sophomore seminar, Astronomy 233 "Topics in Astronomy and Astrophysics," will provide an introduction to current research in astronomy and astrophysics for prospective majors, but is not required of students who elect to major in astronomy after the sophomore year. Students are also urged to acquire computer literacy. Acceptance to the major will first be considered after completion of three semesters of introductory physics and mathematics and in general will require a GPA of 3.20 in physics and mathematics courses.

The major requirements stress the importance of building a strong preparation in physical science. The following upper level courses are normally required:

Physics 314 or 318, 316, 323 or 327, 341 and 443

Mathematics 420 and 422 (or equivalent, e.g. A&EP 321–2)

Astronomy 410, 431, and 432.

Students interested in planetary studies may substitute one or more appropriate advanced courses upon consent of the major adviser or may pursue an independent major under the program in the Science of Earth Systems. In addition, majors are also encouraged to supplement the above courses with any astronomy, physics, or other appropriate courses at or above the 300 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 under the course Astronomy 440 or to apply to a variety of programs at Cornell, Arecibo, and elsewhere that offer undergraduates summer employment as research assistants. Nearly all undergraduate majors and concentrators become involved in research projects in the upperclass years.

Students whose interest in astronomy is sparked somewhat late in their undergraduate career 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 Advisers Committee of the astronomy faculty.

Double majors. A double major in astronomy and another subject is possible in many circumstances. However, the set of courses used to fulfill the requirements for each major must be completely independent.

Concentration. The concentration in astronomy for other majors normally requires 12 credits, at least 8 of which must be at the 300 level or above. Astronomy 233 is recommended for sophomores planning to concentrate in astronomy.

Distribution Requirement

All courses in astronomy, except Astronomy 233, may be used to fulfill the science distribution requirement in the Colleges of Arts and Sciences.

Courses

ASTRO 101 The Nature of the Universe
Fall. 4 credits. No prerequisites. Labs and discussions limited to 30 students each. T. Herter, labs: J. Bell.
This course introduces students to the cosmos. The birth, evolution, and death of stars, the formation of the chemical elements, and the nature of white dwarfs, neutron stars, and black holes are discussed. An introduction to the theories of special relativity and general relativity is given. The course covers the search for other worlds outside the solar system and the possible existence of life and intelligence elsewhere in the universe. Modern theories of cosmology are presented, and the origin, structure, and fate of the universe are discussed. The full notes for the course as well as sample exams and simulations are made available on the web.

ASTRO 102 Our Solar System
Spring. 4 credits. No prerequisites. Labs and discussions limited to 30 students each. J. Veverka; labs: J. Bell.
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: theories of formation; 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).

ASTRO 104 Our Solar System
Spring. 3 credits.
Identical to Astronomy 102 except for omission of the laboratory (see description above).

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.

[ASTRO 109 Freshman Writing Seminar: Questions in Astronomy?
Spring. 3 credits. Not offered 1999–2000.
This class, an introduction to critical, logical thought, will present the basics of the scientific method, how science works in practice, and scientific standards of evidence. We will discuss the evolution of repeatable data into natural law and ideas into accepted theories. Historical illustrations will be drawn from the Copernican Revolution, the Big Bang Theory, and the Search for Extraterrestrial Intelligence. We will also examine pseudoscienes such as astrology and ufology, compare them to their scientific counterparts, and demonstrate that they consistently fail to meet rigorous scientific standards. Students will be asked to write logical criticism of items in the news and assigned readings from Carl Sagan's *Demon-Haunted World* and James Burke's "Connections," and design and report on their own small scientific experiments.]

ASTRO 195 Observational Astronomy
Fall. 3 credits. Limited to 20 students. G. Stacey.
This course provides a "hands-on" introduction to observational astronomy intended for liberal arts students at the freshman and sophomore level. High school mathematics is assumed, but there are no formal prerequisites. The course objective is to teach how we know what we know about the Universe. The course is set up with 2 lectures and 1 evening laboratory per week. Not all of the evening sessions will be used. Planned exercises include 5 or 6 observational labs (star gazing with binoculars and small telescopes, telescopic observations and CCD imaging of star clusters, nebulae and the planets, solar observations, radio observations of the Milky Way Galaxy), plus a selection of exercises from the following: construction and use of simple instruments such as optical spectroscopes and sun dials; experiments in planetary cratering; collection and study of micrometeorites; computer simulations of planetary orbits and the effects of obliquity on planetary weather; and cosmological explorations using data from the Hubble Space Telescope available on the World Wide Web.

ASTRO 201 Our Home in the Universe
Fall. 3 credits. Assumes no scientific background. Course intended for freshmen and sophomores. R. Giovanelli, 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. Several main themes are covered over the course of the semester: (1) our view of the night sky from the ancient Greeks to the Hubble Space Telescope; (2) the death of stars and the formation of black holes; (3) dark matter and the structure of galaxies 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 is required. Course intended for freshmen and sophomores. J. Bell.
This writing course is designed to develop an understanding of our home planet as a member of a diverse and fascinating family of objects in our solar system. Discussion will center on how studies of other planets and satellites have broadened our knowledge and perspective of Earth, and vice versa. We will study, debate, and learn to write critically about important issues of science, ethics, and public policy that have emerged from this new found perspective. Topics to be discussed include global warming, nuclear winter, the impact threat, and the searches for extrasolar planets and extraterrestrial intelligence. Our exploration of these and other topics will be up-to-date, interactive, and possibly controversial.

ASTRO 211 Astronomy: Stars, Galaxies, and Cosmology
Fall. 4 credits. Intended for engineering and physical sciences freshmen and sophomores. Prerequisite: introductory calculus or coregistration in Mathematics 111 or 191. J. Houck.
The formation and evolution of normal stars, supernovae, pulsars, and black holes. The interstellar medium. Cosmology and the structure and evolution of galaxies.

ASTRO 212 The Solar System: Planets, Satellites, and Rings
Spring. 4 credits. Intended for first and second year engineering and physical sciences students. Prerequisite: introductory calculus or coregistration in Mathematics 111 or 191; some knowledge of classical physics (mechanics and thermodynamics). P. Nicholson, D. Campbell.
An introduction to the solar system, with emphasis on the application of simple physical principles. Topics will include the Sun, nucleosynthesis of the elements, radioactive dating, seismology and planetary interiors, planetary surfaces and atmospheres including greenhouse models, orbital mechanics and resonances, interrelations between meteorites, asteroids and comets, the Jovian planets, icy moons and ring systems, and the search for extra-solar planets.

ASTRO 233 Topics in Astronomy and Astrophysics
Fall. 2 credits. Prerequisites: Physics 112 or 116 and 213 or 217, Mathematics 112, 122, or 192, or permission of instructor. Intended for sophomores planning to major in astronomy or related fields. D. Chernoff.
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 280 Space Exploration
Spring. 3 credits. S. Squyres.
This course provides an overview of space science, with particular emphasis on the solar system, and a detailed examination of a few selected objects, including the planet Mars, the

satellites in the outer solar system, and comets. The focus is on methods of collecting information and especially on spacecraft and space missions. Topics will include the design and limitations of instruments. Ethical and political questions associated with space exploration will be discussed. Intended for students with an interest in science, technology, and associated policy issues. No special background in physical sciences, math, or engineering is assumed.

ASTRO 290 Relativity and Astrophysics
Spring. 4 credits. Prerequisites: knowledge of freshman physics, calculus, and geometry. I. Wasserman.
This course provides a geometrically based introduction to special and general relativity, followed by consideration of astrophysical applications. Included will be discussion of tests of Einstein's theory of space, time, and gravitation; physics of white dwarfs, neutron stars, and black holes; introduction to modern cosmology.

ASTRO 299 Search For Life in the Universe
Spring. 4 credits. Prerequisites: two courses in any physical science subject or permission of instructor. J. Cordes, S. Eikenberry.
The contents of the universe will be surveyed. Theories of cosmic and stellar evolution, and of the formation and evolution of planetary systems, planetary atmospheres and surfaces will be reviewed. Questions regarding the evolution of life and the development of technology will be discussed. Methods to detect extraterrestrial life with emphasis on radio telescopes and associated instrumentation will be presented. Hypothetical communication systems will be developed and discussed.

ASTRO 331 Climate Dynamics (also SCAS 331)

ASTRO 332 Elements of Astrophysics
Spring. 4 credits. Prerequisites: Math 112, 122, 192 or equivalent. Physics 213 or 217. R. Giovanelli, G. Stacey.
An introduction to astronomy, with emphasis on the application of physics to the study of the universe. Physical laws of radiation. Distance, size, mass, and age of stars, galaxies, and the universe; stellar evolution and nucleosynthesis. Supernovae, pulsars, and black holes. Galaxies and quasars. Introduction to cosmology. The structure and evolution of planets and of the solar system. Mainly intended for students of science, engineering and science education, interested in astronomy and astrophysics.

ASTRO 410 Experimental Astronomy
Fall. 4 credits. Prerequisites: Physics 214/8 (or 310 or 360), Physics 323/7 (or co-registration) or permission of instructor. J. Cordes, J. Houck, D. Campbell.
Observational astrophysics. Major experiments will involve techniques in CCD (charge-coupled-device) imaging, optical photometry, optical spectroscopy, radiometry, radio spectroscopy and radio astronomy. The experiments involve use of the Hartung-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, OH masers, and galaxies.

ASTRO 431 Introduction to Astrophysics and Space Sciences I
Fall. 4 credits. Prerequisites: mathematics above the 200 level and physics above the 300 level; Physics 443 is recommended. D. Lai.
A systematic development of modern astrophysical concepts for physical science majors. Stellar structure and evolution, stellar atmospheres, compact objects (white dwarf, neutron star and black hole), planets and brown dwarfs. Current research problems in these areas will be introduced along the way. The emphasis will be on using fundamental physics principles to explain astronomical phenomena. A variety of physics, including elements of general relativity, nuclear physics, sold state physics and fluid mechanics, will be introduced or reviewed in a quick, practical fashion and put into use in solving astrophysics puzzles. At the level of *Astrophysical Concepts* by Harwit.

ASTRO 432 Introduction to Astrophysics and Space Sciences II
Spring. 4 credits. Prerequisite: Astronomy 431 or permission of instructor. D. Chernoff.
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 expansion of the universe, metrics, Friedmann equations, dark matter, cosmological tests, the early universe, and the cosmological production of the elements.

[ASTRO 434 The Evolution of Planets
Spring. 4 credits. Not offered 1999–2000.
An introduction to the physical and chemical processes that have been active in altering the environments of planets and satellites from their original to their present state. Theories of the formation of the solar system are revealed with special emphasis on chemical differentiation of the primeval solar nebula. A critical assessment is made of how well the various theories account for the clues left in the meteorite record and how well they explain the current environments of the planets and satellites. The main ideas about the formation and evolution of terrestrial planets, satellite systems, and asteroids are considered in detail. Some specific topics included are the history of the earth-moon system, the probable evolution of Jupiter's Galilean satellites, and the comparative histories of Venus, Earth, and Mars.]

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 need to fill out an independent study form, have it signed by the instructor, and register in the department office, 510 Space Sciences Building.

[ASTRO 485 Atmospheric and Ionospheric Physics (also ELE E 485)
Fall. 3 credits. Prerequisites: Physics through 214 or equivalent, introductory chemistry, introductory differential equations. Not offered 1999–2000. Staff.
The structure and dynamics of the middle atmosphere and the ionosphere are surveyed. Topics include energy balance and thermal structure, global circulation patterns, waves that carry energy from the lower atmosphere to the upper atmosphere, ionization, production and loss of charged particles, coupling of the neutral atmosphere with electric fields, and charged particle transports. Observation techniques, including radar and in situ instruments, will be discussed. Comparisons with other planets will be made.]

[ASTRO 490 Senior Seminar Critical Thinking
Spring. 3 credits. Not offered 1999–2000.
Critical thinking in scientific and nonscientific contexts. Topics will include elements of classical logic and rhetoric, including standards of evidence. Case studies will include examples of competing hypotheses in the history of science, as well as examples from borderline science and medicine, religion, and politics. Stress will be laid on creative generation of alternative hypotheses and their winnowing by critical scrutiny. Topics will include the nature and history of the universe, the nature of reality, the possibilities of life on other planets, and artificial intelligence.]

[ASTRO 509 General Relativity
Fall. 4 credits. Not offered 1999–2000.
For description, see PHYS 553.]

[ASTRO 510 Applications of General Relativity
Spring. 4 credits. Not offered 1999–2000.
For description, see PHYS 554.]

ASTRO 511 Physics of Black Holes, White Dwarfs, and Neutron Stars (also Physics 525)
Spring. 4 credits. D. Lai.
The formation of compact objects; neutrino and gravitational radiation from supernova collapse and neutron stars. Equilibrium configurations, equations of state, stability criteria and mass limits: the influence of rotation and magnetic fields. Pulsar phenomena. Mass flow in binary systems; spherical and disk accretion; high-temperature radiation processes. Compact X-ray sources and gamma-ray bursts. Super massive black holes and active galactic nuclei. Emphasis will be on the application of fundamental physical principles to compact objects. No astronomy or general relativity prerequisites. Text: *Physics of Black Holes, White Dwarfs, and Neutron Stars*, by Shapiro and Teukolsky. Co-registration in ASTRO 699 recommended.

[ASTRO 516 Galactic Structure and Stellar Dynamics
Fall. 4 credits. Not offered 1999–2000.
This course is an introduction to the study of the structure of galaxies via the laws of modern physics. Topics include the observed kinematics and spatial distribution of stars in the vicinity of the Sun, shapes and properties of stellar orbits, the gravitational N-body problem, collisional relaxation in stellar systems, spiral structure, galaxy classification and evolution, and cosmological results in galaxy formation.]

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 523 Signal Modeling, Statistical Inference, and Data Mining in Astronomy
Spring. 4 credits. Not offered 1999–2000.
The course aims to provide tools for modeling and detection of various kinds of signals encountered in the physical sciences and engineering. Data mining and statistical inference from large and diverse databases will also be covered. Experimental design is to be discussed. Basic topics covered include: probability theory; Fourier analysis of continuous and discrete signals; digital filtering; matched filtering and pattern recognition; spectral analysis; Karhunen-Loeve analysis; wavelets; parameter estimation; optimization techniques; Bayesian statistical inference; deterministic, chaotic, and stochastic processes; image formation and analysis; maximum entropy techniques. Specific applications will be chosen from current areas of interest in astronomy, where large-scale surveys throughout the electromagnetic spectrum and using non-electromagnetic signals (e.g., neutrinos and gravitational waves) are ongoing and anticipated. Applications will also be chosen from topics in geophysics, plasma physics, electronics, artificial intelligence, expert systems, and genetic programming. The course will be self-contained and is intended for students with thorough backgrounds in the physical sciences or engineering.]

ASTRO 525 Techniques of Optical/ Infrared and Submillimeter Astronomy
Spring. 4 credits. T. Herter, G. Stacey.
Optical/infrared and submillimeter telescopes and instrumentation will be discussed and related to current research in these fields. The course includes telescope design and general optical design (ray tracing). CCD, photoconductor, photovoltaic, bolometer, impurity band conduction, and heterodyne detection systems are presented. The instrumentation discussion includes general instrument design and specific applications to cameras, spectrographs, and interferometers. Detection limits of various systems, cryogenic techniques, and astronomical data anlaysis techniques are also discussed. Special topics include speckle interferometry and adaptive optics.

ASTRO 530 Astrophysical Processes
Spring. 4 credits. R. Giovanelli, M. Haynes.
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. Not offered 1999–2000.
Global theories of the interstellar medium-mass and energy exchange between the different phases. The role of shock waves and energic outflows in the thermal equilibrium and ionization state of gas in the galaxy. Basic astrophysical fluids and plasmas. Galactic dynamics. Observations techiques, current problems and results.]

[ASTRO 560 Theory of Stellar Structure and Evolution (also Physics 667)
Fall. 4 credits. Not offered 1999–2000.
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 Physics of the Planets
Fall. 4 credits. P. Nicholson.
An introductory survey of planetary science with an emphasis on the application of physical principles. Planetary 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 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 graduate students and seniors in astronomy, physics, and engineering.

ASTRO 571 Mechanics of the Solar System (also Theoretical and Applied Mechanics 673)
Spring. 3 credits. J. Burns.
Gravitational potential, planetary gravity fields. Free and forced rotations. Chandler wobble, polar wander, damping of nutation. Equilibrium tidal theory, tidal heating. Orbital evolution of natural satellites, resonances, spin-orbit coupling. Cassini states. Long-term variations in planetary orbits. Orbital and Rotational Chaos. Dust dynamics. Dynamics of ring systems. Seismic waves, free oscillations. Illustrative examples are drawn from contemporary research.

[ASTRO 579 Celestial Mechanics
Fall. 3 credits. Not offered 1999–2000.
For description, See T&AM 672.]

[ASTRO 590 Galaxies and the Universe
Spring. 4 credits. Not offered 1999–2000.
The universe, its constituents, its large-scale structure, and its history in the light of the major thrusts of extragalactic research. The morphology, photometry, dynamics, and kinematics of galaxies and their subsystems. Determination of masses, mass-to-light ratios, and the "missing mass." Activity in Seyferts, radio galaxies, and quasars. Binaries, groups, clusters and superclusters. The extragalactic distance scale. Galaxy formation and evolution. Confrontation of cosmological theories with observational results.]

ASTRO 599 Cosmology (also Physics 599)
Fall. 4 credits. Prerequisites: statistical physics, quantum mechanics and electromagnetic theory. I. Wasserman.
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, *Principles of Physical Cosmology*.

[ASTRO 620 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 1999–2000.
Selected topics in observational cosmology at radio wavelengths including: redshift surveys, gas stripping mechanisms, rotation curves and the distributions of mass and light, large scale 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.]

[ASTRO 621 Seminar: Planetary Radar Astronomy
Spring. 3 credits. Prerequisites: intended for graduate students and upper-level undergraduates in astronomy, engineering, and geology. A good background in undergraduate mathematics and physics is required. Not offered 1999–2000.
The application of radar to the study of the surfaces of planets, planetary satellites, asteroids, and comets. Topics covered will be target detectability and the specification of the needed antennas, transmitters, and receiving systems; data processing techniques; imaging techniques including delay-Doppler imaging, synthetic aperture radar (SAR) and interferometric SAR; target characterization from cross section, scattering laws and polarization measurements; results from earth-based and spacecraft radar observations of Mercury, Earth, the Moon, Mars, the satellites of Jupiter, the rings of Saturn, asteroids, and comets.]

ASTRO 640 Advanced Study and Research
Fall or spring. Credit to be arranged.
Guided reading and seminars on topics not currently covered in regular courses. Students need to register in the department office, 510 Space Sciences Building.

[ASTRO 652 Advanced Atmospheric Dynamics (also SCAS 652)
Spring. 3 credits. Offered alternate years. Not offered 1999–2000.
For description, see SCAS 652.]

[ASTRO 660 Cosmic Electrodynamics (also Applied and Engineering Physics 608)
Spring. 2 credits. Not offered 1999–2000.]

ASTRO 671 Seminar: Planetary Science
Fall. 3 credits. J. Veverka.
An informal series of lectures discussing the techniques used to obtain and interpret spacecraft and earth-based remote sensing data to the planets, satellites and smaller bodies in the solar system. Intended for graduate students and seniors. The emphasis this year will be on the continuing exploration of Io, Jupiter's volcanically active moon.

[ASTRO 673 Seminar: Planetary Atmospheres
Spring. 2 credits. Not offered 1999–2000.
This course will deal with motions in planetary atmospheres. Among the topics to be discussed are the Venus general circulation, dust and water transports on Mars, alternating jets on the outer planets, and compositional layering in the outer planets.]

[ASTRO 690 Seminar: Computational Astrophysics (also Physics 680)
Spring. 3 credits. Prerequisites: working knowledge of FORTRAN. Not offered 1999–2000. S. Teukolsky.
A course designed to familiarize graduate students with numerical techniques for solving diverse problems in astrophysics. Numerical methods discussed in the course will include solving ordinary and partial differential equations, linear algebra and eigenvalue problems, Monte Carlo techniques, fast Fourier transforms, etc. In contrast to traditional numercial analysis courses, the course will be "how-to," rather than theoretical. No theorems will be proved. Students will be allotted computer time to solve, both individually and in small teams, assigned numerical exercises. Text: *Numerical Recipes* by Press, Teukolsky, Vetterling, and Flannery.]

[ASTRO 699 Seminar: Problems in Theoretical Astrophysics (also Physics 665)
Fall. 2 credits. Not offered 1999–2000.
An informal seminar that will examine "New Directions in Astrophysics." The participants will discuss neutrino astronomy, LIGO (the gravitational wave observatory), high energy gamma rays and cosmic rays, laboratory searches for dark matter, and the future of optical, radio, and infrared astronomy, both on the ground and in space. The seminar is open to all graduate students.]

ASTRO 699 Seminar: Observational High Energy Physics (also Physics 665)
Spring. 2 credits. ASTRO 511 (PHYS 525) is strongly recommended as a co- or prerequisite. S. Eikenberry.
This is a seminar for graduate students, and is intended as a companion course to ASTRO 511 (PHYS 525). The seminar will take an approach to understanding compact objects (primarily black holes and neutron stars) based on their observed properties, in order to complement the primarily theoretical approach of ASTRO 511. The focus will be on areas of recent progress in the field of high energy astrophysics. Topics to be covered include (but are not limited to): rotation-powered pulsars (including millisecond pulsars and magnetars), black-hole X-ray binaries, microquasars and other relativistic jet sources, X-ray bursters, kilohertz QPO sources and gamma-ray bursts.

BIOLOGICAL SCIENCES

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 available to students enrolled in either the College of Agriculture and Life Sciences or the College of Arts and Sciences. Student services associated with the major, such as the Behrman Biology Center and the Office of Undergraduate Biology, 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; systematics and biotic diversity 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 details about the biology curriculum, see the section in this catalog on Biological Sciences.

BIOLOGY AND SOCIETY MAJOR

See under Special Programs and Interdisciplinary Studies.

BURMESE

See Department of Asian Studies.

CAMBODIAN

See Department of Asian Studies.

CHEMISTRY AND CHEMICAL BIOLOGY

P. L. Houston, chair (122 Baker Laboratory, 255–4174); R. C. Fay, director of undergraduate studies; H. D. Abruña, A. C. Albrecht, B. A. Baird, T. P. Begley, J. M. Burlitch, B. K. Carpenter, R. A. Cerione, J. C. Clardy, G. W. Coates, D. B. Collum, H. F. Davis, F. J. DiSalvo, S. E. Ealick, G. S. Ezra, R. C. Fay, J. H. Freed, B. Ganem, M. A. Hines, R. Hoffmann, P. L. Houston, S. Lee, R. F. Loring, T. McCarrick, J. E. McMurry, J. Meinwald, S. O. Russo, D. Y. Sogah, D. A. Usher, B. Widom, C. F. Wilcox, P. T. Wolczanski, D. B. Zax

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 information and perspectives, and affords opportunities for students to participate in research.

The Standard Major

The chemistry major at Cornell provides a great deal of flexibility and prepares students for a large variety of career options. In recent years, chemistry majors have gone on to graduate study in chemistry, medicine, law, and business management, as well as directly into positions with chemical, pharmaceutical, and other industrial companies. A major in chemistry can also provide the basis for work in related areas such as molecular biology, chemical physics, geochemistry, chemical engineering, materials science, solid state physics, and secondary education. The required courses for the major can be completed in three years, leaving the senior year open for advanced and independent work under the supervision of a professor.

The courses are arranged as a progression, with some (including mathematics and physics) prerequisite to those that are more advanced. During the first year, a student should normally register for general chemistry (preferably Chemistry 215–216 although Chemistry 207–208 or 206–208 is acceptable), mathematics, a freshman writing seminar, a foreign language if necessary, or physics. Chemistry 215–216 is aimed at those students with good preparation and a strong interest in chemistry. Students who do not know if their preparation is adequate should consult the instructor. In the second year a student should complete calculus and take physics and organic chemistry (Chemistry 359–360 is preferred to Chemistry 357–358). The second-year laboratory courses include 300, Quantitative Chemistry 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 and Chemical Biology 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, 300; or 207–208, 300; or 211, 208, 300; or 206, 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. 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.

Honors. 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 at least 4 credits of research at Cornell.

Prospective candidates should discuss their plans with advisers by March 1 of their junior year; participants are notified by early January of their senior year. To be awarded honors, candidates must show outstanding performance in at least 8 credits of undergraduate research such as is offered in Chemistry 421, 433, 461, or 477. In addition, the writing of a thesis in the honors seminar (Chemistry 498) is expected.

The Alternative Major

The alternative major is a flexible program that provides core coverage of chemistry around which students can design a program to meet their own career goals. Requirements consist of a core program along with four additional courses chosen by the student. One of the four must be in chemistry at the 300 level or above; the other three may be in another field but should represent a cohesive plan and must be approved by a departmental committee.

The Core Program for the Alternative Major

1) Chemistry 215–216, 300 (or 207–208, 300; or 211, 208, 300; or 206, 208, 300); 251, 257, 287, 289, and 410 (Chem 357–358 or 359–360 can be substituted for Chem 257, or Chem 389–390 can be substituted for Chem 287, thereby fulfilling the requirement for an additional 300-level chemistry course)
2) Mathematics 111–112; or 111, 122; or 191–192
3) Physics 207–208; or 112, 213

Additional Courses for the Alternative Major

Possible plans for the remaining three courses might include programs in Biochemistry; Biology; Physics; Computer Science; Polymers; Materials Science; Science, Technology, and Society; History and Philosophy of Science and Technology; Business and Management; Economics; Education; and others.

Premedical students and those interested in pursuing double majors might find the alternative major particularly attractive. The course requirements for admission to the alternative major are the same as those for the standard major.

Program for Science Teachers

Chemistry majors who wish to become teachers will be interested to know that Cornell University offers a certification program for teachers of secondary (grades 7–12) science. Interested students apply to the program during their sophomore or junior years. If accepted, students integrate some course work in Education with the rest of their undergraduate studies. All chemistry majors who enter this program will remain in the College of Arts and Sciences to complete the major.

After earning the bachelor's degree, certification students enter the Graduate Field of Education to complete a fifth year of study at Cornell. Following this fifth year, students are eligible for a master's degree from Cornell and a teaching certificate from New York State. Additional information is available from Susie Slack, 424 Kennedy Hall, 255–9255 or Prof. Deborah Trumbull, 426 Kennedy Hall, 255–3108.

Laboratory Course Regulations

Students registered for laboratory courses who do not appear at the first meeting of the laboratory will forfeit their registration in that course.

Students and members of the teaching staff are required to wear safety goggles and lab aprons in all chemistry laboratories. Closed-toed footwear is required (no sandals). Students are reminded to take their goggles and lab aprons to the first laboratory session. Those who fail to cooperate with the safety program will be asked to leave the laboratories.

Students are required to pay for glassware and any other items broken or missing from their laboratory desks at the close of each semester. Students who fail to inventory their desks at the appointed time in the presence of their instructor are charged a $10 fee in addition to charges for any breakage.

Courses

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 105 The Language of Chemistry
Fall. 3 credits. This course contributes to meeting the College of Arts and Sciences "Physical and Biological Sciences" (Group I) distribution requirement, as well as satisfying 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: in normal class period at 12:20 p.m. 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, bombykol, and the sperm attractants of algae), the principles of chemistry to which Kornberg refers will be developed. Methods of analyzing chemical 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 106 Strategies in Science: The World of Chemistry
Spring. 3 credits. This course contributes to meeting the College of Arts and Sciences "Physical and Biological Sciences" distribution requirement (Group I) as well as satisfying 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. 29, March 30. M. A. Hines.

A general appreciation of chemistry in the everyday world which will highlight for nonscientists the way the scientific method works. The course will focus not only on what modern chemistry has accomplished, but more generally on the way scientists think and how they function.

CHEM 206 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. Lecs, M W F 11:15; dis sec, W 7:00–8:30 p.m.; 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. 5, Nov. 11. S. Lee.

An introduction to general chemistry, with emphasis on important principles and facts. Chemistry 206 covers much of the same material as Chemistry 207 plus the basics of chemical equilibrium, but does so at a slower pace.

CHEM 207–208 General Chemistry
Fall or summer, 207; spring or summer, 208. 4 credits each term. Recommended for those students who will take further courses in chemistry. Prerequisite for Chemistry 207: high school chemistry. Prerequisite for Chemistry 208: Chemistry 206 or 207. Lecs: T R 10:10 or 12:20. Lab: T R F 8–12 or M T W R F 12:20–4:25. Prelims: 7:30–9 p.m., Oct. 5, Nov. 11, Feb. 29, April 11. Fall: J. E. McMurry; spring: R. C. Fay.

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 207 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. Taking Chemistry 208 after 215 is not recommended and can be done only with the permission of the 208 instructor.

CHEM 211 Chemistry for the Applied Sciences
Fall or spring. 4 credits. Recommended for those students who intend to take only one term of chemistry. Enrollment limited. Prerequisite: high school chemistry or

permission of instructor. Corequisite: a calculus course at the level of Mathematics 111 or 191. Lecs: M W F 12:20. Lab: fall and spring, M T W R F 1:25–4:25. Prelims: 7:30–9 p.m., Sept. 23, Oct. 21, Nov. 23, Feb. 17, March 14, April 13. Fall: H. F. Davis; spring: D. B. Zax.

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

Fall, 215; spring, 216. 4 credits each term. Recommended for students who intend to specialize in chemistry or in related fields. Enrollment limited. Prerequisites: good performance in high school chemistry, physics and mathematics. Corequisite: a calculus course at the level of Mathematics 111 or 191 for students who have not taken high school calculus. Prerequisite for Chemistry 216: Chemistry 215. Lecs: M W F 12:20; lab, M T W R or F 1:25–4:25. Prelims: 7:30–9 p.m., Oct. 5, Nov. 11, Feb. 17, March 14, April 13. Fall: R. Hoffmann; spring: S. Lee.

An intensive systematic study of the laws and concepts of chemistry, with considerable emphasis on quantitative aspects. Second term includes systematics of inorganic chemistry. Laboratory work covers qualitative and quantitative analysis, transition metal chemistry, and spectroscopic techniques.

Note: Taking Chem 208 after 215 is not recommended and can be done only with the permission of 208 instructor.

CHEM 233 Introduction to Biomolecular Structure

Fall. 2 credits. Limited to 30 students. Prerequisites: CHEM 207–208 or equivalents. Lecs, T R 2:30–3:20. S. E. Ealick.

This course is intended for students with a basic understanding of chemistry who are considering a program of study in biochemistry. The interrelationship of the structure and function of biologically important molecules are explored. Emphasis is placed on understanding the way in which the three-dimensional arrangements of atoms determine the biological properties of both small molecules and macromolecules such as proteins and enzymes. The study of molecular structure is aided by interactive computer graphics for visualizing three-dimensional structures of molecules.

CHEM 251 Introduction to Experimental Organic Chemistry

Fall, spring, or summer. 2 credits. Recommended for non-chemistry majors. Enrollment limited. Prerequisites: coregistration in Chemistry 257 or 357. Lecs: fall, R 11:15 or F 8:00; spring, F 8; lab, M T W R or F 1:25–4:25, or T or R 8–11. Prelims: 7:30–9 p.m., Fall: Nov. 11. Spring: April 18. 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. 2 credits. Recommended for non-chemistry majors. Prerequisite: Chemistry 251. Lec, R 11:15; lab, W 1:25–4:25, or R 8–11. Prelims: 7:30–9 p.m. April 18. S. Russo.

A continuation of Chemistry 251.

CHEM 257 Introduction to Organic and Biological Chemistry

Spring. 3 credits. Prerequisite: Chemistry 206 or 207. Because Chemistry 257 is only a three-credit course, it does not provide a practical route to satisfying medical school requirements. Lecs, M W F 11:15. Prelims: in normal class period at 11:15. J. Meinwald.

An introduction to organic chemistry with an emphasis on those structures and reactions of organic compounds having particular relevance to biological chemistry.

CHEM 287–288 Introductory Physical Chemistry

Fall, 287; spring, 288. 3 credits each term. Prerequisites: Chemistry 208 or 216 and Mathematics 111–112 and Physics 208, or permission of instructor. Prerequisite for Chemistry 288: Chemistry 287 or 389. Lecs, M W F 9:05; 287: rec, M or W 1:25, T 9:05; 288: rec, M or W 1:25. Prelims: 7:30–9 p.m., 287: Sept. 30, Nov. 4, Nov. 30. 288: March 9, April 18. Fall: A. C. Albrecht; spring: TBA.

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 transport, kinetics, electrochemistry, spectroscopy. Chemistry 287 satisfies the minimum requirement for physical chemistry in the alternative chemistry major.

CHEM 289–290 Introductory Physical Chemistry Laboratory

Fall, 289; spring, 290. 2 credits each term. Lecs: fall, R 8:00 a.m.; spring, R 8:00 or 9:05. Lab: fall, M T 1:25–4:25; spring, M T W R 1:25–4:25. T. McCarrick.

A survey of the methods basic to the experimental study of physical chemistry, with a focus on the areas of kinetics, equilibrium, calorimetry and molecular spectroscopy.

CHEM 300 Quantitative Chemistry

Fall. 2 credits. Prerequisite: Chemistry 208, or Chemistry 216 or advanced placement in chemistry. Lec, R 10:10; lab, M T W R F 12:20–4:25 or T 8–12. Prelim: 7:30–9 p.m., Oct. 21, Nov. 16. J. M. Burlitch.

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 Experimental Chemistry I

Spring. 4 credits. Prerequisites: Chemistry 300, and 357 or 359. Lec, 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. J. M. Burlitch.

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. Laboratory techniques and the theoretical basis for the separation and characterization techniques used will be discussed in the lectures.

CHEM 302 Experimental Chemistry II

Fall. 4 credits. Enrollment limited; preference given to chemistry majors. Prerequisite: Chemistry 301. Lecs, M W F 9:05; 2 labs, M W 1:25–4:25, T R 8–11 or T R 1:25–4:25. B. A. Baird.

Instrumental methods of analysis, including chemical microscopy, UV, IR and AA spectroscopies, and gas chromatography. The design, execution, and analysis of experiments is stressed.

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. H. D. Abruña.

An introduction to experimental physical chemistry, including topics in calorimetry, spectroscopy and kinetics. The analysis and numerical simulation of experimental data is stressed.

CHEM 357–358 Organic Chemistry for the Life Sciences

Fall or summer, 357; spring or summer, 358. 3 credits each term. Prerequisite for Chemistry 357: Chemistry 208 or 216 or advanced placement; recommended: concurrent registration in Chemistry 251 or 300. Prerequisite for Chemistry 358: Chemistry 357 or permission of the instructor. Lecs, M W F 9:05 or 10:10, optional rec may be offered. Prelims: 7:30–9 p.m., Sept. 30, Oct. 19, Nov. 16, Feb. 17, March 14, April 13. Fall: B. K. Carpenter; spring: J. C. Clardy.

A study of the more important classes of carbon compounds—especially those encountered in the biological sciences. Emphasis will be placed on their three-dimensional structures, mechanisms of their characteristic reactions, their synthesis in nature and the laboratory, methods of identifying them, and their role in modern science and technology.

Note: Because of duplication of material, students who take both Chemistry 257 and 357 will receive graduation credit only for Chemistry 257.

CHEM 359–360 Organic Chemistry I and II

Fall, 359; spring, 360. 4 credits each term. Recommended for students who intend to specialize in chemistry or closely related fields. Enrollment limited. Prerequisites: Chemistry 216 with a grade of B or better, Chemistry 208 with a grade of A or better, or permission of instructor. Prerequisite for Chemistry 360: Chemistry 359. Recommended: coregistration in Chemistry 300–301–302. Lecs, M W F 9:05; dis sec, W 7:30 p.m.; prelims, 7:30–9:00 p.m., Sept. 22, Oct. 20, Nov. 10, Spring: 7:30–9:00 p.m., Feb. 9, March 8, April 5. Fall: B. Ganem; spring, G. W. Coates.

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
Fall, 389; spring, 390. 4 credits each term. Prerequisites: Mathematics 213 or, ideally, 221–222; Physics 208; Chemistry 208 or 216 or permission of instructor. Prerequisite for Chemistry 390: Chemistry 389. Lecs, 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: Sept. 30, Nov. 2, Nov. 30. 390: Feb. 17, March 14, April 13. Fall: M. A. Hines; spring: 390: H. F. Davis.
The principles of physical chemistry are studied from the standpoint of the laws of thermodynamics, kinetic theory, statistical mechanics, and quantum chemistry.

CHEM 391 Physical Chemistry II (also CHEM E 391)
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 1:25 or T 9:05; T. M. Duncan.
The study of two topics: (1) Quantum chemistry—the electronic structure of atoms, molecules, and condensed matter; the interaction of electromagnetic radiation with matter for spectroscopy and chemical reaction. (2) Chemistry kinetics—reaction rate laws from experimental data and reaction mechanisms; approximation methods and applications to polymerization and heterogeneous catalysis.

CHEM 404 Entrepreneurship in Chemical Enterprise
Spring. 1 credit. Lecs, T 2:55–4:10. B. Ganem.
Designed to acquaint students with the problems of planning, starting, and managing a new scientifically oriented business venture, the course will consist of six weekly 90-minute meetings focusing on case studies and assigned reading, as well as outside lectures by entrepreneurs in the chemical, pharmaceutical, and biotechnology industries. Topics will include new technology evaluation and assessment, business formation, resource allocation, management development, as well as manufacturing and sales issues.

[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 times to be arranged. Not offered 1999–2000. J. M. Burlitch.
The syntheses of complex organic, organometallic, and inorganic molecules are carried out with emphasis on the following techniques: vacuum line, high pressure, high-temperature solid state, inert atmosphere, nonaqueous solvents, radioactive labeling, sol-gel, photochemical and electrochemical methods, solid phase peptide synthesis, and polymer synthesis. Elementary glassblowing.]

CHEM 410 Inorganic Chemistry
Fall. 4 credits. Prerequisites: Chemistry 358 or 360, and 287 or 390. Lecs, M W F 11:15. Prelims: 7:30–9:00 p.m., Sept. 23, Oct. 21, Nov. 18. P. T. Wolczanski.
A systematic study of the synthesis, structure, bonding, reactivity and uses of inorganic compounds, organometallic complexes and solid state species.

CHEM 421 Introduction to Inorganic Chemistry Research
Fall or spring. 2–4 credits. Prerequisites: Chemistry 303 and 389–390, or Chemistry 287–288, and Chemistry 289–290 with an average of B– or better, or permission of instructor. Selected faculty.
Research in inorganic chemistry involving both laboratory and library work, planned in consultation with a faculty member.

CHEM 433 Introduction to Analytical Chemistry Research
Fall or spring. 2–4 credits. Prerequisites: Chemistry 303 and 390 with an average of B– or better or permission of instructor. Selected faculty.
Research in analytical chemistry involving both laboratory and library work, planned in consultation with a faculty member.

CHEM 461 Introduction to Organic Chemistry Research
Fall or spring. 2–4 credits. Prerequisites: Chemistry 302 and 358 or 360 with a grade of B– or better or permission of instructor. Selected faculty.
Research in organic chemistry involving both laboratory and library work, planned in consultation with a faculty member.

CHEM 477 Introduction to Physical Chemistry Research
Fall or spring. 2–4 credits. Prerequisite: Chemistry 390 with an average of B– or better or permission of instructor. Selected faculty.
Research in physical chemistry involving both laboratory and library work, planned in consultation with a faculty member.

CHEM 498 Honors Seminar
Spring. No credit. Admission 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 421, 433, 461, or 477 and summer research equivalent to at least 4 credits in the same subject. W 2:30–4. R. Hoffman.
Informal presentations and discussions of selected topics in which all students participate. Professional issues will be discussed, including graduate education, publication, techniques of oral and audiovisual presentation, employment, ethics, chemistry in society, and support of scientific research. Individual research 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
Fall, 600; spring, 601. No credit. Required of all graduate students except those majoring in organic or bioorganic chemistry. Juniors and seniors are encouraged to attend. R 4:40. D. B. Zax.
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 602 Information Literacy for the Physical Scientist
Spring. 1 credit. Primarily for undergraduate chemistry majors doing research and first-year graduate students. Lec, W 4:45–6:00. Not offered 1999–2000.
An introduction to physical science information research methods, including use of paper and electronic resources. With the continued information explosion, much time can be wasted and important information missed unless an efficient information research strategy is developed. This course demonstrates the use of library and other information resources as a method to critically evaluate the success of research projects. Text: *Journal Literature of the Physical Sciences* by Alice Leffer Primack and *Chemical Information Sources* by Gary Wiggins.]

CHEM 605 Advanced Inorganic Chemistry I: Symmetry, Structure, and Reactivity
Fall. 4 credits. Prerequisite: Chemistry 389–390 or equivalent or permission of instructor. Lecs, M W F 11:15. R. C. Fay.
Selected topics in structure, bonding, and reactivity of inorganic compounds with emphasis on main group elements; at the level of *Chemistry of the Elements*, by Greenwood and Earnshaw. Group theory applications: hybrid orbitals, molecular orbitals, molecular vibrations, and ligand field theory; at the level of Cotton's *Chemical Applications of Group Theory*.

[CHEM 606 Advanced Inorganic Chemistry II: Synthesis, Structure, and Reactivity of Coordination Compounds, and Bioinorganic Chemistry
Spring. 4 credits. Lecs, M W F 10:10. Not offered 1999–2000. P. T. Wolczanski.
Synthesis, structure, and reactivity of modern coordination compounds; oxidation and bioinorganic chemistry. Emphasis on bonding models, structure, and reactivity, including the elucidation of mechanisms. Readings at the level of Purcell and Kotz's *Inorganic Chemistry*, and Jordan's *Reaction Mechanisms of Inorganic and Organometallic Systems*.]

[CHEM 607 Advanced Inorganic Chemistry III: Solid-State Chemistry
Spring. 4 credits. Prerequisite: Chemistry 605 or permission of instructor. Lecs, M W F 11:15. Not offered 1999–2000. F. J. DiSalvo.
The third in a three-term sequence. Interdisciplinary approach to solids. Topics include solid-state structure and X-ray diffraction, synthesis methods, defects in solids, phase diagrams, electronic structure, and chemical and physical properties of solids. Text: *Solid State Chemistry and Its Applications*, by West. Readings from inorganic chemistry and solid-state physics texts.]

CHEM 608 Organometallic Chemistry
Spring. 4 credits. M W F 10:10. P. T. Wolczanski.
Synthesis, structure, and reactivity of organotransition metal complexes. Current literature is emphasized, and background readings are at the level of Collman, Hefedus, Finke and Norton's "Principles and Applications of Organotransition Metal Chemistry".

[CHEM 622 Chemical Communication
Fall. 3 credits. Lecs, M W F 10:10. Not offered 1999–2000. J. Meinwald, T. Eisner.
For description, see BIONB 623.]

CHEM 625 Advanced Analytical Chemistry I
Spring. 4 credits. Prerequisite: Chemistry 288 or 390 or equivalent. Lecs, M W F 9:05; occasional prelims W 7:30 p.m. C. F. Wilcox.
The application of molecular spectroscopy to chemical problems. Topics in infrared, NMR, and mass spectroscopy are discussed.

[CHEM 627 Advanced Analytical Chemistry II
Spring. 3 credits. Primarily for graduate students. Prerequisite: Chemistry 390 or equivalent; but Chemistry 793 or equivalent would be helpful. Lecs, M W F 12:20. Not offered 1999–2000. D. B. Zax.
Modern techniques in nuclear magnetic resonance. Little overlap is expected with Chem 625, as this course will focus on more general questions of experimental design, understanding of multipulse experiments, and aspects of coherent averaging theory. Example to be taken from both liquid and solid-state NMR. May also be of interest to other coherent spectroscopies.]

CHEM 628 Isotopic and Trace Element Analysis (also Nutritional Sciences 690)
Spring. 3 credits. Primarily for graduate students and advanced undergraduates. Prerequisite: Chemistry 288 or 390 or 302, or Chemistry 208 and Mathematics 112, or permission of instructor. Offered alternate years. Lecs T R 10:10. J. T. Brenna.
Survey course in modern high precision isotope ratio mass spectrometry (IRMS) techniques and trace/surface methods of analysis. Topics include dual inlet and continuous flow IRMS, thermal ionization MS, inductively coupled plasma MS, atomic spectroscopy, ion and electron microscopies, X-ray and electron spectroscopies, and biological and solid state applications.

CHEM 629 Electrochemistry
Fall. 4 credits. Primarily for graduate students and upperclass undergraduates. Prerequisite: Chemistry 390 or equivalent (Mathematics 213 helpful). Lecs, T R 8:40–9:55. H. D. Abruña.
Fundamentals and applications of electrochemistry. Topics will include the fundamentals of electrode kinetics, electron transfer theory, the electrical double layer, diffusion, and other modes of transport. A wide range of techniques and their application as well as instrumental aspects will be covered.

CHEM 650–651 Organic and Organometallic Chemistry Seminar
Fall, 650; spring, 651. No credit. Required of all graduate students majoring in organic or bioorganic chemistry. Juniors and seniors are encouraged to attend. M 4:30. D. Y. Sogah.
A series of talks representative of all fields of current research interest in organic and organometallic chemistry, given by research associates, faculty members, and distinguished visitors.

CHEM 665 Advanced Organic Chemistry
Fall. 4 credits. Primarily for graduate students and upperclass undergraduates. Prerequisites: Chemistry 358 or 360, and 390 or equivalents or permission of instructor. Lecs, M W F 12:20. D. B. Collum.
A survey of reaction mechanisms and reactive intermediates in organic chemistry.

CHEM 666 Synthetic Organic Chemistry
Spring. 4 credits. Primarily for graduate students and upperclass undergraduates. Prerequisite: Chemistry 665 or permission of instructor. Lecs, T R 10:10–11:25. B. Ganem.
Modern techniques of organic synthesis; applications of organic reaction mechanisms and retrosynthetic analysis to the problems encountered in rational multistep synthesis, with particular emphasis on modern developments in synthesis design.

CHEM 668 Chemical Aspects of Biological Processes
Fall. 4 credits. Prerequisite: Chemistry 360 or equivalent. Lecs, T R 8:40–9:55. T. P. Begley.
A representative selection of the most important classes of enzyme-catalyzed reactions will be examined from a mechanistic perspective. Topics discussed will include the chemical basis of enzymatic catalysis, techniques for the elucidation of enzyme mechanism, cofactor chemistry, 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. 4 credits. 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. Lecs, T R 10:00–11:15. G. W. Coates.
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—radical, 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 characterizations [gel permeation chromatography, viscometry, light scattering, osmometry]; bulk properties—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. Prerequisites: Organic Chemistry 359/360 or equivalent or by permission of instructor. Primarily for graduate students and advanced undergraduates. No previous knowledge of polymer chemistry is required. Knowledge of material covered in Chem 670 will be helpful but not required. Lecs, T R 8:30–10:00. D. Y. Sogah.
The objective of the course is to teach general concepts of polymer synthesis and discuss application of organic synthetic methods to the development of new polymers and the control of their architecture. Emphasis will be on modern concepts in synthetic polymer chemistry and cover topics of current interest: the study of new methods of synthesis, preparation of polymers with reactive end groups, the control of polymer stereochemistry and topology, and the design of polymers tailored for specific uses and properties. Topics on synthesis will be selected from the following: step-growth polymerization, free radical polymerization and copolymerization, Ziegler-Natta polymerization, recent developments in living free radical polymerization, anionic polymerization, cationic polymerization, group transfer polymerization, ring-opening metathesis polymerization, and cyclopolymerization.

CHEM 672 Kinetics and Regulation of Enzyme Systems
Fall. 4 credits. Primarily for graduate students with interests in biophysical chemistry. Prerequisite: Chemistry 288 or 390, BIOBN 331, or equivalents or permission of instructor. Lecs, M W F 10:10. P. L. Houston.
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. Prerequisites: Chemistry 358 or 360, and 390 or equivalents. S-U grades only. Lecs, M W 10–11:10. Not offered 1999–2000. D. A. Usher.
Properties, synthesis, reactions, and biochemical reactions of nucleic acids.]

CHEM 678 Statistical Thermodynamics
Fall. 4 credits. Primarily for graduate students. Prerequisite: Chem 390 or equivalent. Lecs, M W F 10:10. J. Marohn.
The principles of statistical thermodynamics and how they lead to classical thermodynamics. Ensembles and partition functions. Ideal gases and crystals. Thermodynamic properties from spectroscopic and structural data. Chemical equilibrium. Dense gases: virial coefficients. Statistical mechanics of solutions. Bose-Einstein and Fermi-Dirac statistics. At the level of the first twelve chapters of *Statistical Mechanics* by McQuarrie.

CHEM 681 Introduction to Quantum Chemistry
Prerequisites: one year of undergraduate physical chemistry, three semesters of calculus, one year of college physics. Lecs: T R 10:10–11:25 a.m. R. F. Loring.

An introduction to the application of quantum mechanics in chemistry. This course covers many of the topics in Chemistry 793–794 at a more descriptive, less mathematical level. The course is designed for advanced undergraduates, chemistry graduate students with a minor in physical chemistry, and graduate students from related fields with an interest in physical chemistry. At the level of *Quantum Chemistry*, by Levine, or *Molecular Quantum Mechanics* by Atkins.

[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 1999–2000.
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 approximately six weeks. This year's lecturer: Prof. Carl Lineberger, University of Colorado. Lec, T R 11:15.

[CHEM 716 Special Topics in Advanced Inorganic Chemistry (Bonding in Molecules)
Spring. 3 credits. Prerequisite: some exposure to (or a course in) quantum mechanics. A good undergraduate physical chemistry course may be sufficient, while Physics 443 or Chemistry 793 or Chemistry 794 are at a substantially higher level than what is needed. Lecs, M W F 12:20. Not offered 1999–2000. R. Hoffmann.
The purpose of this course is to build a qualitative picture of the bonding in all molecules, including organic, inorganic, organometallic systems and extended structures (polymers, surfaces and three-dimensional materials). The approach uses molecular orbital theory to shape a language of orbital interactions. Most quantum mechanic ideas needed will be taught along the way; the course is specifically directed at organic, inorganic, and polymer chemists who are not theoreticians.]

[CHEM 762 Special Topics in Organic Chemistry: Fundamentals of Polymer Chemistry
Fall. 4 credits. Prerequisite: Physical Chem 389/390 and Organic Chem 359/360 or equivalent or permission of instructor. Primarily for graduate and advanced undergraduate students. Lecs, T R 8:30–10:00. Not offered 1999–2000.
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.]

CHEM 765 Physical Organic Chemistry I
Fall. 4 credits. Primarily for graduate students. Prerequisite: Chemistry 665 or permission of instructor. Lecs, M W F 10:10. C. F. Wilcox.
Application of computational and experimental techniques to studies of organic reaction mechanisms and the properties of reactive intermediates.

[CHEM 766 Physical Organic Chemistry II
Spring. 3 credits. Primarily for graduate students. Prerequisite: Chemistry 765 or permission of instructor. Not offered 1999–2000.]

CHEM 774 Chemistry of Natural Products: Combinatorial Chemistry
Spring. 3 credits. Prerequisites: Chemistry 360 and BIOBM 330 or equivalent. Lec, M W F 10:10–11:30. T. P. Begley.
Combinatorial chemistry has revolutionized the way organic chemists think about structure function studies on biological systems and the design of inhibitors. This course will explore the design, synthesis, screening, and use of natural (i.e., peptide, protein, nucleic acid, carbohydrate) and unnatural (i.e., totally synthetic) libraries.

[CHEM 780 Chemical Kinetics and Molecular Reaction Dynamics
Fall. 4 credits. Prerequisite: Chemistry 681 or permission of instructor. Lecs, T R 10:10–11:25. Not offered 1999–2000. H. F. Davis.
Principles and theories of chemical kinetics and molecular reaction dynamics. Topics include potential energy surfaces, transition state theory, and statistical theories of unimolecular decomposition. Depending on class interest, the course will also include special topics such as surface reactions and photochemistry.]

[CHEM 782 Special Topics in Biophysical and Bioorganic Chemistry
Spring. 3 credits. Lecs, T R 11:15. Not offered 1999–2000.
Topics vary from year to year.]

[CHEM 788 Macromolecular Crystallography (also BIOBM 738)
Spring. 3 credits. S-U grades optional. Prerequisite: permission of instructor. Offered alternate years. Lecs, M W F 10:10. Not offered 1999–2000. S. E. Ealick, P. A. Karplus, J. C. Clardy.
Lectures briefly cover the fundamentals of crystallography and focus on methods for determining the 3-dimensional strucures of macromolecules. These include crystallization, data collection, multiple isomorphous replacement, molecular replacement, model building, refinement, and structure interpretation.]

[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. Not offered 1999–2000. J. C. Clardy.
A beginning course in the applications 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 available from a diffraction experiment is stressed, and practical aspects are incorporated.]

CHEM 791 Spectroscopy
Spring. 4 credits. Prerequisite: Chemistry 793 or Physics 443 or equivalent. Lecs, M W F 11:15–12:05. G. S. Ezra.
Principles of molecular rotational, vibrational, and electronic spectroscopy. Topics include: interaction of molecules with radiation; Born-Oppenheimer approximation; diatomic molecules; polyatomic molecules; feasible operations and the moelcular symmetry group; spectroscopy, dynamics, and IVR. At the level of Kroto's *Molecular Rotation Spectra*.

[CHEM 792 Molecular Collision Theory
Spring. 4 credits. Lecs, T R 10:10–11:25. Not offered 1999–2000. 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. G. S. Ezra.
Schrodinger's equation, wave packets, uncertainty principle, WKB theory, matrix mechanics, orbital and spin angular momentum, exclusion principle, perturbation theory, variational principle. 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 A&EP 322, or permission of instructor. Lecs, T R 10:10–11:25. J. H. Freed.
Time-dependent phenomena in quantum mechanics and light/matter interaction. Group theory. Quantum structure of atoms and molecules. 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 8:30–9:55. B. Widom.
Statistical mechanics of systems of interacting molecules. Structure and thermodynamics of classical liquids. Phase transitions and critical phenomena. Inhomogeneous fluids. Introduction to non-equilibrium statistical mechanics. Students are presumed to have taken a course in statistical thermodynamics at the level of the first twelve chapters of *Statistical Mechanics*, by McQuarrie.

[CHEM 798 Special Topics in Physical Chemistry (Chemical Bonding in Polymers, Surfaces and the Solid State)
Spring. 4 credits. Prerequisite: Chemistry 605, or 681, or 793, or Physics 443, or the equivalent. Lecs, T R 10:10–11:25. Not offered 1999–2000. R. Hoffmann.
The qualitative aspects of the electronic structure and chemical bonding on extended one-, two-, and three-dimensional systems will be discussed, in a way accessible to a wide range of inorganic and organic chemists, and to engineers and physicists as well.]

CHINESE

FALCON Program (Chinese)

See Department of Asian Studies.

CLASSICS

J. Rusten (chair), L. S. Abel, F. M. Ahl, C. Brittain, K. Clinton, J. E. Coleman, G. Fine, J. R. Ginsburg (director of undergraduate studies), E. Hohendahl, G. Holst-Warhaft, T. Irving, G. M. Kirkwood (emeritus), H. Kolias, D. Mankin, G. M. Messing (emeritus), C. Minkowski, A. Nussbaum, H. Pelliccia (director of graduate studies), P. Pucci, H. R. Rawlings III, J. Reed, J. L. Rife, D. R. Shanzer, B. Strauss

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 eleven faculty members, together with professors of related interests in the departments of History, Philosophy, Comparative Literature, History of Art, Modern Languages, 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, education, medicine, diplomacy, management, educational administration, government, and many others.

The department offers courses in Bronze Age and Classical archaeology and is active in field projects in Classical lands. It sponsors archaeological excavations at Halai in Greece, which serves as a field training school for Cornell undergraduate and graduate students. On campus there are also collections of ancient artifacts, reproductions of ancient sculpture, and one of the few laboratories in the world to concentrate on the tree-ring dating of ancient monuments from Greece, Cyprus, and Turkey. The archaeology courses may be used to satisfy some of the requirements for the Intercollege Program in Archaeology or for the major in Classical Civilization. They require no knowledge of either Greek or Latin. Similarly, the department offers a variety of courses and seminars in English on such subjects as Greek mythology, Greek and Roman mystery religions, early Christianity, and Greek and Roman society, as well as ancient epic, tragedy, history, and philosophy. For those whose interest in things Greek and Roman extends no further than a desire to understand the English language a little better, the department offers one course in the Greek and Latin elements that make up a huge proportion of the vocabulary of Modern English, and another that deals more specifically with the Greek and Latin ingredients of bioscientific vocabulary. Programs in Greek and Latin at the elementary level are also offered. For the more ambitious there are courses involving reading, in the original, of Greek and Latin authors from Homer to St. Augustine and Bede and, periodically, the Latin works of Dante, Petrarch, and Milton. Sanskrit, the classical language of ancient India, is also offered, along with courses in translation on Indic religion, myth, and literature. The department makes every attempt to adapt its program to the needs of each student. If there is a Classical writer you would like to study, the department will do its best to help you do so whether you are a major in the department or not.

Majors

The Department of Classics offers majors in Classics, Greek, Latin, and Classical Civilization.

Classics

The Classics major comprises seven courses in advanced Greek and Latin (numbered 201 or above) and 3 courses in related subjects (see below) selected in consultation with the adviser. Classics majors are required to take a minimum of one 300-level course in one language and two 300-level courses in the other.

Students who are considering the option of undertaking graduate study in Classics are strongly advised to complete the Classics major.

Greek

The Greek major comprises Classics 201 plus 5 advanced courses in Greek (numbered 203 and above) of which at least 3 are to be taken at the 300-level, and 3 courses in related subjects (see below) selected in consultation with the adviser.

Latin

The Latin major comprises Classics 205 plus 5 advanced courses in Latin (numbered 207 and above) of which at least 3 are to be taken at the 300-level, and 3 courses in related subjects (see below) selected in consultation with the adviser.

Classical Civilization

Those who major in Classical Civilization must complete (a) qualification in Latin and Greek or proficiency in either; (b) Classics 211 (or History 265), Classics 212 (or History 268), and Classics 220, plus 5 courses selected from those listed under Classical civilization, Classical archaeology, Ancient Philosophy, Latin, and Greek; and (c) 3 courses in related subjects (see below) selected in consultation with the adviser.

Related Subjects

The field or scope of the subject "Classics" is the interdisciplinary study of Greek and Roman antiquity, comprising Greek and Latin language, literature, and linguistics; ancient philosophy; history; archaeology and art history; papyrology; epigraphy; and numismatics. It covers the ancient Mediterranean and neighboring lands as they were during the period extending from approximately 3000 B.C.E. to the 6th century C.E. In addition to the required courses in language and literature, the major includes related courses intended to give breadth and exposure to the other disciplines within the field and to enrich the student's study of the original languages. Since the influence of the Greco-Roman world extended far beyond antiquity, a related course could well focus on some aspect of the classical tradition in a later period. Students select related courses in consultation with their advisers or the DUS.

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 course 472. Credit for the honors course may be included in the credits required for the major. Students who wish to become candidates for honors must have a cumulative average of B, and B+ in the major. In consultation with the Standing Committee on Honors, the students should choose an honors adviser by the end of their sixth semester. By the second week of their seventh semester they should submit an outline of their proposed honors work to the Standing Committee and to the adviser(s). The thesis will be written under the supervision of the honors adviser(s) chosen by the student. Honors advisers will submit recommendations to the Standing Committee on Honors. The Committee will read all honors theses and will determine the level of departmental honors. A copy of each successful honors thesis will be filed with the department.

Independent Study

Independent study at the 300 level may be undertaken by undergraduates upon completion of one semester of work at the 300 level. 200-level independent study may be undertaken only in the case of documented schedule conflict upon application to the DUS.

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 College Year in Athens. (Consult Cornell Abroad for details.) In addition, Cornell is a member institution of the American School of Classical Studies at Athens, whose Summer Program is open to graduate students and qualified undergraduates. The American Academy in Rome, of which Cornell is also a member institution, offers full-year and summer programs for qualified graduate students. For graduate students the Department of Classics offers a few travel grants each year from the Townsend Memorial Fund. Detailed information on these programs is available in the Department of Classics Office, 120 Goldwin Smith Hall.

Summer Support for Language Study

The Beatrice R. Kanders Memorial Scholarship (for the summer immediately following the freshman or sophomore year; preference given to dyslexic students) is 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 majors. Applications are due to the chair of the Department of Classics by March 27.

Placement in Latin, Ancient Greek, and Modern Greek

Placement of first-year students in Latin and ancient Greek courses, and proficiency level in modern Greek, is determined by an examination given by the Department of Classics during orientation week or by arrangement with the director of undergraduate studies.

First-Year 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
Spring. 3 credits. E. Hohendahl.
This course gives the student with no knowledge of the classical languages an understanding of how the Greek and Latin elements that make up over half our English vocabulary operate in both literary and scientific English usage. Attention is paid to how words acquire their meaning and to enlarging each student's working knowledge of vocabulary and grammar.

[CLASS 102 Bioscientific Terminology
3 credits. Not offered 1999–2000; next offered 2000–2001. Staff.
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 can usually recognize the basic meaning of any unfamiliar word in that field. This skill is especially valuable for pre-medical, pre-dental, pre-veterinary students, and for those in other health science fields, as well as for students who would like to broaden their general vocabulary.]

CLASS 211 The Greek Experience #
Fall. 3 credits. Limited to 50 students. 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. Some attention will also be given to the daily life of ordinary citizens, supplemented by slides of ancient art and architecture.

CLASS 212 The Roman Experience #
Spring. 3 credits. J. Ginsburg.
An introduction to the civilization of the Romans as expressed in their literature, religion, and social and political institutions.

CLASS 217 Initiation to Greek Culture: The Greeks at War, from Troy to Charoneia #
Fall. 4 credits. Limited to 18 students. This course is intended especially for freshmen (a few exceptionally motivated sophomores or upperclass students may be accepted). Apply in writing to the chair, Department of Classics, 120 Goldwin Smith Hall. J. Coleman.
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.

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 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. Themes include the 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 the Classical Tradition: Strange Voyages #
Spring. 4 credits. See Classics 217 front matter above. Not offered 1999–2000; next offered 2000–01.]

[CLASS 223 The Comic Theater (also Comparative Literature 223 and Theatre Arts 223) #
Summer 2000 and spring 2001. 3 credits. J. Rusten.
The origins of comic drama in ancient Greece and Rome, and its subsequent incarnations especially in the Italian renaissance (*Commedia erudita* and *Commedia dell'arte*), Elizabethan England, seventeenth-century France, the English Restoration, and Hollywood in the thirties and forties. Chief topics will be: the growth of the comic theatrical tradition and conventions; techniques and themes of comic plots (trickster, parody, farce, caricature); and the role of comedy in society. All readings in English.]

CLASS 231 Ancient Philosophy (also Philosophy 211) #
Fall. 4 credits. G. Fine.
For description, see PHIL 211.

CLASS 236 Greek Mythology (also Comparative Literature 236) #
Fall 1999 and summer 2000. 3 credits. Limited to 200 students. D. Mankin.
A survey of the Greek myths, with emphasis on the content and significance of the myths in Mediterranean society, including the place of myth in Greek life and consciousness; the factors and influences involved in the creation of myths; and the use of myths for our understanding of Greek literature, religion, and moral and political concepts.

[CLASS 237 Greek Religion and Mystery Cults (also Religious Studies 237) #
3 credits. Not offered 1999–2000. K. Clinton.
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, and 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 mystery cults, such as the Eleusinian mysteries of Demeter and Persephone, the Kabiroi, the Great Gods of Samothrace, and Bacchic rites.]

[CLASS 238 The Ancient Epic and Beyond #
3 credits. Not offered 1999–2000. H. Pelliccia.
We will move, Odysseus-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 265 Ancient Greece from Homer to Alexander the Great (also History 265) #
Spring. 4 credits. Open to freshmen. B. Strauss.
For description, see HIST 265.

[CLASS 268 A History of Rome from Republic to Holy City (also History 268) #
Spring. 4 credits. Open to freshmen. Not offered 1999–2000.
For description, see HIST 268.]

[CLASS 291 Classical Indian Narrative (also Asian Studies 291) @ #
Spring. 3 credits. Not offered 1999–2000. C. Minkowski.]

CLASS 303–304 Independent Study in Classical Civilization, Undergraduate Level
303, fall; 304, spring. Up to 4 credits.

[CLASS 333 Greek and Roman Mystery Cults and Early Christianity (also Religious Studies 333) #
Fall. 4 credits. A previous course in Classics (civilization or language) or Religious Studies 101 is recommended. Not offered 1999–2000. K. Clinton.
A study of the controversial question of religious continuity between paganism and early Christianity. After a brief survey of classical mystery cults and Hellenistic religion, the course will focus on such Hellenistic cults as the mystery cults of Isis, Bacchus, and Attis and the Great Mother and on the distinctive features that contributed to their success. Discussion of Christian liturgy and beliefs to determine what Christianity owed to its pagan predecessors and to isolate the factors that contributed to its triumph over the "rival" pagan cults of late antiquity.]

CLASS 345 The Tragic Theater (also Comparative Literature 344 and Theatre Arts 345) #
Spring. 4 credits. Limited to 40 students. F. Ahl.
Tragedy and its audiences from ancient Greece to modern theater and film. Topics: origins of theatrical conventions; Shakespeare and Seneca; tragedy in modern theater and film. Works studied will include: Aeschylus' *Agamemnon*; Sophocles' *Oedipus Tyrannus*, *Philoctetes*; Euripides' *Alcestis*, *Helen*, *Iphigeneia in Aulis*, *Orestes*; Seneca's *Thyestes*, *Trojan Women*; Shakespeare's *Julius Caesar*, *Titus Andronicus*, *Othello*; Strindberg's *The Father*; Dürrenmatt's *The Visit*; Bergman's *Seventh Seal*; Cacoyannis' *Iphigeneia*.

[CLASS 382 Greeks, Romans, and Victorians (also Comparative Literature 382) #
Fall. 4 credits. Not offered 1999–2000. F. Ahl.
This course explores how nineteenth-century (and especially Victorian English and Irish) poets, dramatists, and to a lesser extent, novelists, present Greco-Roman antiquity. The varied influences of Vergil and Homer, Seneca and Sophocles, Plautus and Aristophanes, Horace, and Greek lyric poetry will be discussed in selected works of Thomas More, Shelley, Byron, Swinburne, W. S. Gilbert, Oscar Wilde, and the pre-Raphaelites and Victorian poets.]

[CLASS 390 The Sanskrit Epics (also Asian Studies 390) @ #
4 credits. Not offered 1999–2000. C. Minkowski.
For description, see ASIAN 390.]

[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 1999–2000. C. Minkowski.
For description, see ASIAN 395.]

CLASS 405 Augustine's *Confessions*: Memory and Self (also Comparative Literature 400, Philosophy 413, and Society for the Humanities 402)
Fall. 4 credits. Limited to 15 students. Permission of instructor. C. Brittain.
For description, see S HUM 402.

CLASS 406 Augustine's Dialogues on the Soul (also Comparative Literature 424, Philosophy 413, and Society for the Humanities 403)
Spring. 4 credits. Limited to 15 students. Permission of instructor. C. Brittain.
For description, see S HUM 403.

[CLASS 463 Gender and Politics in the Roman World (also History 463 and Women's Studies 464) #
4 credits. Not offered 1999–2000; next offered 2000–01. J. Ginsburg.
An undergraduate seminar examining the relationship between gender and politics in the late Roman Republic and 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 political activity in ancient Rome might have taken allow a place for women in Roman political life? What role did gender have in Roman political discourse and ideology? Why did issues such as family, marriage, and sexuality become subjects of political debate and legislation?]

CLASS 469 Equality and Inequality in Ancient Greece (also History 469)
Fall. 4 credits. Prerequisite: History 265, Classics 211 or 217, or written permission of the instructor. B. Strauss.
For description, see HIST 469.

[CLASS 480 Roman Society and Politics under the Julio-Claudians (also History 473) #
4 credits. Prerequisite: Classics 212, History 268, or permission of instructor. Not offered 1999–2000. J. Ginsburg.
This course examines 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
711, fall; 712, spring. 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 201 Attic Authors #
Fall. 3 credits. Prerequisite: Classics 103 or 104 or equivalent. H. Pelliccia.
Selected readings from Greek prose.

[CLASS 202 The Greek New Testament #
3 credits. Prerequisite: at least one year of ancient Greek (Classics 101–103 or 104) or permission of instructor. Not offered 1999–2000.]

CLASS 203 Homer #
Spring. 3 credits. Prerequisite: Classics 103 or 104 or equivalent. J. Coleman.
Readings in the Homeric epic with emphasis on formulaic style.

[CLASS 210 Attic Prose
3 credits. Prerequisite: Classics 103 or 104 or equivalent. Not offered 1999–2000.]

CLASS 225–226 Independent Study in Greek, Undergraduate Level
225, fall; 226, spring. Up to 4 credits. Only by permission of the DUS in the case of documented schedule conflict.

CLASS 307–308 Independent Study in Greek, Undergraduate Level
307, fall; 308, spring. Up to 4 credits.

CLASS 310 Greek Undergraduate Seminar #
Fall and spring. 4 credits. Prerequisite: two 200-level courses in Greek or permission of instructor. Fall topic: Lucian. J. Rife. Spring topic: Tragedy. H. Pelliccia.

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. 4 credits. Prerequisite: Classics 206 or equivalent. Not offered 1999–2000.]

[CLASS 342 Greek Prose Composition
4 credits. Prerequisite: one term of 200-level Greek or permission of instructor. Not offered 1999–2000; next offered 2000–01.]

CLASS 417 Advanced Readings in Greek: Comedy #
Spring. 4 credits. J. Rusten.
Aristophanes, Menander, and fragments by other authors.

CLASS 419 Advanced Greek Composition
Fall. 4 credits. Prerequisite: Classics 342 or equivalent. J. Rusten.

CLASS 555 Graduate Proseminar
Fall. 1 credit. H. Pelliccia and staff.
Graduate students will be introduced to the tools, techniques, and methods of classical scholarship.

[GREEK 605–606 Graduate Survey of Greek Literature
605, fall; 606, spring. 4 credits each term. Prerequisite: linguistic proficiency to be determined by instructor. Not offered 1999–2000.
A survey of Greek literature in two semesters. Classics 605: Greek literature from Homer to the mid-fifth century. Classics 606: Greek literature from the late fifth century to the Empire.]

CLASS 632 Topics in Ancient History (also History 630)
Fall. 4 credits. B. Strauss.
For description, see HIST 630.

[CLASS 671 Graduate Seminar in Greek
Fall. 4 credits. Not offered fall 1999.]

[CLASS 672 Graduate Seminar in Greek
Spring. 4 credits. Not offered spring 2000.]

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 108 Latin in Review
Fall. 4 credits. Prerequisite: placement by departmental examination. E. Hohendahl.
This course will accommodate students who place too high for beginning Latin, but not high enough for intermediate.

CLASS 205 Intermediate Latin #
Fall and spring. 3 credits. Prerequisite: Classics 106, 107, 108, or placement by departmental examination. J. Ginsburg, E. Hohendahl.
Readings in Latin prose.

[CLASS 207 Catullus #
Fall. 3 credits. Prerequisite: Classics 106, 107, 108, or one term of 200-level Latin. Not offered 1999–2000.]

CLASS 208 Roman Drama: Seneca #
Fall. 3 credits. Prerequisite: Classics 106, 107, 108, or one term of 200-level Latin. J. Reed.

CLASS 216 Vergil #
Spring. 3 credits. Prerequisite: Classics 106, 107, 108, or one term of 200-level Latin. F. Ahl.

CLASS 227–228 Independent Study in Latin, Undergraduate Level
227, fall; 228, spring. Up to 4 credits. Only by permission of the DUS in the case of documented schedule conflict.

CLASS 312 Latin Undergraduate Seminar #
Fall and spring. 4 credits. Prerequisite: two terms of 200-level Latin or permission of instructor. Fall topic: Virgil's *Georgics*. D. Mankin. Spring topic: Sallust. D. Shanzer.

[CLASS 314 The Augustan Age #
4 credits. Prerequisite: two terms of 200-level Latin or permission of instructor. Not offered 1999–2000.]

CLASS 315–316 Independent Study in Latin, Undergraduate Level
315, fall; 316, spring. Up to 4 credits.

[CLASS 317 Roman Historiography #
4 credits. Prerequisite: one term of 300-level Latin or permission of instructor. Not offered 1999–2000. J. Ginsburg.]

CLASS 341 Latin Prose Composition
Fall. 4 credits. Prerequisite: one term of 200-level Latin or permission of instructor. J. Ginsburg.

CLASS 369 Intensive Mediaeval Latin Reading
Summer only. 4 credits. D. Shanzer.
Web site: www.arts.cornell.edu/classics/Classes/Classics 369/Med_Latin.html

[CLASS 411 Advanced Readings in Latin Literature #
Fall. 4 credits. Not offered fall 1999.]

[CLASS 412 Advanced Readings in Latin Literature #
Spring. 4 credits. Not offered spring 2000.]

[CLASS 441 Advanced Latin Prose Composition
Fall. 4 credits. For graduate students. Only those undergraduates who have completed Latin 341 and have permission of the instructor may enroll. Not offered 1999–2000; next offered 2000–01.]

CLASS 555 Graduate Proseminar
Fall. 1 credit. H. Pelliccia and staff.
Graduate students will be introduced to the tools, techniques, and methods of Classical scholarship.

[CLASS 603 Later Latin Literature
4 credits. Not offered 1999–2000. D. Shanzer.]

CLASS 625–626 Graduate Survey of Latin Literature
625 fall; 626 spring. 4 credits each term. Prerequisite: linguistic proficiency to be determined by instructor. J. Reed.
A survey of Latin literature in two semesters. 625: Latin poetry from its beginnings to the early Empire. 626: Latin literature of the Empire.

[CLASS 679 Graduate Seminar in Latin
Fall. 4 credits. Not offered fall 1999.]

CLASS 680 Graduate Seminar in Latin: Tacitus
Spring. 4 credits. J. Ginsburg.

CLASS 751–752 Independent Study for Graduate Students in Latin
751, fall; 752, spring. Up to 4 credits.

Classical Art and Archaeology

CLASS 220 Introduction to Art History: The Classical World (also History of Art 220) #
Fall. 4 credits. 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.

[CLASS 221 Minoan-Mycenaean Art and Archaeology (also Archaeology 221 and History of Art 221) #
Spring. 3 credits. Not offered 1999–2000. 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) #
3 credits. Prerequisite: permission of instructor. Not offered fall 1999–2000. 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 1999–2000. P. I. Kuniholm.
For description, see Art H 225.]

CLASS 309 Dendrochronology of the Aegean (also Archaeology 309 and History of Art 309)
Fall and spring. 4 credits. Prerequisite: permission of instructor. Limited to 10 students. P. I. Kuniholm.
For description, see ART H 309.

[CLASS 319 Art in the Daily Life of Greece and Rome (also History of Art 319) #
Spring. 4 credits. Not offered 1999–2000. A Ramage.
For description, see ART H 319.]

[CLASS 320 The Archaeology of Classical Greece (also History of Art 320) #
4 credits. Not offered 1999–2000. A. Ramage.]

CLASS 321 Mycenae and Homer (also Archaeology 321 and History of Art 321) #
Fall. 4 credits. Prerequisite: at least one previous course in Archaeology, Classics, or History of Art. J. Coleman.
Study of the relationship between the Mycenaean period of Greece (known primarily from archaeology) and the Homeric *Iliad* and *Odyssey*. Topics include Mycenaean architecture, burial customs, kingship and military activities; the reasons for the collapse of the Bronze Age palatial economies; the archaeological evidence for society in the "Dark Ages" that followed; the writing systems of Mycenaean Greece (Linear B) and the Iron Age (the Semitic/Greek alphabet); the nature of the Homeric poems and their value as historical sources.

[CLASS 322 Greeks and Barbarians (also History of Art 328) #
4 credits. Prerequisite: Classics 220 or 221, or permission of instructor. Not offered 1999–2000. J. Coleman.
A study of the archaeological and other evidence for the interaction between Greek civilization and the peoples of the eastern and western Mediterranean from the thirteenth to the fourth centuries B.C.E. The course will focus on Greek relationships with Egypt, Phoenicia, Cyprus, Anatolia, and Italy in the post-Bronze Age period.]

[CLASS 323 Painting in the Greek and Roman World (also History of Art 323) #
4 credits. Not offered 1999–2000. A. Ramage.]

[CLASS 325 Greek Vase Painting (also History of Art 325) #
4 credits. Not offered 1999–2000. A. Ramage.
For description, see ART H 325.]

CLASS 327 Greek and Roman Coins (also History of Art 327) #
Spring. 4 credits. A. Ramage.
For description, see ART H 327.

CLASS 329 Greek Sculpture (also History of Art 329) #
Spring. 4 credits. J. Coleman.
An examination of ancient Greek sculpture, both three-dimensional and two-dimensional, from the Archaic to the Hellenistic period. Aspects of the works studied include: technological advances, changing ideology of the sculptors, regionalism of styles, and taste of individual patrons.

[CLASS 350 Arts of the Roman Empire (also History of Art 322) #
4 credits. Not offered 1999–2000.
A. Ramage.
For description, see ART H 322.]

[CLASS 352 The City of Athens (also Archaeology 352 and History of Art 352) #
3 credits. Not offered 1999–2000.
A detailed survey of the architectural development of the city of Athens from the Bronze Age to the 6th century A. D. The principal monuments will be examined against a broad historical and cultural background, with special attention to both Athenian society and the development of Greek art and architecture as a whole.]

CLASS 357–358 Independent Study in Classical Archaeology, Undergraduate Level
357, fall; 358, spring. Up to 4 credits.

CLASS 361 Summer Program in Etruscan Archaeology at La Piana (also Archaeology 361)
Summer only. 3 or 6 credits. Permission required. J. Whitehead.

CLASS 423 Ceramics (also Archaeology 423 and History of Art 423)
Fall. 4 credits. Prerequisite: permission of instructor. A. Ramage.
For description, see ART H 423.

[CLASS 430 Seminar on the Bronze Age Architecture of Asia Minor (also Archaeology 425 and History of Art 425) #
4 credits. Not offered 1999–2000.
P. I. Kuniholm.
For description, see ART H 425.]

[CLASS 432 Sardis and the Cities of Asia Minor (also Archaeology 432 and History of Art 424) #
4 credits. Prerequisite: permission of instructor. Not offered 1999–2000.
A. Ramage.
For description, see ART H 424.]

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.
P. I. Kuniholm.
For description, see ART H 434.

[CLASS 435 Seminar on Roman Art and Archaeology (also Archaeology 435 and History of Art 427) #
4 credits. Prerequisite: permission of instructor. Not offered 1999–2000.
A. Ramage.
For description, see ART H 427.]

[CLASS 629 The Prehistoric Aegean (also Archaeology 629) #
4 credits. Not offered 1999–2000.
J. Coleman.
Seminar with focus on the Aegean and neighboring regions in the Neolithic and Early Bronze Ages.]

[CLASS 630 Seminar in Classical Archaeology (also Archaeology 520 and History of Art 520)
4 credits. Not offered 1999–2000.
P. I. Kuniholm.
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 420 Plautus #
Fall. 4 credits. Prerequisite: at least one 300-level Latin course or permission of instructor. A. Nussbaum.
A close reading of several Plautine comedies with attention to language and meter.

CLASS 421 Greek Comparative Grammar (also Linguistics 451) #
Fall. 4 credits. Prerequisite: thorough familiarity with the morphology of classical Greek. 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 452) #
4 credits. Prerequisite: thorough familiarity with the morphology of classical Latin. Not offered 1999–2000.
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 454) #
4 credits. Not offered 1999–2000.
A. Nussbaum.]

[CLASS 425 Greek Dialects (also Linguistics 455) #
4 credits. Not offered 1999–2000.
A. Nussbaum.]

[CLASS 426 Archaic Latin (also Linguistics 456) #
4 credits. Prerequisite: reading knowledge of Latin. Not offered 1999–2000.
A. Nussbaum.]

[CLASS 427 Homeric Philology (also Linguistics 457) #
4 credits. Prerequisite: ability to read Homeric Greek. Not offered 1999–2000.
A. Nussbaum.
The language of the Homeric epics: dialect background, archaisms, modernizations. The notion of a *Kunstsprache*: its constitution, use, and internal consistency. The phonological and morphological aspects of epic compositional technique.]

[CLASS 429 Mycenaean Greek (also Linguistics 459) #
4 credits. Prerequisite: thorough familiarity with the morphology of Classical Greek. Not offered 1999–2000.
A. Nussbaum.]

Sanskrit

CLASS 131–132 Elementary Sanskrit (also Linguistics 131–132 and Sanskrit 131–132)
131, fall, C. Minkowski; 132, spring, staff. 4 credits each term.
An introduction to the essentials of Sanskrit grammar. Designed to enable the student to read classical and epic Sanskrit as quickly as possible.]

[CLASS 251–252 Intermediate Sanskrit (also Linguistics 251–252 and Sanskrit 251–252) @ #
251, fall; 252, spring. 3 credits each term. Prerequisite: Classics 132 or equivalent. Not offered 1999–2000; next offered 2000–01. C. Minkowski.
Readings from the literature of Classical Sanskrit. Fall: selections from the two Sanskrit epics, the *Mahabharata* and the *Ramayana*. Spring: more selections from the epics, and from either Sanskrit story literature or from Sanskrit dramas.]

CLASS 403–404 Independent Study in Sanskrit, Undergraduate Level
403, fall; 404, spring. Up to 4 credits.
C. Minkowski.

CLASS 703–704 Independent Study for Graduate Students in Sanskrit
703, fall; 704, spring. Up to 4 credits.
C. Minkowski.
Also see Classics 291, 390, and 395 (Classical Civilization listings).

Honors Courses

CLASS 472 Honors Course: Senior Essay
Fall and spring. 8 credits. An adviser must be chosen by the end of the student's sixth semester. Topics must be approved by the Standing Committee on Honors by the beginning of the seventh semester.
See "Honors," Classics front matter.

Related Courses in Other Departments and Programs

See listings under:

Archaeology
Asian Studies
Comparative Literature
English
History
History of Art
Medieval Studies
Linguistics
Near Eastern Studies
Philosophy
Religious Studies
Society for the Humanities
Women's Studies

COMPARATIVE LITERATURE

W. J. Kennedy, chairman (141 Goldwin Smith), C. Arroyo, director of Undergraduate Studies (285 Goldwin Smith); N. Saccamano, director of Graduate Studies (145 Goldwin Smith); F. Ahl, C. Arroyo, A. Caputi (Emeritus), C. Carmichael, D. Castillo, C. Chase, W. Cohen, J. Culler, B. deBary, G. Gibian, D. Grossvogel (Emeritus), P. Hohendahl, W. Holdheim (Emeritus), W. Kennedy, N. Melas, J. Monroe, J. Porte, E. Rosenberg, N. Saccamano, N. Sakai, L. Waugh, W. Wetherbee.

Also cooperating: A. Adams, D. Bathrick, J. Bishop, R. Brann, S. Buck-Morss, P. Carden, E. Hanson, T. Hope, C. Kaske, D. Mankin, B. Maxwell, M. Migiel, G. Waite.

The Department of Comparative Literature provides a broad range of courses in European as well as non-European literature. Courses stress significant authors, themes, problems, styles, genres, historical periods, and theoretical perspectives. In cooperation with related departments in the humanities, the departmental offerings reflect current interdisciplinary approaches to literary study: hermeneutics, semiotics, deconstruction, cultural criticism, Marxism, reception aesthetics, feminism, 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 1999–2000 Comparative Literature 304 [fall]), to be taken by all majors in their junior or senior year. At the discretion of the department, students may enroll in core courses in both their junior and senior years.

3) Five courses in literature and other areas of the humanities at the 200 or higher level, to be taken in one or more foreign literature departments. Texts must be read in the original language. A student may offer one language course (conversation, composition, etc.) towards fulfilling the language requirement.

4) An honor's essay (Comparative Literature 493) of roughly fifty pages is now optional. It is to be written during the senior year under the direction of a faculty member, preferably from within the department, who has agreed to work in close cooperation with the student. Students are urged to begin research on their thesis topic during the summer preceding their senior year. In lieu of a Senior Honors Essay, students may take one course at the 400–600 level.

The department also encourages:

1) a program that includes broad historical coverage (e.g., Comparative Literature 201–202: Great Books); intensive study of a single genre (e.g., Comparative Literature 363–364: The European Novel, Comparative Literature 365: Contemporary Fiction); analysis of problems in literary theory (e.g., Comparative Literature 302: Literature and Theory, Comparative Literature 448: Subject to Translation). The department also offers a number of strongly recommended 200-level courses designed to acquaint undergraduates with the discipline: Comparative Literature 203: "Introduction to Comparative Literature," as well as broadranging introductory courses in World Fiction (Comparative Literature 204) and World Poetry (Comparative Literature 205), with emphasis on the nineteenth and twentieth centuries.

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+ on the senior essay, in course work for the major, and in their overall academic performance at Cornell.

First-Year 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 first-year seminar program.

Courses

COM L 201#–202 Great Books
201, fall; 202, spring. 4 credits. Comparative Literature 201 and 202 may be taken independently of each other. Fall: W. J. Kennedy; spring: T. Hope.
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 equipment. 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. The persistence of certain themes (such as slavery, monstrosity, overreaching, coercion, and vengeance) will be a central concern in many of the texts studied. A certain amount of attention will be given to an examination of differing ideological perspectives on the notion of "Great Books." Readings chosen from texts by Shakespeare, Defoe, Swift, Voltaire, Goethe, Mary Shelley, Balzac, Poe, Melville, Marx, Flaubert, Conrad, Kipling, Brecht, Woolf, Césaire, Tutuola, Brathwaite, Naipaul, and Armah.

COM L 203 Introduction to Comparative Literature (also Asian 203)
Fall or spring. 4 credits. Fall: W. Kennedy and department members; spring: E. Rosenberg and department members.
The course is intended to answer the question persistently asked by undergraduates: "What *is* comparative literature, anyway?" The format of the course is designed to acquaint students with the range and variety of the field by having members of the department present those aspects which reflect their areas of expertise and their methods of teaching. Of the two meetings each week, the first will generally take the form of a lecture; the second will be a discussion of the assigned text. Texts and topics range from bawdy tales by Chaucer and Boccaccio to the naturalism of Thomas Mann and the fantasy of Kundera, and from modern American poetry to post-modern critical theory.

COM L 204 Global Fictions (also Asian 204)
Spring. 4 credits. N. Melas.
This course will be an introduction and an inquiry into global perspectives on fiction. Can the reading of fiction point us towards becoming citizens of the world? How might we know this world? How might we imagine it? We will consider the condition of the stranger in this global era as well as construct a geography of reading. Readings will be drawn mainly but not only from the contemporary period and outside Europe. Readings will change depending on the instructor, but may include works of Rushdie, Marquez, Conde, Munif, Castellanos, Oe, Ngugi, Wolf, Kincaid, Homer.

[COM L 205 Introduction to Poetry, Chiefly Modern
4 credits. Not offered 1999–2000. Staff.
Unlike Comparative Literature 207, 205 is intended to be a survey that concentrates largely (but of course not exclusively) on foreign poetry. The course will cut across historical periods and poetic genres, from conventional "strict" genres of the sonnet-variety to forms more nearly associated with our own times: free verse, "the prose poem," etc. Difficult as it may be to avoid poets on the order of Shakespeare, Milton, Goethe, and Keats, we propose to focus on the practitioners of the craft from Baudelaire,Whitman, Hopkins, Mallarmé, and Rilke on down.]

[COM L 206 Introduction to Literary Criticism
Spring. 4 credits. Not offered 1999–2000. Staff.
More advanced undergraduate seminars naturally tend to focus on contemporary literary theory; after all, it is essential for students of literature to be well-informed about contemporary theoretical debates, methodologies, and problems. But literary theory and criticism did not begin with the structuralist revolution of the 1960s, and it is essential for students to understand earlier developments—many of which still have the power to provoke and inspire. Critical historicization should begin at home, with an awareness of how different the forms, practices, institutions and politics of literary criticism have been, and this course will thus introduce students to the vast field of pre-1960 debates. We will examine the historical evolution of key terms now more or less taken for granted as part of critical vocabulary, and we will pay particular attention to the

(relatively recent) emergence of literature itself as a category of study. Critics and theorists will be chosen from among Plato, Aristotle, Cicero, Horace, and Augustine; Renaissance and neo-classical critics such as Spenser, Dryden, and Dr. Johnson; Enlightenment, Romantic and post-Romantic theorists such as Kant, Hegel, Schiller, Coleridge, Wilde, and Pater; and such major twentieth-century figures as Heidegger, Bataille, Sartre, Benjamin, Adorno, and I. A. Richards. No prior knowledge of the subject will be assumed, and all texts will be read in English.]

[COM L 208 Shakespeare and the 20th Century (also ENGL 208)
Fall. 4 credits. Not offered 1999–2000. W. Cohen.
What is the relationship between the plays of Shakespeare in their own time and the various ways they have functioned in modern culture? We will compare selected works of Shakespeare with their adaptations in fiction, theater, film, the educational system, government, and popular culture. The discussion of each play will be organized around one or more critical approaches. The course as a whole will attempt to provide a systematic introduction to the contemporary study of literature and culture.]

COM L 209 Introduction to Cultural Studies
Fall. 4 credits. T. Hope.
What is culture above and beyond literature, and how are the esthetics of walking in the city or receiving a postcard different from (or related to) that of reading a detective story or *National Geographic*? Are we immersed in culture or precipitated out of it? Are we cultural subjects or objects? And who is this "we" in any case? Is this imaginary collective identity itself a product or fantasy of culture? When does culture demand assimilation, and when does it allow for or violently enforce the operations of (class, sexual, racial) difference? Do cultures exist in the plural, and would this plural be one of particularity or relationality? How does or do culture(s) mediate between recent enactments of multiculturalism, on the one hand, and globalization on the other? Readings will range from Freud, Marx and Saussure to contemporary poststructuralist critiques and reformulations of cultural identification.

COM L 215 Comparative American Literatures
Fall. 4 credits. B. Maxwell.
Twentieth-century writing from Canada, the United States, the Caribbean, and Latin America. A hemispheric American Studies perspective will encourage thinking about and across cultural, linguistic, and national demarcations. This course proposes that a question put by the poet William Carlos Williams—"History, history! What do we fools know or care?"—finds its counter-statement in words from Africa, passed on by the novelist Paule Marshall: "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 (in English) will include Joy Kogawa, *Obasan;* Sheila Watson, *The Double Hook;* Hubert Aquin, *The Antiphonary;* Jean Toomer, *Cane;* William Faulkner, *Absalom, Absalom!;* Wilson Harris, *The Palace of the Peacock;* Edward Kamau Brathwaite, *X/Self* and *Trench Town Rock;* Mariano Azuela, *The Underdogs;* Jose Donoso, *Curfew;* and Eduardo Galeano, *The Book of Embraces* and selections from the work of John Sanford, Rosario Castellanos, Clarice Lispector, and Juan Gelman.

COM L 223 The Comic Theater (also CLASS 223 and THETR 223) #
Summer 2000 and spring 2001. 3 credits.
For description, see Classics 223.

COM L 236 Greek Mythology (also CLASS 236) #
Fall. 3 credits. Limited to 200. D. Mankin.
For description, see Classics 236.

[COM L 239 Cultural History of the Jews of Spain (also NES 239, JWST 239, Rel. St. 239 and SPAN L 239)
Fall. 3 credits. Not offered 1999–2000. R. Brann.
For description, please see Near Eastern Studies 239.]

COM L 246 Israel: Literature and Society (also NES 236, JwSt 236)
Fall. 4 credits. Y. Halevi-Wise.
For course description, please see Near Eastern Studies 339.

COM L 279 The Russian Connection, 1830–1867 (also RussL 279)
Fall. 4 credits. P. Carden.
For course description, please see RussL 279.

COM L 280 The Russian Connection, 1870–Present (also RussL 280)
Spring. 4 credits. P. Carden.
For course description, please see Russian Literature280.

COM L 299 The Hebrew Bible and the Arabic Qur'an in Comparative Literature (also RelSt 299 and JwSt 299)
Spring. 4 credits. R. Brann.
For course description, please see Jewish Studies 299.

[COM L 302 Literature and Theory (also COM L 622 and ENGL 302/602)
Fall. 4 credits. Not offered 1999–2000. J. Culler.
Study of issues in contemporary theoretical debates, with particular attention to structuralism, deconstruction, psychoanalysis, and feminism. Readings from Barthes, Derrida, Foucault, J. Butler, B. Johnson, and others. No previous knowlege of literary theory is assumed.]

COM L 304 Europe and Its Others: An Introduction to the Literature of Colonialism
Fall. 4 credits. N. Melas.
Core course for 1999–2000. Through an examination of selected works from the literature of the nineteenth century to the modern period, mainly written in English and French, the course will explore the problems and possibilities, imperialism presented for narration, both in the literature of imperialism and the literature against imperialism. Topics will include transcultural (de)formation of identity, exoticism and internationalism, racial romance, cultural pressures on reading and interpretation, and the powers and pitfalls of writing back. Probable authors: Hagard, Stevenson, Conrad, Ngugi, Camus, Conde, Achebe, Duras, Saleh. All readings available in English.

[COM L 305 Irony: An Introduction
Fall. 4 credits. Not offered 1999–2000. Staff.
Oscar Wilde suggested that all bad poetry is sincere. Was he being ironic? Irony is an aspect of literature (and everyday life) that is very common and of fundamental importance but misunderstood and even distrusted. This course will confront the theory and politics of irony. Our approach will be historical, philosophical, and literary but will never lose sight of practical questions that students necessarily face: must we—or can we—mean what we say? How can we analyze irony in a text? In what sense is the performance of a drag queen ironic? Texts about irony—or ironic texts—to be studied will include Plato, Kierkegaard, Swift, Flaubert, and German idealists. We will also investigate nonverbal irony in twentieth-century music from Mahler to Madonna.]

COM L 311 Modern European Literature and Culture (also RussL 311, French 315)
Fall. 4 credits. G. Gibian.
We shall concern ourselves with European culture as embracing the area from Russia through to the Atlantic Ocean, not as divided into Western, Eastern, or Central. European culture crosses the old East-West political boundaries. Case studies: Ireland, France, Czech Republic, Russia.

This course is designed for those interested both in the artistic, imaginative side of European literature and in the ways in which culture expresses some of the most significant concerns of our age. The conceptual links will include issues of national identity and social justice, as well as concerns of private emotions and individual personality. Popular culture, film, TV, theatre will be integrated with the reading and class discussion. Some authors who will be read: Flaubert, Charlotte Bronte (*Villette*), Karl Marx, Dostoevsky, Mayakovsky, Yeats, Malraux, Camus, Joyce, Solzhenitsyn, Kundera, and others.

[COM L 318 Bodies Politic: Queer Theories and Literature of the Body
Fall. 4 credits. Not offered 1999–2000. T. Hope.
This course will examine notions of corporality—of bodies both social and individual—as deployed and analyzed in theories of gender and sexuality of the last century. How do concepts of perversion and degeneration haunt the idea of the social body? How are individual bodies stigmatized, encoded, and read within the social sphere? Sexology, psychoanalysis and new-historicist critiques, including those that emphasize the discursive intersections of sexuality, race and nationhood, will constitute our textual *corpus*; in an attempt to question the habitual dichotomization of "theoretical" and "cultural" production, we shall also include a small number of literary and visual texts which comment upon these theoretical traditions. Included are works by: Sigmund Freud, Havelock Ellis, Max Nordau, André Gide, Radclyffe Hall, E. M. Forster, Luce Irigaray, Cherríe Moraga, Judith Butler, Michael Foucault, Homi Bhabha, Biddy Martin, Esther Newton, Julia Kristeva, Janine Chasseguet-

Smirgel, Adrienne Rich, Leo Bersani, Richard Fung, Kobena Mercer, Jewelle Gómez, Teresa de Lauretis.]

COM L 322 Russian Theatre and Drama (also RussL 322)
Spring. 4 credits. S. Senderovich.
For course description, please see Russian Literature 322.

COM L 323 Encounters with the Dead (also ITAL L 323/623)
Fall. 4 credits. M. Migiel.
For description, please see Italian Literature 323/623.

COM L 326 Christianity and Judaism (also RelSt 326)
Spring. 4 credits. C. Carmichael.
A study of the New Testament as a product of the First Century Palestinian and Hellenistic Judaism. Other text (also in translation): Passover Haggadah.

COM L 328 Literature of the Old Testament (also Rel. St. 328) @ #
Fall. 4 credits. C. M. Carmichael.
Analysis of small sections of well-known material for in-depth discussion.

COM L 330 Political Theory and Cinema (also GerSt 330, Govt 370, Thetr 329)
Spring. 4 credits. G. Waite.
For course description, please see German Studies 330.

COM L 334 Muslims, Christians and Jews in Islamic Spain: Literature and Society (also NES 339/639, JWST 339, Rel. St. 334 and SPAN L 339/699)
Fall. 4 credits. R. Brann.
For description, please see Near Eastern Studies 339.

[COM L 335 The Modern and Contemporary Theatre (also THETR 335)
Fall. 4 credits. Not offered 1999–2000. R. Schneider.
For course description, please see THETR 335.]

[COM L 336 European Drama 1660–1900: Molière to Ibsen (also ENGL 335 and THETR 333) #
Spring. 4 credits. Not offered 1999–2000. A. R. Parker.
Major works by such writers as Molière, Congreve, Goethe, Schiller, Kleist, Shelley, Byron, Büchner, Ibsen, and Chekhov. Attention to influential theater traditions (commedia dell'arte, melodrama, pantomime); theories and styles of acting (Diderot, Garrick, Kean); the role of theater in the cultural politics of Enlightenment and Revolutionary Europe (Rousseau, Burke).]

COM L 338 Western and Eastern Films of Russian Literary Masterpieces (also RussL 337)
Fall. 4 credits. S. Senderovich.
For course description, please see Russian Literature 337.

[COM L 343 Contemporary Mass Culture in Japan and in the U.S. (also Asian St 363)
Spring. 4 credits. Enrollment limited to 25. Not offered 1999–2000. B. deBary.
For description, please see Asian Studies 363.]

COM L 344 Tragic Theatre (also Classics 345)
Spring. 4 credits. F. Ahl.
For course description, please see Classics 345.

COM L 350 Education and the Western Literary Tradition (also RussL 350, ColS 350)
Spring. 4 credits. P. Carden.
For course description, please see Russian Literature 350.

[COM L 352 European Cultural History, 1750–1870 (also HIST 362) #
Spring. 4 credits. Not offered 1999–2000. M. Steinberg.
For description, please see History 362.]

[COM L 353 European Cultural History (also Hist 363)
Fall. 4 credits. Not offered 1999–2000. M. Steinberg.
For course description, please see History 363.]

COM L 355 Decadence (also ENGL 355 and WOMNS 355)
Fall. 4 credits. E. Hanson.
For description, please see English 355.

[COM L 356 Renaissance Literature
Spring. 4 credits. Not offered 1999–2000. W. Kennedy.
An introduction to Renaissance literary texts with some attention to cultural backgrounds and intellectual history. Readings from Machiavelli, Erasmus, Rabelais, Shak, Cervantes and others.]

COM L 357 Orientalism, Exoticism, and Interiority (also FrLit 397)
Spring. 4 credits. T. Hope.
Not a spatially defined place on a map, nineteenth-century Europe's "Orient" is far more a fantastic resource for the "mapping" of an estranged and eccentric region of European selfhood. We shall critically examine the processes of exoticization and mystification, but also the uncanny intimacy of the imagined Orient. How does the figure of a distant cultural trove to be plundered by the European imagination turn so swiftly into nightmare visions of the haunted domesticity of rugs, divans, caskets and cabinetry, and what does this folding of the exoticized exterior into domestic and psychic interiority have to do with the novel as a genre? Readings in French prose fiction, but also poetry, opera, painting, non-fiction and German and English literature.

[COM L 358 Literature and Religion: Western Mysticism (also RomS 358, Rel. St. 358)
Spring. 4 credits. Not offered 1999–2000. C. Arroyo.
Analysis of some canonical texts of western mysticism toward a systematic view of their common features (a semiotics of the mystic text). Readings include: excerpts from the Bible, Plotinus, Pseudodionysius, Bernard of Clairvaus, Ibn Arabi of Murcia, The Zohar, Meister Eckhart, Teresa of Avila, John of the Cross, and expressions of silence and the ineffable in our times.]

COM L 362 The Culture of the Renaissance II (also ENGL 325, HIST 364, MUS 390, ART H 351 and Rel. St. 362)
Spring. 4 credits. C. Kaske, W. J. Kennedy.
Members of various departments will lecture on Luther, Michelangelo, Edmund Spenser, Cervantes, Copernicus, Galileo, and Monteverdi. Guest lectures will include Peter Dear, History; Esther Dotson, History of Art; and Rebecca Harris-Warrick, Music. Lectures and discussion will introduce different methods of interpretation and of historical analysis. Written requirements: two short papers and a final take-home examination.

COM L 363–364 The European Novel (also SpanL 363)
363, fall; 364, spring. 4 credits. Comparative Literature 363 and 364 may be taken independently of each other. Fall: C. M. Arroyo; spring: J. Ashton.

363: From Boccaccio to Goethe. Survey of the history of the novel from its origins to the end of the eighteenth century. The new genre of Humanism and the medieval romances of chivalry. Ambiguities derived from the lack of the word "novel." Different steps in the conquest of realism. The novel and intellectual history in different epochs: character and structure in the novels and contemporary philosophical views on man, cosmos, gender, and social classes. Readings include Boccaccio's *Fiammetta*; G. Pérez's *Lazarillo de Tormes*; Cervantes's *Don Quixote*, Mme de Lafayette's *The Princess of Cleves*; Defoe's *Robinson Crusoe*; Horace Walpole's *The Castle of Otranto*; and Goethe's *The Sorrows of Young Werther*, as well as a short package containing theoretical statements about the genre from Giraldi Cinthio to Goethe. All texts read in English.

364: From Stendhal to the present (in translation). Close reading of novels from the 19th and 20th centuries: Stendhal's *The Red and the Black*; Flaubert's *Madame Bovary*; Dostoevsky's *Crime and Punishment*; Joyce's *Portrait of the Artist as a Young Man*; Kafka's *The Metamorphosis*; and Kundera's *The Unbearable Lightness of Being*. Study of the changing ways of representing recurring themes: the role of the creative imagination; the city and country; rebellions and revolutions; communities and solidarity; dominant groups and minorities (social, ethnic, religious, psychological); interplay of politics, sex, and humor. Artistic and structural developments: coherence, connectedness, fragmentation; from realism to modernism.

COM L 365 Contemporary Fiction
Fall. 4 credits. B. Maxwell.
A study of European fiction and drama largely drawing on texts from the first half of the twentieth century. We will pay particular attention to the making of literary types and characters; to traces of utopian and messianic elements; to the relations between memory and political revolution; and to the motive of *ressentiment*. Readings (in translation) chosen from the following: Robert Walser, *Snowwhite* and *The Walk*; Franz Kafka, *The Trial*; Thomas Mann, *Death in Venice*; Bertolt Brecht, *The Rise and Fall of the City of Mahagony*; Joseph Roth, *Hotel Savoy*; Alfred Döblin, *Berlin Alexanderplatz*; Christa Wolf, *The Quest for Christa T.*; Louis Aragon, *Paris Peasant*; Louis-Ferdinand Céline, *Death on the Installment Plan*; Elio Vittorini, *In Sicily*; Natalia Ginzburg, stories; and Isaac Babel, stories. Collateral theoretical readings by Georg Lukács, Ernst Bloch, Bertolt Brecht, Walter Benjamin, Siegfried Kracauer, Gershom Scholem, Elias Canetti, and Christa Wolf.

COM L 367 The Russian Novel (also RUSS L 367)
Fall. 4 credits. G. Gibian.
For description, please see Russian Literature 367.

COM L 368 Visual Culture and Social Theory (also GOVT 375 and ART H 370)
Fall. 4 credits. S. Buck-Morss.
For description, please see Government 375.

[COM L 375 Chekhov (also RUSS L 373)
Fall. 4 credits. Not offered 1999–2000. S. Senderovich.
For course description, please see Russian Literature 373.]

COM L 376 Chinese Narrative Fiction (also Asian 374)
Spring. 4 credits. E. Gunn.
For course description, please see Asian Studies 374.

COM L 385 Reading Nabokov (also RUSS L 385, ENGL 379)
Fall. 4 credits. Enrollments limited to 25. G. Shapiro.
For course description, please see Russian Literature 385.

[COM L 387 Interpretation and/as Violence
Spring. 4 credits. Not offered 1999–2000. Staff.
This course is a response to the approach of the millennium and the increase of violence that seems destined to accompany it. The working hypothesis of the course is that reading should be a process of radical patience which resists the millenarian drive towards apocalypse, and that 'reading' should be distinguished from 'interpretation.' The course will introduce students to the history and theory of interpretation and will show how it has implied a certain kind of violence at least since the beginnings of Christianity. We will begin by exploring how the New Testament comes into being as a more or less violent interpretation of Jewish scriptures, and how Christianity sets up a strong interpretative regime that continues to exert its power today. Given that the ethics of interpretation is becoming increasingly urgent, we will focus on how literary interpretation becomes institutionalized in order to rethink what happens when a reader meets a text. Particular attention will be given to developments in nineteenth-century Germany, where theological categories gradually became secularized as part of the founding process of the modern university.]

[COM L 389 Contemporary Literature in Central and E. Europe (also RUSS L 389)
Fall. 4 credits. Not offered 1999–2000. G. Gibian.
For course description, please see Russian Literature 389.]

[COM L 394 Trans-Atlantic Renaissance (also ROM S 394)
Spring. 4 credits. Not offered 1999–2000. J. Piedra.
For course description, please see Romance Studies 394.]

[COM L 395 Fin de Siècle or Belle Epoque?: Parisian Culture Around 1900 (also FRLIT 393)
Spring. 4 credits. Not offered 1999–2000. Staff.
Focusing on Parisian culture between 1880 and 1914, a period in which artists and intellectuals confronted a startling new world wrought by industrial production, urban concentration, and political reorganization, this course will consider the relationship between decadence and modernity, with special attention to sexuality and the subject of modernity in the Belle Epoque. Themes to be considered will include: 1) theories of pathology, decadence, and difference; 2) city spectacle and mass entertainment; 3) the retreat to the interior as a site of psychological exploration and artistic innovation; 4) feminine culture and the New Woman; 5) spaces of the demimonde (the culture of courtesans, sapphism 1900); 6) identity and technological innovation. Short critical texts will be read in relation to well-known authors of the period such as Max Nordau, Zola, Huysmans, Rachilde, Colette, and Proust. Requirements will include short oral presentations and a term paper.]

[COM L 396 German Film (also GERST 396 and THETR 396)
Spring. 4 credits. Requirements: participation in class discussion, one paper, midterm, and final. Not offered 1999–2000. D. Bathrick.
For description, please see Theatre Arts 396.]

COM L 400 Augustine's *Confessions* (also SOC HUM 402 and NES 490)
Fall. 4 credits. Enrollments limited to 15. C. Brittain.
For course description, please see Society for Humanities 402.

COM L 404 History into Fiction: Nazis and the Literary Imagination (also JewST 414, ENGL 404 and GERST 414)
Fall. 4 credits. E. Rosenberg.
For description, see ENGL 404.

COM L 408 Operatic Contacts (also SOC HUM 405)
Fall. 4 credits. Enrollments limited to 15. A. Groos.
For course description, please see Society for Humanities 417.

[COM L 409 Genius and Madness in German Literature (also GER ST 428)
Fall. 4 credits. Not offered 1999–2000. A. Schwarz.
For course description, please see GER ST 428.]

[COM L 410 Semiotics and Language (also LING 400 and Fr Rom St 400)
Spring. 4 credits. Prerequisite: some background in an area relevant to semiotics: e.g., linguistics, philosophy, psychology, anthropology, or literature; or permission of instructor. Not offered 1999–2000. L. Waugh.
For description, please see Linguistics 400.]

[COM L 411 The Short Novel from Flaubert and James to the Present
Spring. 4 credits. Enrollment limited. Not offered 1999–2000. E. Rosenberg.
Discussion of some ten authors who excelled in the form of the novella and whose names are thus up to a point "given": in addition to James and Flaubert, writers like Conrad, Tolstoy, Mann, Kafka, Joyce, Faulkner, Marquez, Morrison. One novella each week or week and a half, but not in canonical order; e.g., Conrad's *Heart of Darkness*, Kafka's *Penal Colony*, and Ozick's *The Shawl* as versions of modern politics (or atrocities); the question of "status" as this is reflected in the relations between employer and domestic in things like Flaubert's *Simple Heart*, Tolstoy's *Master and Man*, and Gertrude Stein's *The Good Anna*; versions of the *récit*—specifically on the conditions of marriage—in Tolstoy's *Kreutzer Sonata* and (to stick with Beethoven) André Gide's *Pastoral Symphony*; same-sex relations in James's *Pupil* and Mann's *Death in Venice*; then also varieties of the fantastic in, say, *Jekyll and Hyde*, *Turn of the Screw*, Dostoevski's *Double*.]

[COM L 413 Death, Culture and the Literary Monument
Fall. 4 credits. Not offered 1999–2000. N. Melas.
Beginning with Homer's *Iliad*, this course will inquire into the monumental transformation of death into immortality in the literary composition. How do death's negations become fiction's triumph? We will pay particular attention to the fate of this procedure when its subjects are no longer heroic warriors but slaves and women. How do colonial domination and gender difference alter the aesthetic procedures and assumptions underlying commemoration and literary immortality? In addition to death and language, we will consider such themes as the relation of antiquity to the present, of identity to its dissolution and of politics to culture. Readings of literary texts drawn from a variety of languages and traditions will be attended by selected readings in critical theory and a glance at visual culture, particularly surrounding monuments commemorating the emancipation of slaves and the holocaust. Authors will include Homer, Derek Walcott, Simone Schwartz-Bart, Virginia Woolf, Krista Wolf, Tayeb Salih, Maurice Blanchot, Hegel, Orlando Patterson, Walter Benjamin.]

COM L 416 Contemporary Literary Criticism (also ASIAN 406)
Spring. 4 credits. Y. Kim.
For course description, please see Asian Studies 406.

[COM L 417 Faust (also GER ST 417)
Fall. 4 credits. Not offered 1999–2000. H. Deinert.
For course description, please see German Studies 417.]

COM L 418 Virtual Orientalisms (also Asian 415)
Spring. 4 credits. B. deBary.
Registration limited to 25. For course description, please see Asian Studies 415.

COM L 419–420 Independent Study
419, fall; 420, spring. Variable credit. Comparative Literature 419 and 420 may be taken independently of each other. Applications available in 145 G.S.

[COM L 421 Approaches to Discourse (also LANG 420
Spring. 4 credits. Not offered 1999–2000. H. Tao.
For course description, please see LANG 420.]

COM L 424 Augustine's *Dialogues of the Soul* (also SOC HUM 403)
Spring. 4 credits. Enrollments limited to 15. C. Brittain.
For course description, please see Society for Humanities 403.

[COM L 425 Marx, Freud, Nietzsche (also GER ST 415, GOVT 473)
Spring. 4 credits. Not offered 1999–2000. G. Waite.
For course description, please see German Studies 415.]

[COM L 426 New Testament Seminar (also REL ST 426)
Spring. 4 credits. Enrollment is limited to 20 students. Not offered 1999–2000. C. Carmichael.
Identification and discussion of problems in the New Testament.]

COM L 428 Biblical Seminar (also RelSt 427)
Fall. 4 credits. C. Carmichael.
Topic for 1999–2000: Sex and Religion in the Bible. Discussion of attitudes to sexuality in the Bible. In Old and New Testament texts we will examine the clash between ancestral behavior and subsequent laws and between legal and religious ideas. Topics will include: marriage and divorce, incest, intermarriage, gender discrimination, guilt and shame, homosexuality, women and purity, sexual language and symbols. It should be possible to say something new about the topics and also, because of the perennial nature of the issues, to say something that is relevant to contemporary life. The seminar is for teachers of ancient history, biblical, Jewish, and religious studies, cultural anthropology, ethics, history of law, literary studies, sociology, western civilization, and women's studies.

[COM L 429 Readings in the New Testament (also NES 429, REL ST 429 and ENGL 429)
Fall. 4 credits. Limited to 30 students. Not offered 1999–2000. J. P. Bishop.
Close readings of representative texts from the New Testament in modern scholarly editions, with the help of appropriate introductory and specialized commentary. The focus will be on Acts and the letters of Paul. All readings will be in English, but repeated reference to the Greek original will be made. Graduate students and undergraduates from other colleges who are interested in the material should not feel inhibited about 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 431 Testimony, Law and Literature (also SocH 420)
Spring. 4 credits. M. Sanders.
For course description, please see Society for Humanities 420.

COM L 433 Visual Studies in the Diaspora (also SocH 410)
Fall. 4 credits. K. Mercer.
For course description, please see Society for Humanities 410.

COM L 434 Nabokov vs. Freud (also RussL 435)
Spring. 4 credits. S. Senderovich.
For course description, please see Russian Literature 435.

[COM L 440 Semiotics and Texts (also LANG 435)
4 credits. Not offered 1999–2000. Staff.
For course description, please see LANG 435.]

COM L 444 China Goes Global (also SocH 422)
Spring. 4 credits. Q. Zhang.
For course description, please see Society for Humanities 422.

[COM L 445 Nabokov vs. Sartre (also RUSS L 425)
Spring. 4 credits. Not offered 1999–2000. S. Senderovich.
For course description, please see Russian Literature 425.]

[COM L 449 Misogyny and Its Readers (also COM L 649, ITAL L 409/609, WM ST 409/609)
Fall. 4 credits. Not offered 1999–2000. M. Migiel.
For course description, please see Italian Literature 409.]

COM L 450 Renaissance Poetry (also ComL 650, Engl 422/622)
Fall. 4 credits. W. Kennedy.
A reading and discussion of key texts in lyric poetry from Italian, French, English, and other European literatures of the Renaissance.
Topic for Fall 99: Forms of national identity in Petrarch, DuBellay, Sidney, and Wroth.

COM L 451 Renaissance Narrative
Spring. 4 credits. W. Kennedy.
A reading and discussion of key texts in narrative epic and chivalric romance from Italian, French, English, and other European literatures of the Renaissance.

[COM L 452 Renaissance Humanism (also COM L 652)
Spring. 4 credits. Enrollment limited to 15. Not offered 1999–2000. W. Kennedy.
A reading and discussion of key texts by Renaissance humanists in Italian, French, English and other European literatures from the fourteenth to seventeenth centuries.]

[COM L 455 Caribbean Literature (also AFRICANA ST 455)
Fall. 4 credits. Enrollment limited to 15. Not offered 1999–2000. A. Adams.
For description, please see Africana Studies 455.]

[COM L 456 Boccaccio: Gender, Power, and the Medieval Text (also ITAL L 445/645 and WOMNS 448/648)
Fall. 4 credits. Not offered 1999–2000. M. Migiel.
For description, please see Italian Literature 445/645.]

COM L 459 Opera, History, Politics, Gender (also HIST 456, MUSIC 474, ITALL 456, SOC HUM 459, WOMST 454)
Spring. 4 credits. M. Steinberg, S. Stewart.
For course description, please see History 456.

COM L 460 Francophone Sub-Saharan African Cinema and Literature
Fall. 4 credits. D. Thomas.
Lectures will focus on the history of Western colonial contact with Africa (from colonization to decolonization), the particular conditions in which African cinema emerged, language politics, production and distribution, film and popular culture, the impact of colonial education and neo/colonial culture on traditional Africa, African women and sexual politics, satires and fables of today's Africa, political commitment, and the consequences of modernization on African traditions and rural life.

In addition to the films that will be screened, students will be required to read a number of novels and plays. This will allow students to compare and contrast the respective merits and effectiveness of writers and filmmakers treating similar sociological circumstances, and to confront the particular problems facing film and print culture.

[COM L 463 Decadence, Degeneration and the 19th-Century Imaginary
Spring. 4 credits. Not offered 1999–2000. T. Hope.
Through critical reading of French, British and German prose fiction as well as examples of medical, anthropological and philosophical thought, we shall examine the social significance of discourses of disease, decadence and degeneration from the late eighteenth century to the early twentieth. How are questions of bodily pathology related to the construction of "national" bodies? How does perversion emerge at the core of theories of heredity and genealogy that traverse Europe's colonial scenes? What is the relationship between symptoms and texts, between sickness and subversion, in the mapping of gender, class, race and sexuality onto the body? The course material will include readings from Jean-Jacques Rousseau, Alexandre Dumas *fils*, Edgar Allan Poe, Honoré de Balzac, Arthur Schopenhauer, Friedrich Nietzsche, Sigmund Freud, Rémy de Gourmont, Havelock Ellis, Radclyffe Hall and Thomas Mann. Students may read in the original language or in translation.]

COM L 465 Feminist Theory/Lesbian Theory (also WomSt 465, GerSt 465)
Fall. 4 credits. A. Villarejo.
For course description, please see Women's Studies 465.

[COM L 472 Poetry of the 1990s (also ENGL 408, SPAN L 472, and GER ST 472)
Fall. 4 credits. Enrollment limited to 15 students. Not offered 1999–2000. J. Monroe.
Where is poetry now? Where is it heading as we move toward the twenty-first century? What is its current situation in light of the historic changes that have occurred since 1989? Exploring how contemporary poetry is responding to a new era of altered expectations and redrawn boundaries, a time of renewal and redefinition, we will track the principal issues, directions, figures, and forces shaping the process of poetry's unfolding in the twentieth century's final decade. Materials will be drawn from a wide variety of forms and contexts, including movies, literary journals, general circulation magazines, and anthologies, as well as individual poetry collections.]

COM L 474 Topics in Modern European Intellectual and Cultural History (also Hist 474)
Fall. 4 credits. D. LaCapra.
For course description, please see History 474.

COM L 477 Mourning People: Melancholias of Nation and Race (also COM L 677, FrLit 409/609)
Fall. 4 credits. T. Hope.
This course will examine the usefulness of psychoanalysis to postcolonial studies, race theory, and genealogies of nationhood. We

shall concentrate on French and Francophone, English and Anglophone literatures as "case studies" intended to test the limits of historicization of theories of race and nation including those of Todorov, Bhabha, Said, Spillers, Cheng, Anderson, Glissant and Freud. Why is the imagination of community so tightly linked with the specter of violent origins? Why is a collectivity grounded in nationhood in fact ruptured by abysses of disavowal? Why does the genealogical imagination of race, similitude and assimilation depend upon the specter of fleshly pathology and archaic symptomaticity? Course material will be wide-ranging, but we shall depart from Bernardin de Saint Pierre's national (French? Mauritian?) fable, Paul et Virginie. proceed through nineteenth-century French and British "cryptic orientalism" and imperial gothic, museology as ethnographic and national discipline, psychoanalytic Egyptology, Africanist and diasporic nostalgias, memory and Jewish identity before and since the holocaust, and migrant mournfulness. In general, the course will move from "allo-melancholic" to "auto-melancholic" cultural formations, investigating, for example, how Mauritian culture has inherited European melancholy as its colonial legacy and how the metropoles have responded to the loss of former colonies.

COM L 478 Nationalism and National Literatures in Francophone sub-Saharan Africa (also COM L 678)
Spring. 4 credits. D. Thomas.
This seminar will begin with an examination of the history of French colonial contact with francophone sub-Saharan Africa. Our discussion will focus on colonial expansionism, French assimilationist policies, and the gradual emergence of the nationalist discourse that culminated in the gradual and systematic dismantling of the Empire. This information will subsequently be brought to the appreciation and understanding of cultural phenomena procued by francophone sub-Saharan African novelists and filmmakers between 1950–1990.

[COM L 481 Baudelaire in Context (also COM L 680)
Spring. 4 credits. Not offered 1999–2000. J. Culler.
A study of *Les Fleurs du Mal* in the context of various nineteenth- and twentieth-century discourses: The Romantic lyric (Hugo, Lamartine, Desbordes-Valmore), romantic satanism, debates about prostitution, and twentieth-century accounts of Baudelaire as the founder of modern poetry or the poet of the city.]

COM L 482 Latin American Women Writers (also SpanL 492, WmSt 481)
Spring. 4 credits. D. Castillo.
For course description, please see Spanish Literature 492.

COM L 483 Imagining the Holocaust (also Engl 483)
Spring 2000. 4 credits. D. Schwarz.
For course description, please see English 458.

COM L 493 Senior Essay
Fall and spring. 8 credits.
Hours to be arranged individually in consultation with the director of the Senior Essay Colloquium. 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 "R" grade will be assigned on the basis of research and a preliminary draft completed in the first semester. A letter grade will be awarded on completion of the second semester.

[COM L 604 Translation and the Global Marketplace
Fall. 4 credits. Not offered 1999–2000. Staff.
The seminar will investigate the global politics of translation, focusing on how works are picked up (or not) for international circulation. Issues to be examined will include: how the politics of local censorship restrict or enable visibility; how the problem of cultural essentialism is packaged and marketed transnationally; how cultural and national identity come through (or not) in translation; how experiments in non-standard English (ebonics, cubonics, créolité, drug argot, and class slang) disturb or reaffirm linguistic identity politics. In addition to critical texts, the course will engage with textual studies of Ken Saro-wiwa's *Sozaboy: A Novel Written in Rotten English*, Salmon Rushdie's *The Santanic Verses*, Theresa Hak Cha's *Dictée*, Patrick Chamoiseau's *Texaco*, Irvine Welsh's *Trainspotting*, and Gustavo Perez Firmat's *Life on the Hyphen*. The final section of the seminar will be devoted to exploring ways in which a growing number of non-western writers have begun to break out of traditionalist narrative modes in order to "translate" the effects of new media on literary representation, from Afro-futurism to postcolonial cyberpunk.]

[COM L 609 Comparison and Cultural Difference
Fall. 4 credits. Not offered 1999–2000. N. Melas.
This course will be a wide-ranging investigation of the pitfalls and possibilities for cross-cultural comparison. We will examine the structure and mechanisms of comparison, both as a disciplinary method and as a concept or practice: to what extent and in what circumstance can comparison produce cultural difference, consolidate it, dissolve it, erect borders, inhabit borderlands, propose a global ecumene? With particular attention to colonialism and globalization, we will inquire into the relation between various modes of comparison and broader contexts and ideologies. Though focused on the humanities and on theoretical texts, readings will include incursions into the social sciences and selected poetry and film. Authors may include Lyotard, Foucault, Fanon, Tilley, Gilroy, Clifford, Appadurai, Bhabha, Lanser, Kincaid, Walcott.]

COM L 610 Modern Japanese Studies: The Formation of the Field in History and Literature (also ASIAN 609)
Spring. 4 credits. B. deBary, N. Sakai, J. Koschmann.
For course description, please see Asian 609.

COM L 619–620 Independent Study
619, fall; 620, spring. Variable credit. Comparative Literature 619 and 620 may be taken independently of each other. Applications available in 145 G.S.

[COM L 622 Literature and Theory (also Com L 302 and ENGL 302/602)
Fall. 4 credits. Not offered 1999–2000. J. Culler.
For description, please see Comparative Literature 302.]

COM L 623 Encounters with the Dead (also Ital 623, JewS 623)
Fall. 4 credits. M. Migiel.
For course description, please see Italian Literature 623.

COM L 625 Literature and Affect (also GerSt 617)
Fall. 4 credits. A. Schwarz.
For course description, please see German Studies 617.

[COM L 626 Baroque (also GER ST 627)
Fall. 4 credits. Not offered 1999–2000. G. Waite.
For description, please see German Studies 627.]

[COM L 641 Bakhtin as Reader (also RUSS L 641)
Spring. 4 credits. Also open to undergraduates with permission of instructor. Not offered 1999–2000. P. Carden.
For description, please see Russian Literature 641.]

[COM L 649 Misogyny and Its Readers (also COM L 449, ITAL L 409/609, WM ST 409/609)
Fall. 4 credits. Not offered 1999–2000. M. Migiel.
For course description, please see Italian Literature 409.]

COM L 650 Renaissance Poetry (also ComL 450, Engl 622)
Fall. 4 credits. W. Kennedy.
For course description, please see Comparative Literature 450.

[COM L 652 Renaissance Humanism (also COM L 452)
Spring. 4 credits. Not offered 1999–2000. W. Kennedy.]

[COM L 656 Aesthetic Theory: The End of Art (also GER ST 656)
Spring. 4 credits. Not offered 1999–2000. P. Gilgen.
For course description, please see German Studies 656.]

[COM L 657 Seminar in Dramatic Theory (also THETR 637)
Spring. 4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. R. Schneider.
For description, please see Theatre Arts 637.]

COM L 660 Visual Ideology (also GerSt 660, Thetr 660)
Spring. 4 credits. G. Waite.
For course description, please see German Studies 660.

COM L 662 Cinematic Desire (also Engl 660, WmSt 661)
Fall. 4 credits. E. Hanson.
For course description, please see English 660.

[COM L 664 Literature and the Uncanny (also GER ST 668)
Fall. 4 credits. Not offered 1999–2000. A. Schwarz.
For course description, please see German Studies 656.]

COM L 671 Transnational Imaginaries: Globalization and Culture
Fall. 4 credits. N. Melas.
The term "globalization" has become ubiquitous in recent years as the primary conceptual frame and material basis for understanding contemporary transnationalism. It evokes a brave new borderless world in

which politics, culture, and social formations are no longer necessarily congruent nor primarily beholden to national boundaries, thus making neocolonial domination easier to see and harder to combat. It triumphantly or despairingly announces the end of history when space precedes time as the measure of human experience, and that experience exceeds the grasp of aspects of our understanding of culture—both in its ethnographic and humanist guises—and of the categories through which we apprehend and analyze it. The question of the mutation of culture in globalization is most often framed either in terms of the prospects for global culture and its inverse, a regeneration of resistant and hybrid localism, or in terms of the global reach of chiefly U.S. popular culture through the media.

While considering these issues, this seminar will focus on how globality is represented, or rather imagined, particularly in cultural texts (chiefly theory, literature, and film) marginal to the centers of power. In addition to providing a critical survey of some of the most influential texts and debates on the subject of globalization, this seminar will also attempt a re-evaluation (not to say a rehabilitation) of the notion of "imagination" and the pivotal if often covert role it plays in claims for cultural resistance. Authors may include Amin, Wallerstein, Hall, Myoshi, Harvey, Robertson, Appadurai, Agamben, Walcott, Brennan, Jameson, Glissant, Mies.

[COM L 674 Contemporary Poetry and Culture: 1968–1998 (also ENGL 697 and GERST 674)
Spring. 4 credits. Not offered 1999–2000. J. Monroe.
The redrawing of cultural and political boundaries underway since the late 1980's has made it possible to conceive of the poetry of the Cold War era with a degree of closure unimaginable only a few years ago. In light of this changed situation, we will focus on the second half of the post-1945 period—the thirty years extending from 1968 to the present—with particular attention to the past two decades. Exploring issues of emerging and evolving importance for a poetry of the present moment in light of the recent past, we will consider dominant modes as well as alternative practices; canon formation, gender, and multiculturalism; the roles of the publishing industry, popular culture, creative writing programs, and new computer technologies in shaping reading habits and writing communities.]

[COM L 675 After the Divide: German Critical Theory of the Seventies and Eighties (also GERST 675 and HIST 675)
Fall. 4 credits. Not offered 1999–2000. P. Hohendahl.
For description, please see German Studies 675.]

COM L 677 Mourning People: Melancholias of Nation and Race (also FrLit 609)
Fall. 4 credits. T. Hope.
For course description, please see Comparative Literature 477.

COM L 678 Nationalism and National Literatures in Francophone sub-Saharan Africa (also COM L 478)
Spring. 4 credits. D. Thomas.
For course description, please see Comparative Literature 478.

[COM L 680 Baudelaire in Context (also COM L 481)
Spring. 4 credits. Not offered 1999–2000. J. Culler.
For course description, please see Comparative Literature 481.]

COM L 683 Imagining the Holocaust (also Com L 483, Engl 458/658, JWST 458/658)
Spring. 4 credits. D. Schwarz.
For course description, please see English 458.

[COM L 686 Althusser and Lacan (also GER ST 686, FR LIT 623)
Spring. 4 credits. Enrollment limited to 12. Not offered 1999–2000. G. Waite.
For course description, please see German Studies 686.]

[COM L 689 Adorno's Aesthetic Theory (also GER ST 689)
Fall. 4 credits. Not offered 1999–2000. P. Hohendahl.
For course description, please see German Studies 689.]

COM L 695 Post-Modern Thought and Area Studies (also JapL 614)
Fall. 4 credits. B. deBary.
For course description, please see Japanese Literature 614.

COM L 696 Conceptualizing Cultural Contact (also GerSt 696, NES 696)
Spring. 4 credits. L. Adelson.
For course description, please see German Studies 696.

[COM L 699 German Film Theory (also GERST 699 and THETR 699)
Fall. 4 credits. Not offered 1999–2000. D. Bathrick.
For description, please see Theatre Arts 699.]

COMPUTER SCIENCE

C. Van Loan, chair; B. Arms, K. Birman, C. Cardie, T. Coleman, R. L. Constable, R. Elber, D. Greenberg, D. Gries, J. Halpern, J. Hartmanis, J. E. Hopcroft, D. Huttenlocher, S. Keshav, J. Kleinberg, D. Kozen, L. Lee, G. Morrisett, A. Myers, K. Pingali, R. A. Rubinfeld, F. B. Schneider, B. Selman, P. Seshadri, D. Shmoys, B. Smith, E. Tardos, R. Teitelbaum, S. Toueg, S. Vavasis, T. vonEicken, R. Zabih

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. For details, visit our World Wide Web site at http://www.cs.cornell.edu/ugrad

The Major

CS majors take courses in algorithms, data structures, logic, programming languages, scientific computing, systems, and theory. Electives in artificial intelligence, computer graphics, computer vision, databases, multimedia, and networks are also possible. Requirements include:

- four semesters of calculus (MATH 111–122 (or 112)–221–222 or 191–192–293–294)
- two semesters of introductory computer programming (COM S 100 and 211 or 212)
- a seven-course computer science core (COM S 222, 280, 314, 381, 410, 414, and 482)
- two 400+ computer science electives, totaling at least 6 credits
- a computer science project course (COM S 413, 415, 418, 433, 473, 501, 514, 519, or 664)
- a 3+ credit mathematical elective course (OR&IE 270, MATH 300+, T&AM 300+, etc.)
- two 300+ courses that are technical in nature and total at least six credits
- a three course specialization in a discipline other than computer science. These courses must be numbered 300-level or greater and total at least nine credits.

The program is broad and rigorous, but it is structured in a way that supports in-depth study of outside areas. Intelligent course selection can set the stage for graduate study and employment in any technical area and any professional area such as business, law, or medicine. With the advisor, the computer science major is expected to put together a coherent program of study that supports career objectives and is true to the aims of liberal education.

Admission

The prerequisites for admission to the major are:

1) Completion of Computer Science 100–211 (or 212)–280
2) Completion of Mathematics 111–122–221 or Mathematics 191–192–293
3) B- or better in all computer science and mathematics courses
4) Acceptance by the department's admissions committee

After admission, students are expected to maintain at least a 2.75 grade-point average in their major courses. Any grade below C– in a core course or related elective is not acceptable.

Honors. To qualify for departmental honors a student must have:

- maintained a cumulative GPA>=3.5
- completed 8 credit hours of COM S course work at or above the 500 level
- completed 6 credit hours of COM S 490 research with a COM S faculty member, spread over at least two semesters and with grades of A- or better.

Note: Honors courses may not be used to satisfy the COM S 400+ elective requirement, the COM S project requirement, the math or technical electives, or the specialization minor. See the COM S undergraduate website for more information on eligibility: http://www.cs.cornell.edu/Ugrad.

Courses

For complete course descriptions, see the computer science listing in the College of Engineering section.

COM S 099 Fundamental Programming Concepts
Fall, summer. 2 credits. S-U grades only. No prerequisites.

COM S 100 Introduction to Computer Programming
Fall, spring, summer. 4 credits.
During the fall semester, 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 Introduction to Cognitive Science (also COGST 101, LING 170, and PSYCH 102)
Fall. 3 credits.

COM S 113 Introduction to C
Fall, spring. 1 credit. Weeks 5–8. Prerequisite: COM S 100 or equivalent programming experience. Credit is granted for both COMS 113 and 213 only if 113 is taken first. S–U grades only.

COM S 114 Unix Tools
Fall, spring. 1 credit. Weeks 1–4. Prerequisite: COM S 100 or equivalent programming experience. S-U grades only.

COM S 130 Creating Web Documents
Fall. 3 credits.

COM S 201 Cognitive Science in Context Laboratory: Explorations of Cognitive Science in Ecological Settings (also COGST 201 and PSYCH 201)
Fall, spring. 4 credits. Limited to 24 students. Prerequisite: Introduction to Cognitive Science (PSYCH 102, COGST 101, COM S 101), or written permission of the instructor. Disc and demos, M W 10:10; lab, M or W 1:25–4:25, plus additional hours to be arranged.
B. Halpern and staff.

COM S 202 Transition to Java
Fall, spring. 1 credit. Weeks 1–4. Prerequisites: COM S 100; COM S 212 recommended.

COM S 211 Computers and Programming (also ENGRD 211)
Fall, spring, summer. 3 credits. Prerequisite: COM S 100 or equivalent programming experience. Credit will not be granted for both COM S 211 and 212.

COM S 212 Structure and Interpretation of Computer Programs (also ENGRD 212)
Fall, spring. 4 credits. Prerequisite: COM S 100 or equivalent programming experience. Credit will not be granted for both COM S 211 and 212.

COM S 213 C++ Programming
Fall, spring. 2 credits. Prerequisite: COM S 211 or 212 or equivalent programming experience. Students who plan to take COMS 113 and 213 must take 113 first. S-U grades only.

COM S 222 Introduction to Scientific Computation (also ENGRD 222)
Spring, summer. 3 credits. Prerequisites: COM S 100 and (MATH 222 or 294).

COM S 280 Discrete Structures
Fall, spring. 4 credits. Pre- or co-requisite: COM S 211 or 212 or permission of instructor.

COM S 314 Introduction to Digital Systems and Computer Organization
Fall, spring. 4 credits. Prerequisite: COM S 211 or 212 or equivalent.

COM S 381 Introduction to Theory of Computing
Fall, summer. 4 credits. Prerequisite: COM S 280 or permission of instructor. Credit will not be granted for both COM S 381 and 481.

[COM S 400 The Science of Programming
Spring. 4 credits. Prerequisite: COM S 280 or equivalent. Not offered every year; semester to be announced.]

COM S 409 Data Structures and Algorithms for Computational Science
Spring. 4 credits. This course is not open to COM S majors. Credit will not be granted for both COM S 409 and 410. Prerequisite: COM S 211 or 212 or equivalent programming experience.

COM S 410 Data Structures
Fall, spring, summer. 4 credits. Prerequisite: COM S 280 or permission of instructor.

[COM S 411 Programming Languages and Logics
Fall. 4 credits. Prerequisites: COM S 410 or permission of instructor. Not offered every year; semester to be announced.]

COM S 412 Introduction to Compilers and Translators
Spring. 3 credits. Prerequisites: COM S 314, 410, and 381 or 481. Corequisite: COM S 413.

COM S 413 Practicum in Compilers and Translators
Spring. 2 credits. Prerequisites: COM S 314, 410, and 381 or 481. Corequisite: COM S 412.
A compiler implementation project related to COM S 412.

COM S 414 Systems Programming and Operating Systems
Fall, summer. 3 credits. Prerequisite: COM S 314 or permission of instructor.

COM S 415 Practicum in Operating Systems
Fall. 2 credits. Prerequisite: COM S 410. Corequisite: COM S 414.

COM S 417 Computer Graphics and Visualization (also ARCH 374)
Spring. 3 credits. Prerequisite: COM S 211 or 212.

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. Corequisite: COM S 417.

COM S 421 Numerical Analysis
Fall. 4 credits. Prerequisites: MATH 294 or equivalent, one additional mathematics course numbered 300 or above, and knowledge of programming.

COM S 432 Introduction To Database Systems
Fall. 3 credits. Prerequisites: COM S 211 or 212 and COM S 410. Recommended: COM S 213 and strong programming skills in C, C++, or Java.

COM S 433 Practicum in Database Systems
Fall. 2 credits. Corequisite: COM S 432.

[COM S 444 Distributed Systems and Algorithms
Fall. 4 credits. Pre- or co-requisite: COM S 414 or permission of instructor. Not offered every year. Not offered 1999–2000.]

COM S 472 Foundations of Artificial Intelligence
Fall. 3 credits. Prerequisites: COM S 211 or 212 and COM S 280 or equivalent.

COM S 473 Practicum in Artificial Intelligence
Fall. 2 credits. Prerequisites: COM S 211 or 212 and COM S 280 or equivalent. Corequisite: COM S 472.

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 481.
A faster-moving and deeper version of COM S 381. Corrective transfers between COM S 481 and 381 (in either direction) are encouraged during the first few weeks of instruction.

COM S 482 Introduction to Analysis of Algorithms
Spring, summer. 4 credits. Prerequisites: COM S 410 and either 381 or 481, or permission of instructor.

COM S 486 Applied Logic (also MATH 486)
Fall or spring. 4 credits. Prerequisites: MATH 222 or 294, COM S 280 or equivalent (such as MATH 332, 432, 434, 481), and some course in mathematics or theoretical computer science.

COM S 490 Independent Reading and Research
Fall, 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 513 System Security
Spring. 4 credits. Prerequisites: COM S 414 or 519 and familiarity with JAVA programming language.

COM S 514 Intermediate Computer Systems
Fall or spring. 4 credits. Prerequisites: COM S 414 or permission of instructor.

COM S 515 Practicum in Systems
Fall or spring. 1–2 credits. Co-rerequisite: COM S 514.

COM S 519 Engineering Computer Networks
Fall. 4 credits. Prerequisites: COM S 314 and 410, or permission of instructor.

COM S 522 Computational Tools and Methods for Finance
Spring. 4 credits. Prerequisites: programming experience (e.g. C FORTRAN, or MATLAB,) some knowledge of numerical methods, especially numerical linear algebra.

COM S 574 Heuristic Methods for Optimization (also CEE 509)
Spring. 3 or 4 credits. Prerequisite: COM S/ENGRD 211 or 212 or 222 or CEE/ENGRD 241, or graduate standing, or permission of instructor.

COM S 601 System Concepts
Fall. 3 credits. Prerequisite: open to students enrolled in the COM S Ph.D. program.

COM S 611 Advanced Programming Languages
Fall. 4 credits. Prerequisites: graduate standing or permission of instructor.

COM S 612 Compiler Design for High-Performance Architectures
Spring. 4 credits. Prerequisites: COM S 314 and 412 or permission of instructor.

COM S 613 Concurrent Programming
Spring. 4 credits. Prerequisites: COM S 414 or permission of instructor. Not offered every year; semester to be announced.

COM S 614 Advanced Systems
Spring. 4 credits. Prerequisite: COM S 414 or permission of instructor.

COM S 618 Principles of Distributed Computing–Message Passing
Spring. 4 credits. Prerequisites: mathematical maturity and some basic knowledge of distributed systems. Offered in even-numbered years.

[COM S 619 Principles of Distributed Computing–Shared Memory
Spring. 4 credits. Prerequisites: mathematical maturity and some basic knowledge of distributed systems. Offered in odd-numbered years. Not offered 1999–2000.]

COM S 621 Matrix Computations
Fall. 4 credits. Prerequisites: MATH 411 and 431 or permission of instructor.

[COM S 622 Numerical Optimization and Nonlinear Algebraic Equations
Spring. 4 credits. Prerequisite: COM S 621. Offered in odd-numbered years. Not offered 1999–2000.]

COM S 624 Numerical Solution of Differential Equations
Spring. 4 credits. Prerequisite: previous exposure to numerical analysis (e.g. COM S 421 or 621) to differential equations, and knowledge of MATLAB. Offered in even-numbered years.

COM S 626 Computational Molecular Biology
Spring. 4 credits. Prerequisites: familiarity with linear programming, numerical solutions of ordinary differential equations and non-linear optimization methods.

[COM S 631 Multimedia Systems
Spring. 4 credits. Prerequisite: COM S 414 or permission of instructor. Not offered 1999–2000.]

COM S 632 Advanced Database Systems
Spring. 4 credits. Prerequisite: COM S 432/433 or permission of instructor.

COM S 664 Machine Vision
Spring. 4 credits. Prerequisites: undergraduate-level understanding of algorithms and MATH 221 or equivalent.

COM S 671 Introduction to Automated Reasoning
Fall. 4 credits. Prerequisite: COM S 611 and graduate standing or permission of instructor.

COM S 672 Advanced Artificial Intelligence
Spring. 4 credits. Prerequisites: COM S 472 or permission of instructor.

COM S 674 Natural Language Processing
Spring. 3 credits. Prerequisites: COM S 472 or permission of instructor. Not offered every year; semester to be announced.

[COM S 676 Reasoning About Knowledge
Fall. 4 credits. Prerequisites: mathematical maturity and an acquaintance with propositional logic. Offered in even-numbered years. Not offered 1999–2000.]

COM S 677 Reasoning About Uncertainty
Fall. 4 credits. Prerequisites: mathematical maturity and an acquaintance with propositional logic. Offered in odd-numbered years.

COM S 681 Analysis of Algorithms
Fall. 4 credits. Prerequisite: (COM S 381 or 481, and graduate standing) or permission of instructor.

COM S 682 Theory of Computing
Spring. 4 credits. Prerequisite: (COM S 381 or 481) and (COM S 482 or 681) or permission of instructor.

COM S 686 Logics of Programs
Spring. 4 credits. Prerequisites: COM S 481, 682, and (MATH 481 or MATH/COM S 486).

COM S 709 Computer Science Colloquium
Fall, 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 611, 613, 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, spring. 4 credits. Prerequisite: permission of instructor.

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.

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, spring. 4 credits. Prerequisite: COM S 621 or 622 or permission of instructor. Not offered every year; semester to be announced.

COM S 729 Seminar in Numerical Analysis
Fall, spring. 1–4 credits (to be arranged). Prerequisite: permission of instructor. S-U grades only.

COM S 754 Systems Research Seminar
Fall, spring. 1 credit.

COM S 772 Seminar in Artificial Intelligence
Fall, spring. 4 credits. Prerequisite: permission of instructor.

COM S 773/774 Proseminar in Cognitive Studies I & II (also COGST, PHIL, LING, and PSYCH 773/774)
Fall, 773; spring, 774. 4 credits.

COM S 775 Seminar in Natural Language Understanding
Fall, spring. 2 credits.

COM S 789 Seminar in Theory of Algorithms and Computing
Fall, spring. 4 credits. Prerequisite: permission of instructor. S-U grades only.

COM S 790 Special Investigations in Computer Science
Fall, spring. Prerequisite: permission of a computer science adviser. Letter grade only. Independent research or Master of Engineering project.

COM S 890 Special Investigations in Computer Science
Fall, spring. Prerequisite: permission of a computer science adviser. S-U grades only. Master of Science degree research.

COM S 990 Special Investigations in Computer Science
Fall, spring. Prerequisite: permission of a computer science adviser. S-U grades only. Doctoral research.

CZECH

See Department of Russian.

DANCE

See under Department of Theatre, Film and Dance.

DUTCH

See Department of German Studies.

ECONOMICS

T. Mitra, chair; R. Masson, graduate field representative; T. Lyons, director of undergraduate studies; K. Basu, L. Blume, S. Coate, M. Conlin, G. Cozzi, T. E. Davis, D. Easley, R. Ehrenberg, R. Frank, G. Hay, Y. Hong, N. Kiefer, P. D. McClelland, M. Majumdar, T. O'Donoghue, S. Ortigueira, U. Possen, R. E. Schuler, K. Shell, G. J. Staller, S. Subramanian, E. Thorbecke, T. Vogelsang, H. Y. Wan, Jr., Y. Wen, J. Wissink. Emeritus: W. Isard, A. Kahn, J. Vanek

The study of economics provides an understanding of the way economies operate and an insight into public issues. The department offers a broad range of undergraduate courses in such fields as money and banking, international and comparative economics; econometrics; theory; history; growth and development; and the organization, performance, and control of industry.

Social Science Distribution Requirement

The microeconomics distribution requirement can be fulfilled with any of the following:

Economics 101, Economics 301, or Economics 313.

The macroeconomics distribution requirement can be satisfied with any of the following:

Economics 102, Economics 302, or Economics 314.

The Major

Prerequisites

Economics 101 and 102 and Math 111 (or equivalents, with approval of the director of undergraduate studies), all with grades of C or better.

Economics 301 with a grade of C or better substitutes for 101; Economics 302 with a grade of C or better substitutes for 102.

Requirements

Eight courses listed by the Department of Economics at the 300 level or above, or approved by the student's major adviser, all with grades of C- or better.

These eight courses must include:

(1) Economics 313 and 314,

(2) Economics 321, or Economics 319 and 320,

(3) at least 3 courses from the following: 318, 320, 322–99, 467.

Economics 301 with a grade of B or better substitutes for both 101 and 313; Economics 302 with a grade of B or better substitutes for both 102 and 314.

If Economics 321 is applied toward the major, neither 319 nor 320 can be applied.

Economics 263, 399, and 499 *cannot* be counted toward the eight-course requirement.

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 and 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, winter, 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, winter, 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 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 263 International Economics
Spring and summer. 4 credits. Prerequisite: Economics 101–102 or equivalent.
This course surveys international economics in one semester. First, it surveys the sources of comparative advantage, and it analyzes commercial policy and the institutional aspects of the world trading system. Second, it discusses exchange rates, and it studies theories of balances of payments adjustments. This course is intended primarily for government majors who are comfortable with a less technical approach to international economics. (Cannot be applied to the economics major.)

ECON 301 Microeconomics
Fall. 4 credits. Prerequisite: calculus.
Intended for students with strong analytical skills who have not taken Economics 101, 102. 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 302 Macroeconomics
Spring. 4 credits. Prerequisite: Economics 301.
Intended for students with strong analytical skills who have not taken Economics 101, 102. 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 307 Introduction to Peace Science (also CRP 495.18 and Introduction to Peace Science)
Winter session. 4 credits. Prerequisites: Economics 101–102 or permission of instructor.
Introduction to the theories of and research on conflict resolution. Topics include conflict, its role and impact on society; theories of aggression and altruism; causes of war; game theory; conflict management procedures and other analytical tools and methods of peace science; alternatives to war.

ECON 313 Intermediate Microeconomic Theory
Fall, spring, and summer. 4 credits. Prerequisites: Economics 101–102 and calculus.
The pricing processes in a private enterprise economy are analyzed under varying competitive conditions, and their role in the allocation of resources and the functional distribution of national income is considered.

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 317 Intermediate Mathematical Economics I
Fall. 4 credits. Prerequisites: Economics 101–102 and Math 111–112. Not offered 1999–2000.
Introduction of calculus and matrix algebra; problems of maximization of a function of several variables. Economic examples are used to illustrate and teach the mathematical concepts.]

[ECON 318 Intermediate Mathematical Economics II
Spring. 4 credits. Prerequisites: Economics 101–102 and Math 111–112. Not offered 1999–2000.
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, 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. Instructor's permission required.
Same material as Economics 324, seminar limited to 12 students.

ECON 331 Money and Credit
Fall. 4 credits. Prerequisites: Economics 101–102 and 314.

A systematic treatment of the determinants of the money supply and the volume of credit. Economic analysis of credit markets and financial institutions in the United States.

ECON 333 Financial Economics
Spring. 4 credits. Prerequisites: Economics 313 and 314.
The theory and decision making in the presence of uncertainty and the practical aspects of particular asset markets are examined.

ECON 335 Public Finance: The Microeconomics of Government
Fall. 4 credits. Prerequisites: Economics 101–102 and 313, or their equivalent, and one semester of calculus.
The role of government in a free market economy is analyzed. Topics covered include public goods, market failures, allocation mechanisms, optimal taxation, effects of taxation, and benefit-cost analysis. Current topics of an applied nature will vary from term to term.

ECON 336 Public Finance: Resource Allocation and Fiscal Policy
Spring. 4 credits. Prerequisites: Economics 101–102, 313 or their equivalent and one semester of calculus.
This course covers the revenue side of public finance and special topics. Subjects covered include the federal debt, the budget, and government regulation and transfers, as well as problems like local public goods, health care, education, the hierarchy of governmental structure, plus a variety of applied problems.

ECON 341 Labor Economics
For description, see ILRLE 240.

ECON 351 Industrial Organization I
Fall. 4 credits. Prerequisite: Economics 313 or its equivalent.
This course examines markets with only a few firms (i.e., oligopolies), and the primary focus will be the strategic interactions between firms. Topics include static competition in oligopolies, cartels and other forms of collusive behavior, competition between firms producing differentiated products, entry behavior, R&D behavior, and government interventions in oligopoly industries (e.g., antitrust laws).

ECON 352 Industrial Organization II
Spring. 4 credits. Prerequisite: Economics 313 or its equivalent.
This course primarily focuses on the pricing decisions of firms. The course does not consider the strategic response of other firms to these pricing decisions. The pricing decisions include price discrimination, commodity bundling, pricing a product line and pricing a durable good. In addition to pricing decisions, the course will consider topics associated with private information such as adverse selection, signaling and moral hazard. Numerous theoretical models are presented and empirical results are discussed.

ECON 361 International Trade Theory and Policy
Fall. 4 credits. Prerequisites: Economics 101–102 and 313.
This course surveys the sources of comparative advantage. It studies commerical policy and analyzes the welfare economics of trade between countries. Some attention is paid to the institutional aspects of the world trading system.

ECON 362 International Monetary Theory and Policy
Spring and summer. 4 credits. Prerequisites: Economics 101–102 and 314.
This course surveys the determination of exchange rates and theories of balance of payments adjustments. It also explores open economy macroeconomics, and it analyzes some of the institutional details of foreign exchange markets, balance of payments accounting, and the international monetary system.

ECON 371 Economic Development
Spring. 4 credits. Prerequisites: Economics 313 or equivalent.
Study of the problem of sustaining accelerated economic growth in less-developed countries. Trade-offs between growth, welfare, and equity; the legacy of colonialism; relevance of history and economic theory; problems of capital formation, economic planning and international specialization; and the interaction of industrialization, agricultural development, and population change are emphasized.

[ECON 372 Applied Economic Development
Fall or spring. 4 credits. Prerequisite: Economics 101–102. Not offered 1999–2000.
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 404 Economics and the Law
Fall. 4 credits. Prerequisite: Economics 101.
An examination, through the lens of economic analysis, of legal principles drawn from various branches of law, including contracts, torts, and property. Cases are assigned for class discussion; in addition, there are several writing assignments.

ECON 408 Production Economics and Policy
For description, see ARME 608.

ECON 409 Environmental Economics and Policy
For description, see ARME 451.

ECON 413 Economics of Consumer Demand
For description, see CEH 613.

ECON 415 Price Analysis
For description, see ARME 415.

[ECON 416 Intertemporal Economics
Spring. 4 credits. Prerequisites: Economics 313. Not offered 1999–2000.
This course is intended for advanced economics majors who are especially interested in economic theory. Topics to be covered: (a) review of the one good Ramsey model of optimal savings and accumulation; conditions for intertemporal efficiency in production; comparative dynamics and sensitivity analysis; (b) some earlier models of capital accumulation; the roles of present value and internal rate of return in guiding investment decisions; (c) growth, exhaustible resources; pollution and conservation: discussion of the trade-offs facing a society.]

[ECON 417 History of Economic Analysis #
Spring. 4 credits. Prerequisites: Economics 101–102 or permission of instructor. Not offered 1999–2000.
Early writings in economics and their relationship to current economic analysis and policy issues, for example, ancient and medieval philosophers on justice in exchange; mercantilist arguments for trade protection; early theories about the effect of monetary expansion (D. Hume); the role of the entrepreneur (Cantillon); and general competitive equilibrium (the Physiocrats). The most recent reading assignment in this course is Adam Smith's *Wealth of Nations* but the emphasis is on the relationship between the precursors of Adam Smith and his *Wealth of Nations* to modern economics analysis and current efforts to answer some of the questions raised in the early writing on economics.]

[ECON 419 Economic Decisions under Uncertainty
Fall. 4 credits. Prerequisites: Economics 313 and 319. Not offered 1999–2000.
This course provides an introduction to the theory of decision making under uncertainty with emphasis on economic applications of the theory.]

ECON 420 Economics of Family Policy—Adults
Economics 420 and 421 together, count as one course for the Economics major.
For description, see CEH 320.

ECON 421 Economics of Family Policy—Children
Economics 420 and 421 together, count as one course for the Economics major.
For description, see CEH 321.

ECON 422 The Economics of Infrastructure and a Sustainable Environment
For description, see CEE 422.

ECON 425 Economic History of Latin America @ #
Spring. 4 credits.
A survey of changing economic institutions and policies from pre-Columbian to modern times.

ECON 426 History of American Enterprise #
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 430 Policy Analysis: Welfare Theory, Agriculture, and Trade
For description, see ARME 630.

ECON 432 Health Economics and Policy
For description, see CEH 632 or PAM 653.

ECON 435 Information and Regulation
For description, see CEH 635.

ECON 440 Analysis of Agricultural Markets
Economics 440 and 441 together, count as one course for the Economics major.
For description, see ARME 640.

ECON 441 Commodity Futures Markets
Economics 440 and 441 together, count as one course for the Economics major.
For description, see ARME 641.

ECON 444 Modern European Economic History
For description, see ILRLE 444.

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 1999–2000.
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 450 Resource Economics
For description, see ARME 450.

ECON 451 Economic Security
For description, see ILRLE 340.

ECON 453 The Economics of Unemployment
For description, see ILRLE 348.

ECON 454 The Economics of Health Care
For description, see ILRLE 440.

ECON 455 Income Distribution
For description, see ILRLE 441.

ECON 456 The Economics of Employee Benefits
For description, see ILRLE 442.

ECON 457 Women in the Economy
For description, see ILRLE 445.

ECON 458 Topics in Twentieth Century Economic History
For description, see ILRLE 448.

ECON 459 Economic History of British Labor 1750–1940
For description, see ILRLE 640.

ECON 460 Economic Analysis of the Welfare State
For description, see ILRLE 642.

ECON 461 The Economics of Occupational Safety and Health
For description, see ILRLE 644.

ECON 462 Labor in Developing Economies
For description, see ILRIC 332.

ECON 464 Economics of Agricultural Development
For description, see ARME 464.

ECON 465 Food and Nutrition Policy
For description, see ARME 665.

ECON 466 Economics of Development
For description, see ARME 666.

ECON 467 Game Theory
Fall. 4 credits. Prerequisites: Economics 313 and 319.
This course studies mathematical models of conflict and cooperation in situations of uncertainty (about nature and about decision makers).

ECON 468 Economic Problems of Latin America @
Spring. 4 credits. Prerequisites: Economics 101–102.
Current topics include, international debt, capital flight, economic integration, stabilization programs, etc.

ECON 469 China's Economy Under Mao and Deng @
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 between 1949 and the early 1990's.

ECON 471 The Economies of the Former Soviet Union and of Central Europe: From Central Planning to Markets
Fall. 4 credits. Prerequisites: Economics 101, 102.
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 472 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 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 473 Economics of Export-led Development @
Spring. 4 credits. Prerequisites: Economics 313, 314, or their equivalent.
This course will examine the phenomenon of export-led development from both the theoretical and empirical points of view. Concentration will be on experiences within the West Pacific Rim.

ECON 474 National and International Food Economics
For description, see NS 457.

ECON 475 The Economy of India @
Fall. 4 credits. Prerequisite: Economics 101–102 or equivalent background.
This course will present the major economics and development problems of contemporary India and 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 477 Contemporary Development of Southeast Asian Economies
Spring. 3 credits. Prerequisite: Economics 101, 102.
See CRP 679.09 for description.

ECON 498 Readings in Economics
Fall or spring. Variable credit.
Independent study.

ECON 499 Honors Program
Fall and spring. 8 credits. Prerequisites: Economics 313, 314, 321 (or 319–320).
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 609 Microeconomic Theory I
Fall. 4 credits.
Topics in consumer and producer theory.

ECON 610 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 613 Macroeconomic Theory I
Fall. 4 credits.
Static general equilibrium. Intertemporal general equilibrium: infinitely lived agents models and overlapping generations models. Welfare theorems. Equivalence between sequential markets and Arrow-Debreu Markets. Ricardian proposition. Modigliani-Miller theorem. Asset pricing. Recursive competitive equilibrium. The Neoclassical Growth Model. Calibration. Introduction to dynamic programming.

ECON 614 Macroeconomic Theory II
Spring. 4 credits.
Dynamic programming. Stochastic growth. Search models. Cash-in-advance models. Real business-cycle models. Labor indivisibilities and lotteries. Heterogeneous agents models. Optimal fiscal and monetary policy. Sustainable plans. Endogenous growth.

ECON 616 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 617 Intermediate Mathematical Economics I
Fall. 4 credits. Prerequisites: Calculus II and intermediate linear algebra.
The course will cover selected topics in Matrix algebra (vector spaces, matrices, simultaneous linear equations, characteristic value problem), calculus of several variables (elementary real analysis, partial differentiation, convex analysis), classical optimization theory (unconstrained maximization, constrained maximization).

[ECON 618 Intermediate Mathematical Economics II
Spring. 4 credits. Not offered 1999–2000.
A continuation of Economics 617, the course develops additional mathematical techniques for applications in economics. Topics covered could include study of dynamic systems (linear and nonlinear difference equations, differential equation, chaotic behavior), dynamic optimization methods (optimal control theory, nonstochastic and stochastic dynamic programming), and game theory (repeated dynamic and evolutionary games).]

ECON 619 Econometrics I
Fall. 4 credits. Prerequisites: Economics 319–320 or permission of instructor.
This course gives the probabilistic and statistical background for meaningful application of econometric techniques. Topics to be covered are (1) probability theory: probability spaces, random variables, distributions, moments, transformations, conditional distributions, distribution theory and the multivariate normal distribution, convergence concepts, laws of large numbers, central limit theorems, Monte Carlo simulation; (2) statistics: sample statistics, sufficiency, exponential families of distributions. Further topics in statistics will be considered in Economics 620.

ECON 620 Econometrics II
Spring. 4 credits. Prerequisite: Economics 619.
This course is a continuation of Economics 619 (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 699 Readings in Economics
Fall or spring. Variable credit.
Independent study.

ECON 703 Seminar in Peace Science
Fall. 4 credits.
Among topics to be covered at an advanced level are game theory, coalition theory, bargaining and negotiation processes, cooperative procedures, microbehavior models, macrosocial processes, and general systems analysis.

ECON 710 Stochastic Economics: Concepts and Techniques
Spring. 4 credits. Prerequisites: Economics 609, 610, 613, 614, 619, and 620.
This course will review a number of techniques that have been useful in developing stochastic models of economic behavior. Among these are (a) discrete-time Markov processes, (b) dynamic programming under uncertainty, and (c) continuous-time diffusion processes. Examples of economic models will be drawn from recent literature on optimal capital accumulation and optimal savings and portfolio selection problems; permanent income hypothesis; dynamic models of price adjustment, etc. Advanced graduate students contemplating work in economic theory and econometric theory will gain exposure to current research.

ECON 712 Advanced Macroeconomics
4 credits. Prerequisites: Economics 613, 614.
The purpose of this course is to introduce the student to some of the topics and analytic techniques of current macroeconomic research. The course will fall into three parts: dynamic programming, new Keynesian economics, and recent theories of economic growth. The dynamic programming section will include models of consumption, investment, and real business cycles. The new Keynesian section will cover models of wage and price rigidity, coordination failure and credit markets. The section on endogenous growth will look at recent efforts to add non-convexities to models of optimal growth. These topics are intended to complement the material on overlapping generations covered elsewhere.

ECON 713 Advanced Macroeconomics II
Spring. 4 credits. Prerequisites: ECON 613, 614.
This course reveiws the most recent research in endogenous growth theory. This theory is little more than a decade old, but it has produced a large amount of both empirical and theoretical results that have substantially reshaped the general field of macroeconomics. It is perhaps no exaggeration to say that most of the work at the frontier of today's macroeconomics belongs to this field. An increasing number of papers have been touching important issues such as; learning by doing, R&D investment, market structure, private and public organization of R&D, education financing, human capital accumulation, technological unemployment, growth and business cycles, inequality and growth, political equilibrium, democracy and growth, instability, social conflict, capital accumulation, intergenerational and vested interests and barriers to technology adoption, international transfers of technologies, sustainable development, etc.

This course tries to orient the student in this large and variegated literature consisting of recently published articles and working papers. Understanding this literature is a sound training in the analytical methods used at the frontier of theoretical research, but it also provides a number of empirical results at the center of the economic debate.

ECON 717 Mathematical Economics
4 credits. Prerequisites: ECON 609–610 (or equivalent training in micro theory) and MATH 413–414 (or equivalent training in analysis).
The primary theme of this course is to explore the role of prices in achieving an efficient allocation of resources in dynamic economies. Some of the classical results on static equilibrium theory and welfare economics on attaining optimal allocation through decentralized organizations are examined through an axiomatic approach. Some basic issues on capital theory are also analyzed.

[ECON 718 Topics in Mathematical Economics
4 credits. Not offered 1999–2000.]

ECON 719 Advanced Topics in Econometrics I
Fall. 4 credits. Prerequisites: Economics 619–620 or permission of instructor.
Advanced topics in econometrics, such as asymptotic estimation and test theory, robust estimation, Bayesian inference, advanced topics in time-series analysis, errors in variable and latent variable models, qualitative and limited dependent variables, aggregation, panel data, and duration models.

ECON 720 Advanced Topics in Econometrics II
Spring. 4 credits. Prerequisites: Economics 619–620 or permission of instructor.
For description see Economics 719.

ECON 721 Time Series Econometrics
Spring. 4 credits. Prerequisites: Economics 619–620 or permission of instructor.
This course covers traditional and current time series techniques that are widely used in econometrics. Topics include the theory of stationary stochastic processes including univariate ARMA(p,q) models, spectral density analysis, and vector autoregressive models; parametric and semi-parametric estimation; current developments in distributional theory; estimation and testing in models with integrated regressors including, unit root tests, cointegration, and permanent vs. transitory components.

[ECON 731 Monetary Theory and Policy
Spring. 4 credits. Preequisites: Economics 614 or permission of the instructor. Not offered 1999–2000.
Advanced topics in monetary economics, macroeconomics, and economic growth—such as overlapping-generations, taxes and transfers denominated in money, transactions demand for money, multi-asset accumulation, exchange rates, and financial intermediation.]

[ECON 732 Monetary Theory and Policy
Fall. 4 credits. Prerequisites: Economics 731 or permission of the instructor. Not offered 1999–2000.
Advanced topics in monetary economics, macroeconomics, and economic growth—such as economic volatility, the "burden" of government debt, restrictions on government borrowing, dynamic optimization, endogenous growth theory, technological evolution, financial market frictions, and cyclical fluctuations.]

ECON 735 Public Finance: Resource Allocation and Fiscal Policy (also ARME 735)
Spring. 4 credits.
This course develops a mathematical and highly analytical understanding of the role of government in market economies and the fundamentals of public economics and related issues. Topics covered include generalizations and extensions of the fundamental theorems of welfare economics, in-depth analysis of

social choice theory and the theory on implementation in economic environments, public goods and externalities and other forms of market failure associated with asymmetric information. The theoretical foundation for optimal direct and indirect taxation is also introduced along with the development of various consumer surplus measures and an application to benefit cost analysis. Topics of an applied nature vary from semester to semester depending upon faculty research interests.

ECON 736 Public Finance: Resource Allocation and Fiscal Policy
Fall. 4 credits.
This course spends a large part of the semester covering the revenue side of public finance. Topics include the impact of various types of taxes as well as the determination of optimal taxation. The impact of taxation on labor supply, savings, company finance and investment behavior, risk bearing, and portfolio choice are explored. Other topics include the interaction of taxation and inflation, tax evasion, tax incidence, social security, unemployment insurance, deficits, and interactions between different levels of government.

[ECON 737 Location Theory and Regional Analysis
Fall. 4 credits. Prerequisites: Economics 609, 617, and Econometrics. Not offered 1999–2000.
Economic principles influencing the location of economic activity, its spatial equilibrium structure, and dynamic forces. Topics include spatial pricing policies, price competition, and relocation by firms; residential location patterns; patterns of regional growth and decline; and patterns of urbanization.]

ECON 738 Public Choice
Spring. 4 credits. Prerequisites: ECON 609, 610.
This class has two parts. It begins with an introduction to economic theories of political decision making. We review the theory of voting, theories of political parties and party competition, theories of legislative decision making and interest group influence. We also discuss empirical evidence concerning the validity of these theories. The second part uses these theories to address a number of issues in Public Economics. We develop the theory of political failure, analyze the performance of alternative political systems and discuss the problem of doing policy analysis which takes into account political constraints.

ECON 741 Seminar in Labor Economics
For description see ILRLE 744.

ECON 742 Seminar in Labor Economics
For description see ILRLE 745.

ECON 751 Industrial Organization and Regulation
Fall. 4 credits. Prerequisites: ECON 609, 610.
This course focuses primarily on recent theoretical advances in the study of industrial organization. Topics covered include market structure, non-linear pricing, quality, durability, location selection, repeated games, collusion, entry deterrence, managerial incentives, switching costs, government intervention, and R&D/Patents. These topics are discussed in a game-theoretic context.

ECON 752 Industrial Organization and Regulation
Spring. 4 credits. Prerequisites: ECON 609, 610, 751.
This course rounds out some topics in the Theory of Industrial Organization with the specific intent of addressing the empirical implications of the theory. The course reviews empirical literature in the SCP paradigm and in the NEIO paradigm.

[ECON 753 Public Policy Issues for Industrial Organizations
Spring. 4 credits. Prerequisites: Economics 609, 610, and 751. Not offered 1999–2000.
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 755 Rivalry and Cooperation
Fall. 4 credits. Prerequisites: Economics Graduate Core or instructor's permission. Not offered 1999–2000.
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 756 Noncooperative Game Theory
Fall. 4 credits. Prerequisites: Economics 609–610 and 619.
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 757 Economics of Imperfect Information
Spring. 4 credits. Prerequisites: Economics 609–610 and 619.
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 760 Topics in Political Economy
Fall. 4 credits. Prerequisite: Economics graduate core or instructor's permission.
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 761 International Economics: Trade Theory and Policy
Fall. 4 credits. Prerequisites: ECON 609, 610.
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 762 International Economics: International Finance and Open Economy Macroeconomics
Spring. 4 credits. Prerequisite: ECON 761.
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 770 Topics in Economic Development
For description, see ARME 667.

ECON 771 Economic Development and Development Planning
Spring. 4 credits. Prerequisites: graduate core or instructor's permission.
Reviews the existing literature on the determinants of economic growth and the interrelationship of 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 772 Economics of Development
Spring. 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 773 Economic Development
Fall. 4 credits. Prerequisites: Economics 609 and 620.
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 774 Economic Systems
Spring. 4 credits.
The course deals with economic systems, with the formerly centrally planned economies, and with the economies in transition.

ECON 784 Seminars in Advanced Economics
Fall and spring. 4 credits.

ENGLISH

H. Shaw, chair; B. Adams, director of undergraduate studies (255–3492); D. Mermin, director of graduate studies (255–7989); B. Correll, director of honors program; J. Ashton, A. Boehm, F. Bogel, L. Bogel, M. P. Brady, L. Brown, C. Chase, J. Culler, S. Davis, E. DeLoughrey, L. Fakundiny, R. Farrell, D. Fried, A. Galloway, R. Gilbert, J. Goldsby, K. Gottschalk, E. Hanson, L. Herrin, T. Hill, M. Hite, M. Jacobus, P. Janowitz, B. Jeyifo, C. Kaske, M. Koch, B. Maxwell, D. McCall, K. McClane, M. McCoy, H. S. McMillin, S. Mohanty, R. Morgan, T. Murray, B. V. Olguín, R. Parker, J. Porte, E. Rosenberg, N. Saccamano, S. Samuels, P. Sawyer, D. Schwarz, M. Seltzer, R. Shepherd, S. Siegel, H. Spillers, G. Teskey, S. Vaughn, H. Viramontes, W. Wetherbee, S. Wong.
Emeriti: M. H. Abrams, A. R. Ammons, J. Bishop, J. Blackall, A. Caputi, D. Eddy, R. Elias, A. Lurie, P. Marcus, J. McConkey, S. Parrish, M. Radzinowicz, S. C. Strout.

The Department of English offers a wide range of courses in English, American, and Anglophone literature as well as in creative writing, expository writing, and film analysis. Literature courses focus variously on the close reading of texts, the study of particular authors and genres, questions of critical theory and method, and the relationship of literary works to their historical periods and to other disciplines. The department seeks not only to foster analytical reading and lucid writing, but also through the study of literary texts, to teach students to think about the nature of language and to be alert to the rigors and pleasures of that ordinary and peculiar activity, reading.

Students who major in English develop their own programs of study in consultation with their advisers. Some focus on a particular historical period or literary genre; others combine sustained work in creative writing with the study of literature. Others pursue special interests in such areas as women's literature, African-American literature, literature and the visual arts, or critical theory.

Many students informally supplement their course work in English by attending the public lectures and poetry readings sponsored by the department, or by writing for campus literary magazines.

The Major

The Department of English recommends that students prepare themselves for the English major by taking at least one introductory course. Freshmen interested in majoring in English are encouraged to take one or more of the following freshman seminars: The Reading of Fiction (English 270), The Reading of Poetry (English 271), Introduction to Drama (English 272). These courses concentrate on the skills basic to the English major and to much other academic work—responsive, sensitive reading and lucid, forceful writing. As freshman seminars, English 270, 271, or 272 will satisfy one-half the College of Arts and Sciences' freshman seminar requirement. They are open to all second-term freshmen and are also open, as space permits, to first-term freshmen with scores 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, as well as to students who have completed another freshman seminar.

English 201 and 202, which together constitute a two-semester survey of major British writers, though not required are strongly recommended for majors and prospective majors because they afford the kind of overview and introduction to authors, periods, and literary genres that helps students make more informed choices of advanced courses. The American Literary Tradition (English 275), Creative Writing (English 280 or 281), and the Essay in English (English 295) are also suitable preparations for the major.

Course Requirements

English majors are required to complete, with passing letter grades, at least 40 credit hours in courses approved for the major. All English courses numbered 300 and above are approved for the major. In addition, all 200-level English courses except freshman seminars (English 270, 271, and 272), courses in creative and expository writing (English 280, 281, 288, and 289), and those courses which state that they are intended for nonmajors are approved for the major.

Of the 40 credits required to complete the major, 8 (two courses) must be at the 400 level or above, and 12 (three courses) must be taken in lierature originally written in English before 1800. As many as 12 credits in literature or creative writing in Comparative Literature, Theatre, Film, & Dance, the Africana Studies and Research Center, the Society for the Humanities, Asian American Studies, and Latino Studies may be counted toward the major provided they are at the 300 level or above. Double majors may exercise this option even if the 12 credits are applied to their second major. English majors are encouraged to take advantage of this option by taking courses in which they read foreign works of literature in the original language: 200-level literature courses for which qualification is a prerequisite may for this purpose be treated as if they were 300-level courses.

The Major in English with Honors

Second-term sophomores who have done superior work in English and related subjects are encouraged to seek admission to the department's program leading to the degree of Bachelor of Arts with Honors in English. Following an interview with the chair of the Honors committee, qualified students will be admitted provisionally to the program. During their junior year, these students must complete at least one Honors seminar (English 491 or 492) and are encouraged to take an additional 400-level English course in the field in which they plan to concentrate. On the basis of work in these and other English courses, a provisional honors candidate is expected to select a thesis topic and secure a thesis adviser by the end of the junior year. A student who has been accepted by a thesis adviser becomes a candidate for honors rather than a provisional candidate.

During the senior year, each candidate for Honors in English enrolls in a year-long tutorial (English 493 and 494) with the faculty member chosen as thesis adviser. The year's work culminates in the submission of a substantial scholarly or critical essay to be judged by at least two members of the faculty.

More information about the program may be found in the brochure for honors candidates available in the English office.

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 sophomores, juniors, and seniors and to others 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 may be required.

First-Year Writing Seminars

As part of the First-Year 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 Writing Seminar requirement. Descriptions of First-Year Writing Program offerings may be found in the First-Year Writing Program listings, available from college registrars in August for the fall term and in November for the spring term.

First-Year Writing Seminars Recommended for Prospective Majors

ENGL 270 The Reading of Fiction
Fall, spring, each summer. 3 credits. Each section limited to 17 students. Freshman Writing Seminar. Recommended for prospective majors in English.
This course examines modern fiction, with an emphasis on the short story and novella. Students will write critical essays on authors who flourished between 1870 and the present, such as James, Joyce, Woolf, Hurston, Lawrence, Fitzgerald, Hemingway, Faulkner, Rhys, Welty, Salinger, and Morrison. Reading lists vary from section to section, and some may include a novel, but close, attentive, imaginative reading and writing are central to all. This course does not satisfy requirements for the English major.

ENGL 271 The Reading of Poetry
Fall, spring. 3 credits. Each section limited to 17 students. Recommended for prospective majors in English.
This course is designed to increase the student's ability to understand and write about poetry. Readings will be drawn from the major periods, modes, and genres of poetry written in English. This course does not satisfy requirements for the English major.

ENGL 272 Introduction to Drama
Fall, spring. 3 credits. Each section limited to 17 students. Recommended for prospective majors in English.
Students in this seminar study plays, older and newer, in a variety of dramatic idioms and cultural traditions. Plays being performed by the Theatre Department will be included if possible. A reading list might include works by Sophocles, Shakespeare, Chekhov, Brecht, Caryl Churchill, Beckett, and Shange. Course work consists of writing and discussion and the occasional viewing of live or filmed performances. This course does not satisfy requirements for the English major.

Expository Writing

ENGL 288–89 Expository Writing
Fall, spring, summer, winter. 3 credits. Each section limited to 16 students. Students must have completed their colleges' first-year writing requirements or have permission of the instructor. S. Davis and staff.
Web site: http://instruct1.cit.cornell.edu/Courses/engl288/288FT99.index.html 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 in relevant published material and write and revise their own work regularly, while reviewing and responding to each other's. 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. English 288 does not satisfy requirements for the English major.

Section 1—S. Jefferis—Minding the Body

Section 2—J. Dougherty—Into the Wild

Section 3—A. Boehm—The Reflective Essay

Section 4—B. LeGendre—Issues, Audiences and Ourselves

Section 5—S. Davis—Writing in the Electronic Age

Section 6—G. Umbach—Reading the News, Understanding the Media

Spring 1999: To be announced

See English department *Course Offerings* for full fall and spring section descriptions.

ENGL 381 Reading as Writing
Spring. 4 credits. Course limited to 15 students. Prerequisite: permission of the instructor on the basis of a writing sample (critical/interpretive prose), which should reach the instructor before the first day of class. S. Davis.
This course practices and studies related arts: reading selected 19th- and 20th- century prose fictions and poems and writing interpretive essays about them—but also, writing as a reader of one's own work and revising in the light of others' responses to it. Course members will work with a fairly small number of texts and build sustained essays from shorter (written) "readings" of them. The texts (tentatively): Marilynne Robinson's *Housekeeping*, poems of Wordsworth, poems and stories of Poe, Vladimir Nabokov's *Lolita;* Doris Lessing's *Memoirs of a Survivor*, and J. M. Coetzee's *Waiting for the Barbarians.* Students will present their work to the group at various stages of completion and develop a portfolio of well-crafted prose for submission at the end of the term. With the help of a few theorists of reading and literary reception, they will also pay attention to the ways in which both critical readers and creative writers "rewrite" the texts they read. This is a course for English majors and nonmajors who wish to extend their mastery of critical and interpretive prose and their understanding of what they do when they write it. It will be advantageous for students planning to write honors theses in English or another discipline.

ENGL 387 Autobiography: Theory and Practice
Spring. 4 credits. A. Boehm.
In this nonfiction prose-writing seminar we explicate canonical autobiographies as models of rhetoric to be imitated in weekly writing assignments.

ENGL 388 The Art of the Essay
Fall. 4 credits. Limited to 15 students. Interested students should submit one or more pieces of recent writing (prose) to the instructor before the beginning of the term, preferably at preregistration. L. Fakundiny.
For both English majors and nonmajors who have done distinguished work in freshman writing seminars and in such courses as English 280–281, 288–289, and who desire intensive practice in writing essays as a kind of creative nonfiction. The course assumes a high degree of self-motivation, a capacity for independent work, and critical interest in the work of other writers; it aims for a portfolio of conceptually rich and stylistically polished writing.

Creative Writing

Students usually begin their work in Creative Writing with English 280 or 281, and only after completion of the Freshman Writing 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, winter session. 3 credits. Prerequisites: completion of the Freshman Seminar requirement. Limited to 18 students.
Majors and prospective majors, please note. Although recommended for prospective English majors, English 280–281 cannot be counted towards the 40 credits required for completion of the English major. It is a prerequisite for 300-level courses in creative writing, which count towards the major. English 280 is not a prerequisite for English 281.
An introductory course in the theory, practice, and 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.

ENGL 382–383 Narrative Writing
Fall, 382; spring, 383. 4 credits each term. Each section limited to 15 students. Previous enrollment in English 280 or 281 recommended. Prerequisite: permission of instructor, normally on the basis of a manuscript. Fall: Sec. 1, R. Morgan; sec. 2, D. McCall; sec. 3, L. Herrin. Spring: H. Viramontes, M. Koch, R. Morgan, L. Herrin.
The writing of fiction; study of models; analysis of students' work.

ENGL 384–385 Verse Writing
Fall or summer, 384; spring, 385. 4 credits each term. Each section limited to 15 students. Prerequisites: English 280 or 281, or permission of instructor. Fall: R. Shepherd, R. McClane. Spring: R. Shepherd, P. Janowitz.
The writing of poetry; study of models; analysis of students' poems; personal conferences.

ENGL 480–481 Seminar in Writing
Fall, 480; spring, 481. 4 credits each term. Each section limited to 15 students. Students are encouraged to take English 280 or 281 and at least one 300-level writing course. Prerequisites: permission of instructor, normally on the basis of a manuscript. Fall: Sec. 1, H. Viramontes; sec. 2, R. Morgan. Spring: M. McCoy, K. McClane.
Intended for those writers who have already gained a basic mastery of technique. Although English 480 is not a prerequisite for 481, students normally enroll for both terms and should be capable of a major project—a collection of stories or poems, a group of personal essays, or perhaps a novel—to be completed by the end of the second semester. Seminars are used for discussion of the students' manuscripts and published works that individual members have found of exceptional value.

Courses for Freshmen and Sophomores

These courses have no prerequisites and are open to freshmen and non-majors as well as majors and prospective majors.

Introductions to Literary Studies

ENGL 201–202 The English Literary Tradition #
201: Fall. 4 credits. English 201 is not a prerequisite for 202. This course may be used as one of the three pre-1800 courses required of English majors. A. Galloway.
An introduction to the study of English literature, examining its historical development and many of its highest achievements. Works to be read include *Sir Gawain and the Green Knight*; selections from Chaucer's *Canterbury Tales* and Spenser's *Faerie Queene*; Shakespeare's *Henry IV, Part I* and *King Lear*; poems by Jonson, Donne, and Herbert; and selections from Milton's *Paradise Lost.*
202: Spring. 4 credits. D. Fried.
A survey of English literature from the late seventeenth century to the early twentieth

century, including poetry and some prose works from the Restoration and eighteenth century, the Romantic period, the Victorian period, and Modernism. Lectures and discussion sections.

ENGL 204 Mostly Poems and Stories
Fall and spring. 4 credits. Fall, F. Bogel; spring, R. Parker.
Introduction to the pleasures of close reading, with special emphasis on analyzing the forms, structures, and rhetorical dynamics that characterize poems, prose narratives, and drama and contribute to their appeal. The syllabus will include works from older as well as more recent periods. We are likely to study poems by (among others) William Shakespeare, Robert Herrick, John Keats, Robert Browning, Christina Rossetti, Sylvia Plath, Ted Hughes, and Elizabeth Bishop; stories by Isabel Allende, Flannery O'Connor, James Baldwin, Toni Cade Bambara, and Beth Nugent; and such novels as Austen's *Pride and Prejudice* and Morrison's *The Bluest Eye*.

ENGL 208 Shakespeare and the Twentieth Century (also Comparative Literature 208)
Fall. 4 credits. S. Davis.
This course traces relationships between the Shakespeare of early modern times and some of the Shakespeares inherited and created by the twentieth century. We will compare a small number of plays with their adaptations in fiction, theater, film, the educational system, and popular culture. The discussion of each play will be organized around one or more critical approaches. The course will attempt to provide an introduction to the contemporary study of literature and culture.

ENGL 227 Shakespeare #
Spring. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. W. Wetherbee.
Careful study of ten of Shakespeare's major plays, including at least three videotaped performances.

Major Genres and Areas

ENGL 203 Major Poets
Spring. 4 credits. R. Gilbert.
Intensive reading in the work of nine poets chosen to represent important periods and modes of poetry. Poets to be studied may include William Shakespeare (the sonnets), Andrew Marvell, Alexander Pope, John Keats, Emily Dickinson, Robert Browning, Gwendolyn Brooks, and Seamus Heaney.

ENGL 205 Readings in English Literature
Fall. 3 credits. **This course is intended for nonmajors.** R. Farrell.
English Literature to 1800: this course is open to any student interested in literature and culture. Authors covered include Chaucer, Shakespeare, Jonson, Swift, and Pope. Grade will be based on four short papers, three of which may be revised for a higher grade.

[ENGL 206 Readings in English and American Literature
3 credits. **This course is intended for non-majors.** Two lectures and one discussion section each week. To be offered 2000–2001.]

ENGL 207 Introduction to Modern Poetry
Fall. 4 credits. R. Gilbert.
This course will sample the vast array of poetic modes and forms employed over the past century and a half, with primary emphasis on the work of American poets. Our focus in the course will be on the poems themselves—how they feel, sound, look, mean, and behave. Lectures, discussions, and written assignments will emphasize both the craft of writing poetry and the discipline of reading it with understanding and appreciation. No previous study of poetry required.

ENGL 209 Introduction to Cultural Studies
Spring. 4 credits. M. P. Brady.
Salsa, hip-hop, MTV, talkshows, sit-coms, movies, literature are all forms of entertainment and means of analyzing the cultures that produce them. This course will introduce students to the various cultural forms we encounter in our everyday lives and to some of the critical work that has been written about them. Examples will come from a range of contemporary and historical texts. The course will follow a lecture-discussion format.

[ENGL 210 Medieval Romance: The Voyage to the Other World
3 credits. To be offered 2000–2001.]

ENGL 212 Introduction to Medieval Epic
Spring. 4 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*, the *Tain Bo Cualigne*, the *Chanson de Roland*, the *Nibelunglied*, selections from Malory, and English and Scots ballads. Requirements include two papers, a mid-term, and a final. No previous knowledge of medieval literature is expected.

ENGL 240 Survey in U.S. Latino Literature (also Latino Studies 240)
Spring. 4 credits. M. P. Brady.
It is estimated that by the year 2030, the Latino/a population in the United States will be the largest "minority group" in the country. This course seeks to introduce students to the growing body of literature (both fiction and poetry) by the various U.S. Latino/a communities. We will consider cultural production that results from intercultural crossings between Mexico, Cuba, Guatemala, Dominican Republic, El Salvador and Los Angeles, New York, Miami. How do Latina/o literatures converge and diverge as they explore issues of "race," ethnicity, gender, sexuality, class, nationality, and identity in general, at a time when the American profile is increasingly becoming "latinized." Authors examined may include Tomás Rivera, Cherrie Moraga, Jesús Colón, Miguel Pinero, Nicolasa Mohr, Cristina García, Julia Alvarez, Américo Paredes, Junot Díaz, Loida Maritza Pérez, Sandra Benítez, Martin Espada, Lorna Dee Cervantes, Frances Negrón-Muntaner, Luz María Umpierre, and Hector Tobar.

ENGL 253 The Modern Novel
Fall. 4 credits. J. Ashton.
In this course we will read some of the most famous and groundbreaking novels of the 20th century, asking, among other things, what makes them "modern." Period of concentration will shift from year to year. For Fall of 1999, the focus will be on American modernism 1920–1940, including the following novels: *Babbitt* (1922), *The Great Gatsby* (1925), *The Sun Also Rises* (1926), *Death Comes for the Archbishop* (1927), *Passing* (1929), *The Sound and the Fury* (1929), *The Maltese Falcon* (1930), *The 42nd Parallel* (1930), *Nightwood* (1936), and *Native Son* (1940).

ENGL 260 Introduction to American Indian Literatures (also American Studies 260)
Fall. 4 credits. R. Warrior.
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. 4 credits. S. Wong.
This course will introduce students to a 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 relation between literary forms and the sociohistorical context within which they take on their meanings, and about the historical formation of Asian American identities.

[ENGL 264 Ethnic Literature: Bridges and Boundaries
4 credits. To be offered 2000–2001.]

ENGL 265 Introduction to African American Literature (also American Studies 265)
Fall. 4 credits. J. Goldsby.
From Phillis Wheatley's Boston to Walter Moseley's Los Angeles, the city has long been an alluring force in African American literature. In this course, we will read a broad range of texts, films, and other visual media that celebrate and/or question urban life. Through these works, we will also explore intraracial conflicts of class, gender, sexuality, and nationality amongst African Americans themselves, from the "Talented Tenth" to the "Hip Hop Nation." Authors may include: DuBois, Larsen, Hughes, Hurston, Wright, Petry, Baldwin, Brooks, Ellison, Hansberry, Baraka, Shange, Reed, Deveare Smith, Morrison.

ENGL 274 Scottish Literature and Culture #
Fall. 3 or 4 credits. The course may be taken for 3 or 4 credits; those taking it for 4 credits will complete an additional writing project. This course only counts towards the English major when taken for 4 credits. Non-majors are welcome. Enrollment limited to 20. T. Hill and H. Shaw.
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 nineteenth and twentieth centuries. The course should

appeal to those who wish to learn more about their Scottish heritage, to those who wish to view in a new perspective works normally considered monuments of "English" literature, and to those who simply wish to know more about a remarkable culture and the literature it produced. Some of the texts will be read in Scots, but no familiarity with Scots or earlier English is presumed. Authors studied will include Henryson, Dunbar, Anonymous (the Scottish Ballads), Hume, Burns, Scott, Hogg, Stevenson, and Grassic Gibbon.

ENGL 275 The American Literary Tradition (also American Studies 275)
Fall. 4 credits. H. Spillers.
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 295 The Essay in English #
4 credits. Prerequisite: completion of freshman seminar requirement. This course may be counted as one of the three pre-1800 literature courses required of English majors. To be offered 2000–2001.]

Special Topics

ENGL 235 Rewriting the Classics: Stories of travels and encounters
Spring. 4 credits. E. DeLoughrey.
In this course we will look at such classic tales as Shakespeare's *The Tempest*, Defoe's *Robinson Crusoe*, Brontë's *Jane Eyre*, and Conrad's *Heart of Darkness* and later novels that rewrite them, such as Aime Cesaire's *The Tempest*, J. M. Coetze's *Foe*, Jean Rhys' *Wide Sargasso Sea*, and Wilson Harris' *Palace of the Peacock*. We will consider how stories travel across time and space and how the modern versions differ from their classic counterparts. Requirements: active class participation, student presentations, a few short essays and a final paper on the writer of your choice.

ENGL 252 Women and the Holocaust (also Women's Studies 252 and Jewish Studies 255)
Fall. 4 credits. M. Jacobus.
The lens provided by women's writing about the Holocaust offers a unique perspective on women's living and dying in the camps. We will focus on Holocaust writing by women and girls, some autobiographical, some fictional, that explores their gendered traumas of separation, sequestration, sexuality, survival, and memory. Using the definitive edition of Anne Frank's diaries as a point of departure, we will read memoirs and journals by women who recorded their lives en route to and in the camps. Texts will include the Dutch Etty Hillesum's *An Interrupted Life* and the French Charlotte Delbo's account of French women deportees in *Auschwitz and After*, which provides an extended meditation on both trauma and memory. As well as later fiction by Cynthia Ozick and Ida Fink that trace both the lasting effects and the irrecoverable "traces" of Holocaust trauma, we will read accounts of betrayal and survival such as Cordelia Edvardson's *Burned Child Seeks the Fire* and Liana Millu's *Smoke over Birkenau*. We will also look at Charlotte Salomon's moving pictorial autobiography of a young woman painter caught up in the events of the Holocaust. The supposed narrative of a child survivor, Binjamin Wilkomirski's controversial "memoirs" of a child survivor, *Fragments*, and Anne Michaels's *Fugitive Pieces* segue to the later effects of Holocaust trauma on the literary imagination. Readings will include autobiographical essays, essays on trauma theory and Holocaust literary criticism, as well as historical, documentary, and video material. Throughout, the emphasis will be on women's holocaust writing as literature, memorial and testimony.

ENGL 263 Interpreting Hitchcock
Fall. 4 credits. Two lectures a week, and a weekly discussion section. Students must be free to attend Monday evening screenings of the films. Lab fee. Enrollment limited to 75. L. Bogel.
Through detailed analysis of about a dozen of Hitchcock's major films—from early British talkies (*Blackmail, The Thirty-Nine Steps*), to early 40's work in Hollywood (*Shadow of a Doubt, Notorious*), and major American films of his late period (*Rear Window, Psycho, The Birds, 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.

ENGL 268 The Culture of the 1960s (also American Studies 268)
Fall. 4 credits. P. Sawyer.
Were the Sixties a time of dangerous experimentation with drugs, sex, and alternative lifestyles on the part of a pampered generation that gradually learned to straighten up and join the mainstream? Or was it a time of revolutionary hopefulness, when the civil rights movement and the Vietnam War stimulated an empassioned critique that changed American society? What can the experiences of young "boomers" contribute to a later generation, the last of the twentieth century? The course explores these and other questions by focusing on the topics of racial justice, the Vietnam War, the counterculture, the New Left, the woman's movement and the movement for gay rights. Texts will include *The Autobiography of Malcolm X, The Electric Kool-Aid Acid Test, Dispatches*, the poems of Allen Ginsburg and Adrienne Rich, films, music, speeches, and manifestos. The term paper will explore students' special interests.

ENGL 291 The American 1920s: Literature and Culture (also American Studies 291)
Fall. 4 credits. B. Maxwell.
The course will take a broad approach to the cultural activities of the decade following the First World War and preceding the Great Depression. Topics will include the new motives, forms, and audiences of fiction and poetry; literary realism under duress; the Harlem Renaissance; postwar blues and the influenza epidemic; suffragist politics and the New Woman; *Fugitive* revanchism; the masses as a matter for intellectual scrutiny; Fordism; the Red Scare, nativism, and the fear of anarchism; the cultures of radio, children's illustrated books, popular song and jazz. We will ask: what made for aesthetic radicalism and political radicalism in the period; what were the relations of pleasure and labor; how differentiated was the self-consciousness of the "Lost Generation"; and what appear to be the legacies of the decade? Readings will include essays by Randolph Bourne, Margaret Sanger, Walter Lippmann, W. E. B. DuBois, and Lewis Mumford; fiction by Jean Toomer, Ernest Hemingway, Sherwood Anderson, Dorothy Parker, Nella Larsen, John Dos Passos, Samuel Ornitz, Sinclair Lewis, Dashiell Hammet, and perhaps even F. Scott Fitzgerald; and poetry by Pound, Eliot, Williams, H. D., Langston Hughes, Hart Crane, Marianne Moore, and Louis Zukofsky.

Courses for Sophomores, Juniors, and Seniors

Courses at the 300 level are open to sophomores, juniors, and seniors and to others with the permission of the instructor.

ENGL 301 Mind and Memory (also Society for the Humanities 301, Theater 301, and Music 372)
Spring. 4 credits. D. Ackerman.
For complete description see Society for the Humanities 301.

[ENGL 302 Literature and Theory (also English 602 and Comparative Literature 302 and 622)
Fall. 4 credits. To be offered 2000–2001.]

[ENGL 308 Icelandic Family Sagas
4 credits. To be offered 2000–2001.]

ENGL 310 Old English in Translation
Spring. 4 credits. T. Hill.
This course may be used as one of the three courses before 1800 required for the English major.

Cultural backgrounds, reading, and critical analysis of Anglo-Saxon poetry in translation, pagan and Christian epic, elegy, heroic legend, and other forms. Attention will be given to the relations of this literature to that of later periods.

ENGL 311 Old English (also English 611) #
Fall. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. T. Hill.
This course will provide a grounding in the Old English language and proceed to the reading of some major texts in poetry, such as *The Wanderer* and *The Battle of Maldon*. No previous knowledge of Old or Middle English is required or expected. There will be both a mid term and a final, plus oral reports. Students will be encouraged to follow their own interests. Graduate students will be expected to do a substantial paper, or other research exercise.

ENGL 312 *Beowulf* (also English 612) #
Spring. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. One semester's study, or the equivalent, of Old English is a prerequisite. R. Farrell.
A close reading of *Beowulf*. Attention will be given to relevant archaeological, literary, cultural, and linguistic issues.

ENGL 319 Chaucer #
Spring. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. R. Farrell.
This course will begin with the study of the major *Canterbury Tales* and some of Chaucer's minor works, such as *The Book of the Duchess*. All works will be read in Middle English, but ample time will be devoted to learning the language, for it is impossible to read Chaucer as a poet without Middle English. There will be lectures on Chaucer's life, society, literary and religious content. There will be take home mid- and end-of-term exams, and student presentations.

ENGL 320 Literature of the English Renaissance (1500–1660) #
Spring. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. B. Adams.
Verse and prose (principally non-dramatic) from More to Milton, including selected works of Skelton, Wyatt, Surrey, Sidney, Spenser, Marlowe, Shakespeare, Jonson, Donne, Herbert, Bacon, Marvell, Suckling, Lovelace, Burton,-and Browne. Contexts (political, social, intellectual, religious) as well as texts.

ENGL 321 Spenser and Malory (also Religious Studies 319) #
Fall. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. Informal lecture and discussion. Two papers, no exams. C. Kaske.
Paired selections covering about half of Malory's *Morte d'Arthur* and half of Spenser's *Faerie Queene*. Chretien's romances, *Sir Gawain 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.

ENGL 325 The Culture of the Renaissance II (also Comparative Literature 362, and History 364) #
Spring. 4 credits.
For complete description, see Comparative Literature 362.

ENGL 327 Shakespeare
Fall. 4 credits. B. Correll.
The course will focus on the importance of gender and power in eight texts of Shakespeare: comedies, tragedies, poetry. Lectures and discussions will address issues of form, context and thematic content, as well as Renaissance and contemporary cultural debates.

[ENGL 328 The Bible
4 credits. To be offered 2000–2001.]

[ENGL 329 Milton #
4 credits. To be offered 2000–2001.]

ENGL 330 Restoration and Eighteenth-Century Literature #
Spring. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. F. Bogel.
Close reading of texts in a variety of genres (poetry, fiction, drama, autobiography) will be guided by such topics as the nature of satire, irony, and mock-forms; the languages of the ridiculous and the sublime; the authority and fallibility of human knowledge; connections among melancholy, madness, and imagination. Works by such writers as Rochester, Dryden, Swift, Gay, Defoe, Johnson, Boswell, Sterne, and Cowper.

ENGL 333 The Eighteenth-Century English Novel #
Fall. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. N. Saccamano.
A study of form and theme in the British novel tradition. The course focuses on representative novels mostly from the eighteenth century, paying close attention to language and structure but also to cultural contexts and to the development of the novel form itself. We explore such topics as truth and fiction; romance, realism, satire, and the gothic; heroic and mock-heroic modes; sentiment, sensibility, and sexuality; race and gender; and the forms and uses of narrative. Readings may include Behn's *Oroonoko*, Defoe's *Moll Flanders*, Richardson's *Clarissa*, Fielding's *Tom Jones*, Johnson's *Rasselas*, Walpole's *The Castle of Otranto*, Sterne's *A Sentimental Journey*, and Austen's *Emma*.

ENGL 335 European Drama 1660–1900: Molière to Ibsen (also Comparative Literature 336)
Spring. 4 credits. R. Parker.
For complete description, see Comparative Literature 336.

ENGL 340 The English Romantic Period #
Fall. 4 credits. R. Parker.
Readings in various writers from the late 1780s through the 1820s—among them Blake, 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 political and literary surveys. The course will be concerned both with formal experiments in narrative, lyric, and dramatic representation and with analyses of political and cultural issues and contexts in an age of national reform and international revolution and conflict.

ENGL 345 Victorian Controversies
Fall. 4 credits. S. Siegel.
Economic, political and technological changes transformed the nineteenth century. We will consider some of the controversies these transformations provoked in England and Ireland. Our readings will be selected chiefly from leading nineteenth-century periodicals and from essays that contributed greatly to shaping public opinion. We will explore the social problems Victorian critics and artists identified, the various solutions they proposed, and their contrasting visions of their nation and its colonies. The men and women who contributed to the periodical press, and who shaped literary culture and anticipated new cultural forms, were preoccupied with urgent quetions about themselves: Was their century marked by progress or by decline? Would machines degrade or ennoble workers? Did aesthetic experience complement or compete with religious doctrine? Were art and science dependent upon or opposed to each other? Should all forms of expression be permitted or should certain forms be censored? Should the colonies be permitted to rule themselves or remain dependent on England? Would prestige be gained if institutions of higher learning awarded degrees to women? Was "manliness" revealed through "character" or through "behavior"? In addition to these intellectual conflicts, we will be attentive to the emergence of new visual forms that participated in and provoked controversy. Accordingly, we will view photographs and descriptions of England's great Crystal Palace Exhibition of 1851. We will consider the objections such displays aroused, as well as the emergence of new and controversial fashions in painting, in clothing, in interior design, and in home furnishings. Authors will include Arnold, Browning, Eliot, Morris, Pater, the Rossettis, Ruskin, Shaw, Swinburne, Wilde, and Yeats. Classes will be taught by lecture and discussion. Examinations will be in-class and take-home exercises.

ENGL 347 Freud and Reading
Spring. 4 credits. M. Jacobus.
This course will offer an introduction to Freud's writings, and to the legacy of his ideas, focusing on Freud as both writer and reader, as well as exploring his interest for contemporary students of literature and culture. Well served by his early translators, Freud has long been an object of fascination to literary critics and close-readers, as well as the source of a significant body of literary theory. We will look both at early "novella"-style works such as *Studies on Hysteria* and at the case-histories of Little Hans, Dora, and the Wolf Man, with an eye to Freud's narrative skill and persuasive art, as well as at subsequent readings that take issue with or illuminate his theories or modes of analysis. Alongside the case-histories, we will explore *The Interpretation of Dreams* and some of the influential readings of the dream-text to which it gave rise. We will also read Freud's writings on literature and art, including *Delusion and Dream in Jensen's Gradiva* (his reading of a *fin de siècle* novel), along with his writings on such topics as daydreaming, telepathy, negation, and the uncanny. We will end with his response to the first world war in *Beyond the Pleasure Principle*. The emphasis will be on what Freud's writing offers for literary and cultural studies, as well as the ways in which his ideas both shaped and were shaped by twentieth-century European culture.

ENGL 348 Studies in Women's Fiction: The Development of the Female-Authored Novel from the Seventeenth to the Twentieth Century (also Women's Studies 348)
Fall. 4 credits. L. Brown.
This course raises central questions about the role of gender in the study of literature by exploring the development of the female-authored novel from the seventeenth to the twentieth century. Readings will include Aphra Behn's *Oroonoko*, Fanny Burney's *Evelina*, Jane Austen's *Emma*, Charlotte Brontë's *Jane Eyre*, Virginia Woolf's *A Room of One's Own* and *Mrs. Dalloway*, and Toni Morrison's *Sula*. These works raise issues of race and slavery, love and marriage, sexuality and homosexuality, history and women's history, and writing itself. Students in the class will work together to develop strong close readings of the texts and to explore the contexts in which they were written. These discussions will be the basis for an evolving assessment of the status of a work authored by a woman. Students will be asked to participate in discussion, and to write 4 four-page papers and a take-home final exam.

[ENGL 350 The Modern Tradition I: 1890–1930
Fall. 4 credits. To be offered 2000–2001.]

ENGL 351 The Modern Tradition II
Spring. 4 credits. S. Siegel.
This course will consider the relation of modernists literary expression to the violence and ideological upheavals of the first half of the century. Readings will include Imagist and Surrealist Manifestos; the social and political writings of the Bloomsbury Group; the emergence and elaboration of dream theory, psychoanalysis, and literary Expressionism. Readings will include T. E. Hulme, Ezra Pound, and Wyndham Lewis; Lytton Strachey, Virginia Woolf, and G. E. Moore; Freud, Jung, and Winnicott; Yeats, Lady Gregory, and Shaw.

ENGL 352 Queer Theatre (also Theatre Arts 320 and Women's Studies 320)
Spring. 4 credits. E. Gainor.
For complete description, see Theatre Arts 320.

[ENGL 353 Postcolonial Liteature
To be offered 2000–2001.]

ENGL 355 Decadence (also Comparative Literature 355 and 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. We will discuss the most important texts through which "decadence" was defined as a literary style, including works by Charles Baudelaire, J.-K. Huysmans, Rachilde, Leopold von Sacher-Masoch, A. C. Swinburne, Walter Pater, and Lionel Johnson, with a particular focus on Oscar Wilde. Topics for discussion will include aestheticism and the cult of "art for art's sake," theories of cultural and linguistic degeneration, homophobia and sexual encoding, androgyny and sexual inversion, hysteria and paranoia, masochism and mysticism, chastity and sublimation, Catholicism and Hellenism, and dandyism. Students may read French and German texts in the original or in translation.

ENGL 356 Postmodernist Fiction
Spring. 4 credits. M. Hite.
This class will explore experimental (i.e., weird, counterrealist, "difficult") fiction, both print and hypertext, written in the post-World War II period by some, but not all, of the following writers: Kathy Acker, Margaret Atwood, John Barth, Angela Carter, Theresa Hak Kyung Cha, Robert Coover, Don De Lillo, J. Yellowlees Douglas, Michael Joyce, Nathaniel Mackey, Vladimir Nabokov, Thomas Pynchon, Ishmael Reed and Joanna Russ. We will also read some criticism and theory dealing with the period, condition, or movement described as "postmodern" or "postmodernist." Hypertexts will be available on computers at campus locations designated especially for this function. Copies of hypertexts (on floppy disk) will also be available from library reserve.

Class requirements include online newsgroup participation, two critical papers, a take-home midterm and a take-home final.

ENGL 361 Early American Literature (also American Studies 361)
Spring. 4 credits. This course may be used as one of the three pre-1800 courses required for English majors. S. Samuels.
An exploration of national identities in the formative British colonial period, including the relation of sexualities, religions, narrative practices, and encounters with other cultures to the contested formulations of destiny and free will in determining and explaining an American national character. Moving from early contact narratives through the conflicts that led to the American Revolution and beyond, this course will consider American writing from the 1630s to the 1830s; among other sources, we will read sermons, diaries, journals and poetry of the Puritans, captivity and emancipation narratives, autobiographical writings by Jonathan Edwards and Benjamin Franklin, political writings by Crevecoeur, Paine, and Jefferson, fiction by Brockden Brown, Irving, Sedgwick, Child, and Cooper and the early work of Poe, Hawthorne, and Emerson.

ENGL 362 The American Renaissance (also American Studies 362)
Fall. 4 credits. J. Porte.
American writing from the 1830's through the 1850's, with emphasis on the major literary achievements of Emerson, Poe, Hawthorne, Thoreau, Melville, Whitman and Dickinson. We shall also study Douglass's 1845 *Narrative* and Stowe's *Uncle Tom's Cabin*.

ENGL 363 The Age of Realism and Naturalism (also American Studies 363)
Spring. 4 credits. J. Goldsby.
Literary history tells us that realism and naturalism were aesthetic movements that emerged in American fiction at the turn of the 19th century. Cultural histories of the era tell us social ideals about what constituted the "real" and the "natural" were debated by Americans as they coped with the revolutionary changes that turned their worlds upside down between the Civil and First World Wars.

This course moves between these two accounts in order to appreciate the varied styles and issues that comprised the literature of American realism at the turn of the 19th century. Principal authors may include: Charles Chesnutt, Stephen Crane, Theodore Dreiser, William Dean Howells, Henry James, Mark Twain, and Edith Wharton.

[ENGL 364 American Literature Between the Wars (also American Studies 364)
4 credits. To be offered 2000–2001.]

[ENGL 365 American Literature Since 1945 (also American Studies 365)
Fall. 4 credits. To be offered 2000–2001.]

ENGL 366 The Nineteenth-Century American Novel (also American Studies 366)
Spring. 4 credits. M. Seltzer.
A study of American fiction in its first flowering. This course will include such major works as Hawthorne's *The Scarlet Letter*, Melville's *Moby-Dick*, James's *The Portrait of a Lady*, and Mark Twain's *Adventures of Huckleberry Finn*.

ENGL 369 Studies in Film Analysis: Fast Talking Dames
Spring. 4 credits. L. Bogel.
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 relation of these films to American culture, about Hollywood's changing constructions of "woman," the "maternal," and the "feminine," and questions about desire, pleasure, fantasy, and ideology in relation to the melodramatic heroine. Required weekly, evening screenings of such films as: *Picnic; Now, Voyager; Rebecca; Mildred Pierce; The Women; Imitation of Life; Gilda; Leave Her to Heaven; Gaslight*. Regular critical readings, frequent viewing questions, two longer essays, no exam. Students must be free to attend regular evening screenings and video showings of the films once or twice a week. Lab fee.

[ENGL 371 American Poetry to 1950 (also American Studies 371)
4 credits. To be offered 2000–2001.]

[ENGL 375 Survey in African American Literature to 1917 (also American Studies 375)
4 credits. To be offered 2000–2001.]

ENGL 376 Survey in African American Literature: 1918 to present
Spring. 4 credits. H. Spillers.
This course will select its readings from the genres of poetry, drama, fiction, and non-fiction produced by black American writers from the period of the Harlem Renaissance, to the present. Readings will include poems by Harlem Renaissance poets, the poets of African-American modernism, i.e., Gwendolyn Brooks and Robert Hayden, and some of the poetry of the Black Arts Movement of the 60s, by way of Leroi Jones/Imamu Baraka's and Larry Neal's *Black Fire*; plays by Lorraine Hansberry, Ed Bullins, and August Wilson; non-fictional and fictional writings by Malcolm X, Martin Luther King, Nella Larsen, Jean Toomer, Zora Neale Hurston, Toni Morrison, and Nate Mackey. (*Cane, The Autobiography of an Ex-Colored Man, Passing, The Autobiography of Malcolm X, Letter from an Birmingham Jail, Black Boy, Invisible Man, Flight to Canada, Oxherding Tales, Middle Passage, Jazz*, and *The Bedouin Hornbook* will be among the selected texts for the spring term.) The course is designed for majors, but will be open to all interested students.

ENGL 378 American Poetry Since 1950 (also American Studies 372)
Fall. 4 credits. R. Gilbert.
The second half of the 20th century has been a remarkably rich and diverse period in American poetry, characterized by constant innovations in form and technique, and restless exploration of new areas of language and experience. In this course we'll focus on a series of representative figures born between 1911 and 1932. These may include some or all of the following: Elizabeth Bishop, Robert Lowell, Gwendolyn Brooks, John Berryman, Robert Creeley, Allen Ginsberg, Frank O'Hara, W. S. Merwin, James Wright, A. R. Ammons, John Ashbery, James Merrill, Sylvia Plath, and Adrienne Rich.

ENGL 379 Reading Nabokov
Fall. 4 credits. G. Shapiro.
For complete description, see Russian literature 385.

ENGL 381 Reading as Writing
See complete course description in section headed Expository Writing.

ENGL 382–383 Narrative Writing
See complete course description in section headed Creative Writing.

ENGL 384–385 Verse Writing
See complete course description in section headed Creative Writing.

ENGL 388 The Art of the Essay
See complete course description in section headed Expository Writing.

[ENGL 390 Autobiography: Memoir, Memory, and History
4 credits. To be offered 2000–2001.]

[ENGL 394 Topics in American Indian Literature (also American Indian Studies 394 and American Studies 394)
4 credits. To be offered 2000–2001.]

[ENGL 395 Video: Art, Theory, Politics (also Theatre Arts 395)
Fall. 4 credits. To be offered 2000–2001.]

Courses for Advanced Undergraduates

Courses at the 400-level are open to juniors and seniors and to others by permission of instructor unless other prerequisites are noted.

ENGL 402 Literature as Moral Inquiry
Fall. 4 credits. S. Mohanty.
What can literary works, especially novels and short stories, tell us about moral issues? Should they be seen as suggesting a form of moral inquiry similar to the kind of philosophical discussion we get in, say, Aristotle's Nicomachean Ethics? Do they deal with the same range of issues? Can reading philosophical works in ethics together with novels that deal with similar themes help us understand these themes better? This course is an attempt to answer these questions. We will read selections from key texts in moral philosophy, including works by Aristotle, Kant, Marx, Nietzsche, and Rawls. Our attempt will be to use these works to help us understand the nature of moral debate and inquiry in novels like Eliot's *Middlemarch*, James's *Portrait of a Lady*, Morrison's *Beloved*, Woolf's *Mrs. Dalloway*, Conrad's *Heart of Darkness*, Achebe's *Things Fall Apart*, and Handke's *The Left Handed Woman*. Other writers we will most probably read include Nadine Gordimer, Doris Lessing, Salman Rushdie, and Kazuo Ishiguro. The emphasis will be on close reading, with particular attention to the relationship between formal elements (such as the use of narrative techniques) and the moral questions the texts organize and explore. Assignments include two papers and a journal.

ENGL 404 History Into Fiction: Nazis and the Literary Imagination (also Comparative Literature 404 and German Studies 414)
Fall. 4 credits. E. Rosenberg.
The twelve years of Hitler's rule remain the most critical, "longest" years of the century. We shall read some eight texts by Anglophone and Continental novelists (and a few playwrights and poets) that explore the salient features of the regime: Weimar and Hitler's rise to power (e.g., Mann's "Mario and the Magician," Brecht's *Arturo Ui*, Isherwood's *Goodbye to Berlin*); civilian life in Nazi Germany (Brecht's "Jewish Wife" and other one-actors, Günter Grass's *Tin Drum)*; World War II and the Occupation of Europe (e.g., Camus's *The Plague*, Heinrich Böll's short fiction, Anne Frank's *Diary*); the persecution of the European Jews and genocide (e.g., Sartre's "Childhood of a Leader," Peter Weiss's *The Investigation*, Borowski's *This Way for the Gas*, Spiegelman's *Maus I* or *Maus II*, Ozick's "The Shawl"). Lastly some lyrics by Celan, Nelly Sachs, Anthony Hecht. Brief ancillary selections by historians and memorialists (Arendt, Primo Levi, Bettelheim) and the instructor's private documentation of life under Hitler. Two papers, no exam.

[ENGL 405 The Politics of Contemporary Criticism
Fall. 4 credits. To be offered 2000–2001.]

ENGL 410 Contemporary Native American Literature and its Contexts (also Society for the Humanities 408)
Fall. 4 credits. E. Cheyfitz.
For complete description, see Society for the Humanites 408.

ENGL 413 Middle English (also English 613) #
Fall. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. A. Galloway.
This course surveys the literature of later medieval England, beginning with the cultural, literary, and linguistic collapse of standard Old English and proceeding to the age of Chaucer and perhaps a bit beyond. Readings will move through chronicles, homilies, lyrics, and acknowledged literary masterpieces such as *The Owl and the Nightingale*, the works of the Pearl poet, selections from *Piers Plowman*, and other poems from the "alliterative revival."

[ENGL 416 Chaucer and the Politics of Love
Spring. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. To be offered 2000–2001.]

[ENGL 417 Early Medieval Archaeology and Literature (Also ENGL 617, ARCHEO 417, & ARCHEO 617)
Spring. 4 credits. To be offered 2000–2001.]

[ENGL 423 Seventeenth-Century Lyric
Fall. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. Not open to sophomores. To be offered 2000–2001.]

[ENGL 425 Elizabethan and Jacobean Drama (also ENGL 628)
4 credits. This course may be used as one of the three pre-1800 courses required of English majors. To be offered 2000–2001.]

[ENGL 427 Studies in Shakespeare
4 credits. This course may be used as one of the three pre-1800 courses required of English majors. To be offered 2000–2001.]

ENGL 430 Literature as History: The Americas (also American Studies 430.04)
Spring. 4 credits. B. Maxwell.
Beginning with William Carlos Williams's *In the American Grain* (1925), this course will consider modernist innovations in the telling of history by literary means. Responding to what they felt as the "deadness" of conventional historiography, writers such as Williams, Charles Reznikoff, John Sanford, Muriel Rukeyser, Melvin Tolson, and Paul Metcalf produced imaginative American histories that made a new world of historical narration, and in the process found new objects of historical attention, one of which was the plural, transnational America of the hemispheric Americas. This reconfiguration anticipated and in some cases shaped recent revisionist critiques of the European presence on American soil (Eduardo Galeano, Leslie Marmon Silko, David Stannard, Ward Churchill, Noam Chomsky, Ana Castillo); accordingly, students will read examples, some polemical, of that later work.

[ENGL 432 Studies in the 18th Century: The Development of Print Culture
4 credits. This course may be used as one of the three pre-1800 courses required of English majors. To be offered 2000–2001.]

ENGL 434 Electronic Art and Culture
Fall. 4 credits. Requirements: 2 medium length papers (7–8 pages), visual project (hypertext or image), seminar presentation. Some advanced knowledge of either the artistic or theoretical context is helpful. Permission of Instructor. T. Murray.
The course will analyze the "interface" between recent projects in electronic art and theories of digital culture. Artifacts to be studied include video and audio installations, web art, CD-Rom art, and digitized cinema. We will study both process and content with an emphasis on the role of historical and ideological representation in the works to be discussed. Special consideration will be given to issues such as memory, sexuality, cultural identity, and virtuality. Theorists to be read will include: Bellour, Mercer, Rodowick, Zimmermann, Druckrey, Kroker, Virilio, Morse, Hershman, and Gomez-Pena. Artists to be studied, including, Piper, Menkes, Woolery, Tamblyn, Marker, Iimura, McCoy, can be previewed at: http://contactzones.cit.cornell.edu/

[ENGL 438 Libertines and License (also French Literature 474)
4 credits. To be offered 2000–2001.]

ENGL 439 Austen in the Eighteenth Century #
Fall. 4 credits. D. Mermin.
This course may be used as one of the three pre-1800 courses required of English majors. 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 draw deftly on eighteenth-century thought and literature; exploring these links should enrich our experience of Austen's wit and art.

ENGL 440 Slavery and the Idea of Race in Early Modern England (also English 640 and Society for the Humanities 415)
Spring. 4 credits. L. Brown.
For complete description, see Society for the Humanities 415.

ENGL 442 Testimony, Law, Literature (also Society for the Humanities 415)
Spring. 4 credits. M. Sanders.
For complete description, see Society for the Humanities 415.

[ENGL 443 The Dandy in London and Dublin: 1790–1890
4 credits. To be offered 2000–2001.]

[ENGL 448 The American Short Story
Fall, spring, or summer. 4 credits. To be offered 2000–2001.]

ENGL 452 Wilde and Woolf (also English 652)
Fall. 4 credits. S. Siegel.
This seminar will consider the question of style: what does the word mean; why has it claimed attention; how has it behaved in the work of two authors whose writing among their contemporaries marked a distinctive departure? We will explore Oscar Wilde and Virginia Woolf as readers of literary and social texts. Along the way, we will direct our attention to the implicit expectations we bring to our understanding of "Victorians" and "Modernists." Selections will be drawn from the full range of Wilde's and Woolf's work. Our principal texts, however, will be limited to a few essays by each author.

[ENGL 454 American Musical Theatre (also Music 490 and Theatre Arts 454)
4 credits. Prerequisite: English 272 or Theatre Arts 240–41. To be offered 2000–2001.]

ENGL 458 Imagining the Holocaust (also English 658, Jewish Studies 458 and 658, Comparative Literature 483 and 683)
Spring. 4 credits. D. Schwarz.
What is the role of the literary imagination in keeping the memory of the Holocaust alive for our culture? We shall examine major and widely read Holocaust narratives which have shaped the way we understand and respond to the Holocaust. As we move further away from the original events, why do the kinds of narratives with which authors render the Holocaust horror evolve to include fantasy and parable? Employing both a chronological overview and a synchronic approach—which conceives of the authors having a conversation with one another—we shall discover recurring themes and structural patterns in the works we read.

We shall begin with first person reminiscences—Wiesel's *Night*, Levi's *Survival at Auschwitz*, and *The Diary of Anne Frank*—before turning to searingly realistic fictions such as Hersey's *The Wall*, Kosinski's *The Painted Bird*, and Ozick's "The Shawl." In later weeks, we shall explore diverse kinds of fictions and discuss the mythopoeic vision of Schwarz-Bart's *The Last of the Just*, the illuminating distortions of Epstein's *King of the Jews*, the Kafkaesque parable of Appelfeld's *Badenheim 1939*, and the fantastic cartoons of Spiegleman's *Maus*, books. We shall also include Kineally's *Schindler's List*, which was the source of Spielberg's academy award winning film, and compare the book with the film.

[ENGL 459 Contemporary British Drama
4 credits. To be offered 2000–2001.]

ENGL 460 Riddles of Rhythm
Fall. 4 credits. D. Fried.
What makes a poem's pulse beat? How and why does language ordered into rhythm affect us? How do poets shape our responses through rhythmic means? What are some of the ways that poets and their readers have tried to make sense of the essence and effects of rhythm? Is poetic rhythm best understood on the model of music? Does ordinary language outside of poetry have its own rhythms? What does the arrangement of poems in lines have to do with its rhythms? Is "free verse" free from rhythm? We will read a variety of poems from the Renaissance to the present, and a range of essays about poetry in an attempt to answer these questions. Writing assignments will include interpretive essays about poems, analysis of accounts of poetic rhythm, including accounts offered by the poets themselves, and occasional short exercises working with poetic rhythm and other formal features of poems. Poets to be studied may include Shakespeare, Herbert, Marvell, Milton, Pope, Keats, Byron, Poe, Dickinson, Whitman, Hopkins, Hardy, Owen, Frost, Williams, Moore, Bishop, and Ammons. No previous study of poetic meter or rhythm is assumed.

ENGL 463 Problems in the Novel: Murder and Crimewriting
Spring. 4 credits. M. Seltzer.
An investigation of the representation of murder across a range of novels, non-fictional accounts and film. Focus on turn of the century and recent materials.

ENGL 464 Emerson and Poe
Spring. 4 credits. R. Morgan.
This course will focus on the two most important opposing theories and theorists of American poetry and poetics in the 19th century. Though near contemporaries, born in Boston in the same decade, and both deriving their main ideas from Coleridge, Emerson and Poe represented sharply differing versions of the American poetic enterprise. Both steeped in Neo-platonic terms and metaphors, they inspired conflicting traditions, Emerson the expansive Wordsworthian poetics that Whitman seized upon, Poe the Gnostic interiors that made him kin to Hawthorne, Melville and Baudelaire in faraway Paris. Poe called Emerson one of the transcendental "frog-pondians" and Emerson referred to Poe as "the jingle man." Through the work of later writers such as Dickinson, Frost, Crane, and Faulkner we will study how the schism Poe and Emerson defined has been central to American literature ever since.

[ENGL 465 Proseminar in American Studies (also AmSt 465)
4 credits. To be offered 2000–2001.]

[ENGL 466 James on Film
4 credits. To be offered 2000–2001.]

ENGL 469 Faulkner (also American Studies 469)
Fall. 4 credits. H. Spillers.
This course will examine selected writings of William Faulkner, beginning with some of the early novels (*The Sound and the Fury, Light in August, Absalom, Absalom!)* and concluding with *A Fable*. We will consider Faulkner's impact as a maker of myth and as one of the leading figures of a literary discourse that creates a modernist sensibility in American letters. As a southern writer, Faulkner is traditionally confined to the character study of exotic types, but his systemic fictional exploration of "violence and the sacred" provides a powerful clue to the larger issue of a national identity. Faulkner, in his own terms, dared to imagine "culture" as a problem for fiction. This course will attempt to consider the outcome.

ENGL 470 Studies in the Novel: Hemingway, Fitzgerald, Faulkner
Spring. 4 credits. D. McCall.
Close readings of the major texts. Problems in biography.

[ENGL 473 American Indian Autobiography
4 credits. To be offered 2000–2001.]

[ENGl 474 Contemporary African American Poetry
4 credits. Limited to 15 students. Admission by permission of instructor only. To be offered 2000–2001.]

ENGL 475 Studies in the Twentieth Century: Major Experimental Novels
Fall. 4 credits. M. Hite.
A seminar looking at the scope of experimental narrative fiction in the twentieth century, going backward from the hypertexts of the 1990s to the "stream of consciousness" mode and theory that marked the second decade of the century. We will look closely at hypertext fiction and theory by Shelley Jackson, Deena Larsen and Stuart Moulthrop; at print fiction by Angela Carter, Thomas Pynchon, William Faulkner, Virginia Woolf and Dorothy Richardson; and at critical essays by such writers as Moulthrop, Coover, Carter, Haraway, Benjamin, Woolf and Richardson.

Seminar participants will do regular 5–10 minute presentations, weekly short (2–3 page) essays posted on the class newsgroup, and a final, longer (14+ pages) paper. Hypertexts will be available on computers at two campus locations designated specially for this function. Copies of the hypertexts will also be on library reserve for students to check out.

ENGL 476 Global Women's Literature (also Women's Studies 476)
Fall. 4 credits. E. DeLoughrey.
This course focuses on contemporary women's writing in English from "postcolonial" regions such as the Pacific, Caribbean, India and Africa. During the semester we will look at how women from these regions depict the process of migration from within the nation (from rural to urban spaces) or from the "postcolony" to metropoles such as England. As women are generally associated with private, domestic space, this course will explore the motifs of exile and border crossing and sketch out the ways in which gender, nation and class relate to recent masculinist productions of "traveling theory." We will read novels/poetry by Joan Riley, Merle Hodge, Patricia Grace, Miriama Ba, Anita Desai, and Grace Nichols, and align these texts with the theoretical works of Edward Said, Karen Kaplan, Paul Gilroy and M. Nourbese Philip. Requirements: active class participation, student presentations, a few short essays and a final paper on the writer of your choice.

ENGL 477 Studies in Native American Literature: Native American Literature and Criticism (also English 677)
Spring. 4 credits. R. Warrior.
Native American literature and the criticism that has grown alongside it has emerged over the past thirty years into a maturing field. A major purpose of this course is to provide an advanced introduction to the major literary texts in the field. But another focus of the course will be a metatheoretical discussion of how literary and cultural criticism is constructed and theorized for that literature.

Readings will include Silko, Vizenor, Momaday, Harjo, Craig Womack, Jace Weaver, and Kimberly Blaeser.

ENGL 478 American Religions and American Literatures
Spring. 4 credits. R. Warrior.
This course explores ways in which the discourses of American religions inform the literary production of the United States in the nineteenth century. Beginning with selections from Jonathan Edwards and other theological writers, we will then turn to a set of canonical literary texts, including *The Scarlet Letter, Moby Dick*, and Whitman's "Democratic Vistas." But we will also read work that represents a more diverse version of America's literatures and religions, including American Indian writers such as William Apess, Maria Stewart and others.

ENGL 479 Jewish-American Writing (also American Studies 479 and Jewish Studies 478)
Fall. 4 credits. J. Porte.
A study of American Writing from about 1895 to the present that is concerned with the Jewish experience in the New World. Some topics to be covered: immigrant life, gender issues, the conflict between religious and secular outlooks, political affiliation, the Great Depression, the Group Theater, anti-Semitism, Jewish life in the suburbs, the impact of the Holocaust, the "renewal" of Yiddish culture and religious interest. Authors to be studied will probably include: Abraham Cahan, Anzia Yezierska, Fannie Hurst, Henry Roth, Clifford Odets, Karl Shapiro, Alfred Kazin, Saul Bellow, Bernard Malamud, Philip Roth, Ruth Whitman, and Cynthia Ozick. There will be opportunities for research in secondary sources and we may view some films on Jewish subjects.

ENGL 480–481 Seminar in Writing
Fall, 480; spring 481. 4 credits.
See complete description in section headed Creative Writing.

ENGL 490 Literatures of the Archipelagoes: Caribbean and Pacific "Tidalectics"
Spring. 4 credits. E. DeLoughrey.
The islands of the Pacific and Caribbean share similar histories of European colonization and complex patterns of migration, diaspora, "ex-isle" and settlement. As a series of small nations connected by the migratory paths of the sea, their literatures are often categorized under the rubric of regional studies. In Barbadian Kamau Brathwaite's definition, "tidalectics" draw upon "the movement of the water backwards and forwards as a kind of cyclicmotion, rather than linear." While we will examine a number of themes shared by the writers of both regions (island sovereignty, creolization, and postcolonial issues), overall we will focus on how seas and oceans facilitate these patterns of dispersal and landfall in both archipelagoes. We will look at the ways bodies of water are theorized by Paul Gilroy, Antonio Benitez-Rojo, Edouard Glissant and Pacific writers Epeli Hau'ofa, Witi Ihimaera and Albert Wendt. Other readings will include poetry by Derek Walcott, Brathwaite, Grace Nichols, Teresia Teaiwa, and novels/short stories by Ihimaera, Wendt, Ana Lydia Vega, and Edwidge Danticat.

ENGL 491 Honors Seminar I
Fall. 4 credits. Open to students in the Honors Program in English or related fields, or by permission of instructor.
Early Shakespeare. S. McMillin.
Studies in the first half of Shakespeare's career, intended to introduce the critical and scholarly questions important in Shakespeare studies today. Readings will include such plays as *Henry IV, Parts One and Two, Henry V, Romeo and Juliet, Comedy of Errors, Much Ado About Nothing, Merchant of Venice.* Assignments will fall at the rate of about one play and one critical essay per week. Reports, short papers, a term paper.

ENGL 492 Honors Seminar II
Spring. 4 credits. Open to students in the Honors Program in English or related fields, or by permission of instructors.
Section I: Birth of the Cool: African American Literary Culture of the 1940s and 1950s. J. Goldsby.
After the Harlem Renaissance but before the Civil Rights and Black Nationalist eras, an extraordinary group of African American writers—the "coolest," in Miles Davis' sense of the term—came of literary age together: Ralph Ellison, Richard Wright, and James Baldwin; Gwendolyn Brooks, Ann Petry, and Dorothy West. We will read their signal works in the context of the authors' careers, and in relation to the cultural and racial politics underlying the "American Century." Short critical essays, 1–2 oral presentations, and a research-oriented project. English 265 or 376 suggested but not required.

Section II: Reading Joyce's *Ulysses*. D. Schwarz.
A thorough, episode-by-episode study of the art and meaning of Joyce's *Ulysses*. We will explore the relationship between it and the other experiments in modernism and show how *Ulysses* redefines the concepts of epic and hero. We will also view *Ulysses* to address major issues in literary study and to test various critical and scholarly approaches. Such a self-conscious inquiry into theories and methods should prepare students to confront other complex texts, as well as help them define their own critical positions as they plan their senior honors theses.

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 for 1999–2000

Fall

ENGL 600 Colloquium for Entering Students

ENGL 602 Literature and Theory

ENGL 611 Old English (also English 311)

ENGL 614 Middle English (also English 413)

ENGL 616 The Development of Print Culture

ENGL 622 Renaissance Poetry (also Comparative Literature 450, Comparative Literature 650)

ENGL 627 Studies in Shakespeare: Shakespeare and Money

ENGL 641 Studies in Romantic Writing: Byron, Hazleitt, Shelley, Keats, and the Issue(s) of Romanticism

ENGL 652 Wilde and Woolf (also English 452)

ENGL 660 Cinematic Desire (also Theatre Arts 661, Women's Studies 661, & Comparative Literature 662)

ENGL 667 American Fiction, 1850–1900

ENGL 688 The Stein Era: (Post)Modernism and the Canonzing of Gertrude Stein

ENGL 707 Writing in the Disciplines: Literacy, Social Organization, Consciousness, and the Information Society (also Writing 707)

ENGL 710 Advanced Reading in Old English

ENGL 780.1 MFA Seminar: Poetry

ENGL 780.2 MFA Seminar: Fiction

ENGL 785 Reading for Writers

Spring

ENGL 610 Dante, Chaucer, Boccacio, and Gower

ENGL 612 *Beowulf* (also English 312)

ENGL 618 Medieval Drama

ENGL 623 Allegory and Romance

ENGL 633 Eighteenth Century Poetry

ENGL 640 Slavery and the Idea of Race in Early Modern English (also Society for the Humanities 418 & English 440)

ENGL 643 Mad Romanticisms

ENGL 656 Postmodernism

ENGL 658 Representing the Holocaust (also English 458, Jewish Studies 458 & Jewish Studies 658)

ENGL 675 The Long Poem

ENGL 676 Theory of the Novel

ENGL 677 Native American Literature and Criticism

ENGL 681 Prosody

ENGL 699 Studies in African American Literature: African-American Women and the Culture Critique

ENGI 781.1 MFA Seminar: Poetry

ENGL 781.2 MFA Seminar: Fiction

English for Academic Purposes

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: ENGLF 205 or placement by examination. S. Schaffzin.
A writing class for those who have completed ENGLF 205 and need further practice, or for those who place into the course. Individual conferences are also included.

ENGLF 209 English as a Second Language
Fall or spring. 1 credit. Prerequisite: permission of instructor. S. Schaffzin.
Practice in classroom speaking and in informal conversational English techniques for 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: permission of instructor. S. Schaffzin.
Practice in academic speaking. Formal classroom discussion techniques and presentation of information to a group. Presentations are videotapes and reviewed with the instructor. 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: permission of instructor. Enrollment is restricted to 12 on a first-come, first-served basis. D. Campbell.
Research paper writing. For the major writing assignment of this course, the students must have a real project that is required for their graduate work. This can be a thesis proposal; a pre-thesis; part of a thesis, such as the literature review or discussion section; a paper for another course or a series of shorter papers (with permission of the other instructor); or a paper for publication. Time limitations make it difficult to deal with work over 20 pages in length. Course work involves practice in paraphrase, summary, the production of cohesive, coherent prose, vocabulary use, and grammatical structure. Frequent individual conferences are a necessary part of the course. Separate sections for Social Sciences/Humanities and for Science/Technology.

ENGLF 213 Written English for Non-Native Speakers
Spring. 3 credits. Prerequisite: permission of instructor. S. Schaffzin.
Designed for those whose writing fluency is sufficient for them to carry on regular academic work but who want to refine and develop their ability to express themselves clearly and effectively. Individual conferences supplement class work.

First-Year Writing Seminar

ENGLB 215–216 English for Later Bilinguals
For description, see first-year writing seminar brochure.

Intensive English Program

305 Morrill Hall

J. M. Mancusi, director; E. J. Beukenkamp, R. L. Feldman, K. Golkowska, M. Johns, M. T. Lovell, S. Yates

This noncredit, nondegree program provides full-time intensive English language instruction as well as academic, social, and cultural orientation to the United States and its institutions. The aim of the program is for participants to acquire proficiency in the language in order to pursue goals in English for academic, business, professional, or personal purposes.

Programs are offered both fall and spring semesters and in the six-week summer session (from late June to early August). Participants receive a minimum of 20 hours of classroom instruction weekly in speaking, listening, reading, writing, and grammar, which are taught at all levels from low intermediate through very-high advanced. Applicants must be at least 17 years of age, hold the equivalent of a high school diploma, and have had some previous study of English.

Students who have gained full admission to or who are already registered in degree-granting programs at Cornell should consult the section "English for Academic Purposes" (series ENGLF).

The Intensive English Program is coordinated by the director, Jeanette Mancusi, Cornell University, Morrill Hall, Ithaca, New York 14853–4701, U.S.A. Information and application materials are available directly from the program by writing to the above address, calling 607/255–4863, or faxing 607/255–7491. Internet e-mail is CUIEP@cornell.edu. Web page is http://dml.cornell.edu/languages/IEP/cuiep.html.

FILM

See Department of Theatre, Film and Dance.

FRENCH

See Romance Studies.

FIRST-YEAR WRITING SEMINARS

For information about the requirements for 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 October for the spring term.

GEOLOGICAL SCIENCES

B. L. Isacks, chair; R. W. Kay, director of undergraduate studies; R. W. Allmendinger, W. Allmon, M. Barazangi, W. A. Bassett, J. M. Bird, L. D. Brown, L. M. Cathles, J. L. Cisne, K. Cook, L. A. Derry, C. H. Greene, T. E. Jordan, S. Mahlburg Kay, F. H. T. Rhodes, D. L. Turcotte, W. M. White

As an intercollege unit, the Department of Geological Sciences has degree programs in both the College of Arts and Sciences (B.A. degree) and the College of Engineering (B.S. degree).

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 prior warning. As the human population grows, 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. The Geological Sciences Major prepares students for advanced study in geology, geophysics, geochemistry and geobiology, and careers in mineral and petroleum exploration or in environmental geology. Alternatively, it is a valuable major for a pre-law or pre-med program or in preparation for a career in K-12 education.

In addition to course work, students learn by outdoor field work and involvement in the vigorous research programs of the department. Facilities include equipment for processing seismic signals and digital images of the earth's surface, instruments for highly precise isotopic and element analyses, 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). 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 Department of Geological Sciences is the core department in a new intercollege program in the Science of Earth Systems (SES). In the College of Arts and Sciences, this program can be taken as a separate major administered by the Department of Geological Sciences (described in more detail in the section at the front of this catalog, "Interdisciplinary Centers, Programs, and Studies"). The Geological Sciences major emphasizes the structure, composition and evolution of our planet, while the SES major is more concerned with currently active processes on and near the earth's surface where the interactions of water, life, rock and air produce our planetary environment. The SES major is for students interested in careers in atmospheric, hydrological and ocean sciences, environmental chemistry (biogeochemistry), and environmental geophysics.

The Major

For admission to the Geological Sciences major in the College of Arts and Sciences, a student should have made substantial progress toward completing the following basic science requirements for the major: MATH 111–112 or MATH 191–192, PHYS 207–208 or PHYS 112–213, CHEM 207 or 211. Freshmen and Sophomores should take an introductory GEOL course (or courses), normally GEOL 101 or GEOL 201, or GEOL 102 or GEOL 104. Juniors with a strong foundation in mathematics and science may be accepted into the major without an introductory course.

Majors take GEOL 210, the five 300-level core courses listed below, 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 an advanced outdoor field experience may be met by completing one of the follow 4 credit options: (a) GEOL 417 (Field Mapping in Argentina, 3 credits) and GEOL 491 or 492 (based on field observations) for a combined 4 credit minimum; (b) GEOL 437 (Geophysical Field Methods, 3 credits) plus at least 1 credit of GEOL 491 or 492 using geophysical techniques from GEOL 437; (c) GEOL 491–492 (Undergraduate Research, 2 credits each) with a significant component of field work; or (d) an approved outdoor field course taught by another college or university (4 credit minimum).

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 R. W. Kay, director of undergraduate studies, or another faculty member 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, 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 491 or 492). Students interested in applying should contact the director of undergraduate studies during the second semester of the junior year.

Courses

Freshman and Sophomore Courses

GEOL 101 Introductory Geological Sciences
Fall, spring, or summer. 3 credits. Fall, staff; spring, J. M. Bird; summer, W. Brice.
Designed to enhance an appreciation of the physical world. Natural environments, surface features, dynamic processes such as mountain belts, volcanoes, earthquakes, glaciers, and river systems are emphasized. Interactions of the atmosphere, hydrosphere, biosphere, and lithosphere (Earth System Science). Water, mineral, and fuel resources; environmental concerns. Field trips in the Ithaca region.

GEOL 102 Evolution of the Earth and Life (also Bio G 170)
Spring. 3 credits. J. L. Cisne.
Earth systems and their evolution. Earth history's astronomical context. Plate tectonics, continental drift, and their implications for climate and life. Coevolution of life and the atmosphere. Precedents for ongoing global change. Dinosaurs, mass extinctions, and human ancestry. Laboratories on reconstructing geological history and mapping ancient geography. Fossil collecting on field trips.

GEOL 104 The Sea: An Introduction to Oceanography (also BIO ES 154)
Spring, summer. 3–4 (4 credits with lab section) credits. Spring: C. H. Greene, W. M. White; summer: J. Chiment.
A survey of the physics, chemistry, geology, and biology of the oceans for both science and non-science majors. Topics include: seafloor spreading and plate tectonics, marine sedimentation, chemistry of seawater, ocean currents and circulation, the oceans and climate change, ocean ecology, coastal processes, marine pollution, and marine resources.

GEOL 105 Writing on Rocks (Freshman Seminar)
Fall. 3 credits. J. Chiment.
See Freshman Seminar Handbook for description.

GEOL 106 Vertebrate Fossil Preparation
Spring. 1 credit. Prerequisites: one introductory geology course or concurrent enrollment, class size is limited.
J. Chiment.
A laboratory-oriented course that will expose students to techniques of vertebrate fossil preparation. Roughing-out and fine preparation of large specimens in solid matrix will be covered, as well as screen washing and microscope techniques for the recovery of micro-vertebrate remains. Specialized scanning techniques will be discussed.

The class will meet for one hour each week for the first six weeks of the semester. Students will be assigned to an individual or group project requiring two hours of participation each week for the remainder of the semester.

GEOL 107 How the Earth Works
Fall. 1 credit. J. L. Cisne.
A user-friendly introduction to the workings and interactions of solid earth, ocean, atmosphere, and life as they relate to understanding ongoing global change.

GEOL 109 Dinosaurs
Fall. 1 credit. J. L. Cisne.
An introductory survey course for anyone interested in dinosaurs. 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-scientists 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 environment damage, living with natural hazards. Mineral resource use in 21st century and an environmentally sound fuel-minerals cycle.

GEOL 122 Earthquake! (also ENGRI 122)
Fall. 3 credits. L. D. Brown.
The science of natural hazards and strategic resources is explored. Techniques for locating and characterizing earthquakes, and assessing the damage 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 200 Art, Archaeology, and Analysis (also ARKEO 285, ARTH 200, ENGRI 185, PHYS 200)
Spring. 3 credits. R. Kay.
An interdepartmental course on the use of techniques of science and engineering in cultural research. Applications of physical and physiological principles to the study of archaeological artifacts and works of art. Historical and technical aspects of artistic creation. Anlayses by modern methods to deduce geographical origins, and for exploration, dating and authentication of cultural objects. Does not meet liberal studies distribution requirement for Engineering.

GEOL 201 Introduction to the Physics and Chemistry of the Earth (also ENGRD 201)
Fall. 3 credits. Prerequisites: Physics 112 or 207. L. M. Cathles.

Formation of the solar system: accretion and evolution of the earth. The rock cycle: radioactive isotypes and the geological time scale, plate tectonics, rock and minerals, earth dynamics, mantle plumes. The hydrologic cycle: runoff, floods and sedimentation, groundwater flow, contaminant transport. Weathering cycle: chemical cycles, CO_2 (weathering), rock cycle, controls on global temperature (CO_2 or ocean currents), oil and mineral resources.

[GEOL 203 Natural Hazards and the Science of Complexity
Fall. 3 credits. Prerequisites: 1 calculus course. Not offered 1999–2000. D. L. Turcotte.
Studies of natural hazards; earthquakes, volcanic eruptions, floods, hurricanes, tornadoes, severe storms, wildfires, meteor impacts. Applications of the science of complexity to natural hazards: fractals, chaos, and self-organized criticality.]

GEOL 204 Ocean Sciences Laboratory
Spring. 3 credits. Prerequisite or co-requisite: BIOES 154/GEOL 104. C. H. Greene, B. W. Monger.
A laboratory course investigating the physics, chemistry, geology, and biology of the oceans. This course is intended for science majors to supplement the material covered in BIOES 154/GEOL 104. The course includes a discussion section and laboratory each week.

GEOL 210 Introduction to Field Methods in Geological Sciences
Fall. 3 credits. Prerequisite: GEOL 101, 201, or permission of instructor. Weekly field sessions. A weekend field trip. S. Mahlburg Kay.
The methods by which rocks are used as a geological database. Field methods used in the construction of geologic maps and cross sections; systematic description of stratigraphic sections. Field and laboratory sessions on Saturday mornings until Thanksgiving. One additional lecture during most of these weeks. One weekend field trip to eastern New York.

GEOL 212 Caribbean Field Trip (January)
Spring. 2 credits. Prerequisite: permission of instructor. Enrollment limited to 15. Approximate cost $1100. L. D. Brown.
A multidisciplinary look at earth science and environmental issues represented in the Yucatan Peninsula of Mexico. Base for operations will be the Centro Ecologico Akumal, located on the Caribbean coast south of Cancun. This coast and its associated reef epitomizes the conflict between ecological preservation and economic development on an international scale. Excursions may include visits to Merida, a historic Spanish town which lies above the buried impact structure that many believe resulted in the death of the dinosaurs; ruins at Chichen Itza, Mayapan, Coba, and Tulum associated with the rise and fall of Mayan culture; and wildlife (monkeys, jaguars, crocodiles) preserves where recent geological studies have found evidence that the fall of the Mayans may have been triggered by climate change. The field trip will feature snorkel tours of reefs and lagoons as well as the cenotes (sinkholes) that characterize this classic karst landscape. Weekly lectures during the semester will provide background; field trip scheduled for January 2000.

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 Shoals Marine Laboratory (SML), on an island near Portsmouth, New Hampshire. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost for 1999 (including tuition, room, board, and ferry transportation) is $1100.

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 302 and SCAS 332)
Spring. 4 credits. Prerequisites: MATH 112 or 192 and CHEM 207 or equivalent. Lectures, to be announced; discussion, to be announced. B. L. Isacks and staff.
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.

GEOL 315 Geomorphology
Fall. 4 credits. Prerequisite: one of the following: a 3-credit GEOL or SES course, or SCAS 260. T. E. Jordan and B. L. Isacks.
A study of the processes that sculpt the Earth's landscapes (above and below sea level) and the nature of those landforms. Landforms constructed by Earth's internal processes are the point of departure, as we examine their modification by physical interaction with the atmosphere and oceans. Also treated are depositional landforms that are generated by accumulations of grains of sediment. Laboratory exercises include both field examination of landforms of the Finger Lakes area and computer analysis of satellite images and Digital Elevation Models of examples from around the globe. Two Saturday field trips.

GEOL 321 Introduction to Biogeochemistry (also SES 321, NTRES 321)
Fall. 4 credits. Prerequisites: CHEM 207, MATH 112, plus a course in biology and/or geology. L. A. Derry, J. Yavitt.
Control and function of the Earth's global biogeochemical cycles. The course begins with a review of the basic inorganic and organic chemistry of biologically significant elements, and then considers the biogeochemical cycling of carbon, nutrients, and metals that take place in soil, sediments, rivers and the oceans. Topics include weathering, acid-base chemistry, biological redox processes, nutrient cycling, trace gas fluxes, bio-active metals, the use of isotopic tracers, and mathematical models. Interactions between global biogeochemical cycles and other components of the Earth system are discussed.

GEOL 326 Structural Geology
Spring. 4 credits. Prerequisite: MATH 112, GEOL 101 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 or 201 and Chem 207 or permission of instructor. S. Mahlburg Kay.
Examination of minerals by hand-specimen properties and optical microscopy. Geological 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 or 201. J. L. Cisne.
Formation of sedimentary rocks. Depositional processes and environments. Correlation of strata in relation to time and environment. Petrology of sandstones and limestones. Geological age determination. Reconstruction of paleogeography and interpretation of earth history from stratigraphic evidence. Organization of strata in stratigraphic sequences.

GEOL 388 Geophysics and Geotectonics
Spring. 4 credits. Prerequisites: Mathematics 192 (or 112) and Physics 208 or 213. 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 Satellite Remote Sensing in Geosciences
Fall. 3 credits. Prerequisite: permission of instructor. Not offered 1999–2000. B. L. Isacks.
Instruction in satellite remote sensing, image processing, geographic information systems (GIS) and analysis of digital elevation models, using advanced computer workstations, via participation in current research on earthquakes, glaciers, and tectonics.]

GEOL 417 Field Mapping in Argentina
Summer. 3 credits. Prerequisites: GEOL 210 and 326; Spanish desirable, but not required. S. Mahlburg Kay.
Modern techniques of geological mapping applied in the region of San Juan, Argentina, including folded and faulted sedimentary rock units of the Andean Precordillera (San Juan River section), intensely deformed Precambrian metamorphic rocks of the Pampean Ranges (Pie de Palo), and shallow-level silicic intrusives (Cerro Blanco-Ullun).

[GEOL 423 Petroleum Geology
Fall. 3 credits. Recommended: GEOL 326. Offered alternate years. Not offered 1999–2000.
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 434 Reflection Seismology
Spring. 4 credits. Prerequisites: Mathematics 192 and Physics 208, 213, or equivalent. L. D. Brown.
Fundamentals of subsurface imaging by multichannel seismic reflection techniques as used in oil exploration and geohydrological investigations. Covers survey design, acquisition, analysis, processing and interpretation in both 2D and 3D. Includes discussion of related techniques such as seismic refraction analysis, tomographic inversion, vertical seismic profiling, shear wave exploration and ground penetrating radar. Lab is keyed to state-of-the-art seismic processing, modeling and interpretation software from LandMark.

GEOL 437 Geophysical Field Methods
Fall. 3 credits. Prerequisites: PHYS 213 or 208, or permission of instructor. L. D. Brown.
Introduction to field methods of geophysical exploration, especially as applied to environmental issues. Emphasis on seismic, ground penetrating radar, gravity, and magnetic 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 445 Geohydrology (also ABEN 471 and C&EE 431)
Fall. 3 credits. Prerequisites: Mathematics 294 and Engr 202. W. Brutsaert, L. M. Cathles, J.-Y. Parlange, T. S. Steenhuis.
Intermediate-level study of aquifer geology, groundwater flow, and related design factors. Includes description and properties of natural aquifers, groundwater hydraulics, soil water, and solute transport.

[GEOL 452 X-ray Diffraction Techniques
Spring. 3 credits. Prerequisites: GEOL 355 or permission of instructor. Offered alternate years. Not offered 1999–2000. W. A. Bassett and staff.
Automated X-ray diffractometer, Debye-Scherrer, real-time Laue, high-temperature diffraction, high-pressure diffraction, and pole-figure analysis. Applications in materials science and geological sciences. Labs will be held in the new Materials Science X-Ray Facility.]

[GEOL 453 Advanced Petrology
Fall. 3 credits. Prerequisite: GEOL 356. Offered alternate years. Not offered 1999–2000. R. W. Kay.
Magmas and metamorphism in the context of plate tectonics. Major and trace element chemistry and phase petrology as monitors of the creation and modification of igneous rocks. Temperature and stress in the crust and mantle and their influence on reaction rates and textures of metamorphic rocks. Application of experimental studies to natural systems.]

[GEOL 454 Advanced Mineralogy
Spring. 3 credits. Prerequisite: GEOL 355 or permission of instructor. Offered alternate years. Not offered 1999–2000. 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 evolution of the crust, mantle, and core; weathering and the chemistry of natural waters; chemistry of rivers and the oceans; hydrothermal systems and ore deposition.

[GEOL 458 Volcanology
Spring. 3 credits. Corequisite: GEOL 356 or equivalent. Offered alternate years. Not offered 1999–2000. R. W. Kay and W. M. White.
Causes of volcanism, melting in the Earth, and the origin of magmas. Physical volcanology, nature and types of volcanic eruptions and associated deposits, eruption mechanisms. Volcanic plumbing systems, magma chamber processes, evolution of magma. Volcanism and impact phenomena in the Solar System. Volcanic hazard assessment and volcano monitoring. Ore deposits associated with volcanism.]

[GEOL 462 Marine Ecological Processes (also BIOES 462)
Spring. 3 credits. Limited to 75 students. Prerequisite: BIOES 261. Offered alternate years. Not offered 1999–2000. Lecs and disc, M W F 10:10. C. D. Harvell, C. H. Greene.
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. Examples are drawn from all types of marine habitats, including polar seas, temperate coastal waters, and tropical coral reefs.]

GEOL 475 Special Topics in Oceanography
Spring, summer. 2–5 var. credits. Prerequisites: GEOL 104 or BIO ES 154, and permission of instructor. C. H. Greene.
Undergraduate instruction and participation in advanced areas of oceanographic research. Topics will change from term to term. Contact instructor for further information.

[GEOL 476 Sedimentary Basins: Tectonics and Mechanics
Fall. 3 credits. Prerequisite: GEOL 375 or permission of instructor. Not offered 1999–2000. 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
Fall. 3 credits. Prerequisite: GEOL 375 or permission of instructor. Offered alternate years. TBA. T. E. Jordan.
Modern improvements on traditional methods of study of ages and of genetic relations among sedimentary rocks, emphasizing 3-D relationships. Techniques and applications of sequence stratigraphy at scales ranging from beds to entire basins. Physical correlation, dating techniques, and time resolution in sedimentary rocks. Physical controls on the stratigraphic record. Numerical modeling.

GEOL 479 Paleobiology (also BIOES 479)
Fall. 3 credits. Prerequisites: one year of introductory biology for majors and either BIOES 274, 373, GEOL 375, or permission of instructor. W. Allmon.
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.

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 491–492 Undergraduate Research
Fall, spring. 1 to 4 credits. Staff. (B. L. Isacks and R. W. Kay, 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 as an engineering analysis team. Each student makes a weekly progress report and writes part of a final report. Results are presented in a half-day seminar at end of term.

GEOL 622 Advanced Structural Geology I
Spring. 3 credits. Prerequisites: GEOL 326 and permission of instructor. Offered alternate years. R. W. Allmendinger.
Stress-strain theory and application. Advanced techniques of structural analysis. Topics include finite and incremental strain measurement; microstructure, preferred orientation, and TEM analysis; pressure solution and cleavage development; and experimental deformation. Applications to deformation of unconsolidated sediments, brittle and brittle-ductile deformation of supracrustal strata, and ductile deformation of high-grade metamorphic rocks. Kinematic analysis of shear zones and folds in these regimes.

[GEOL 624 Advanced Structural Geology II
Spring. 3 credits. Prerequisites: GEOL 326 and permission of instructor. Offered alternate years. Not offered 1999–2000. R. W. Allmendinger.
Geometry, kinematics, and mechanics of structural provinces. Concentration on thrust belts, rift provinces, or strike-slip provinces. Techniques of balanced cross sections.]

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 634 Advanced Geophysics I: Fractals and Chaos in Geology and Geophysics
Spring. 3 credits. Prerequisite: GEOL 388 or permission of instructor. Offered alternate years. 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 388 or permission of instructor. Offered alternate years. Not offered 1999–2000. 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
Spring. 3 credits. Prerequisite: MATH 293 or permission of instructor. Offered alternate years. 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 cosmochronology using radioactive decay schemes, including U-Pb, Rb-Sr, Sm-Nd, K-Ar, U-series isotopes, and cosmogenic isotopes such as ^{14}C and ^{36}Cl. Use of radiogenic and stable isotopes in petrology and their application to study of the evolution of the crust and mantle. Isotopic evidence regarding the formation of the Earth and the Solar System. Stable isotopes and their use in geothermometry, ore petrogenesis, paleontology, and the global climate system.

GEOL 681 Geotectonics
Fall. 3 credits. Prerequisite: permission of instructor. J. M. Bird.
Theories of orogeny; ocean and continent evolution. Kinematics of lithosphere plates. Rock-time assemblages of modern oceans and continental margins, and analogs in ancient orogenic belts. Time-space reconstructions of specific regions. Problems of dynamic mechanisms—corollaries and evidence from crustal features.

GEOL 695 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 seismics 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 731 Plate Tectonics and Geology
J. M. Bird.

GEOL 733 Fractals and Chaos—Independent Studies
D. L. Turcotte.

GEOL 751 Petrology and Geochemistry
S. Mahlburg Kay, R. W. Kay.

GEOL 753 Advanced Topics in Mineral Physics
W. A. Bassett.

GEOL 755 Advanced Topics in Petrology and Tectonics
J. M. Bird, W. A. Bassett.

GEOL 757 Current Research in Petrology
S. Mahlburg Kay, R. W. Kay.

GEOL 762 Advanced Topics in Petroleum Exploration
Fall. W. B. Travers.

GEOL 771 Advanced Topics in Sedimentology and Stratigraphy
T. E. Jordan.

GEOL 773 Paleobiology
J. L. Cisne.

GEOL 775 Advanced Topics in Oceanography
Spring. C. H. Green.

GEOL 780 Earthquake Record Reading
Fall. M. Barazangi.

GEOL 781 Geophysics, Exploration Seismology
L. D. Brown.

GEOL 783 Advanced Topics in Geophysics
B. L. Isacks.

GEOL 789 Lithospheric Seismology (COCORP Seminar)
L. D. Brown.

GEOL 793 Andes-Himalaya Seminar
S. Mahlburg Kay, R. W. Allmendinger, B. L. Isacks, T. E. Jordan.

GEOL 795 Low Temperature Geochemistry
L. A. Derry.

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.

GERMAN STUDIES

L. Adelson, chair; P. Gilgen, director of undergraduate studies; A. Schwarz, director of graduate studies; D. Bathrick, M. Briggs (Dutch), B. Buettner, H. Deinert, I. Ezergailis, A. Groos, P. U. Hohendahl, G. Lischke, B. Martin, L. Trancik (Swedish), G. Valk, G. Waite

The Department of German Studies offers students a wide variety of opportunities to explore the literature and culture of German-speaking countries, whether as part of their general education, a major in German Studies or a double major involving another discipline, or as preparation for graduate school or an international professional career. Courses are offered in English translation as well as in German; subjects range from medieval to contemporary literature and from film and visual culture to intellectual history, music, history of psychology, and women's studies.

The department's offerings in English begin with a series of First-Year Writing Seminars introducing various aspects of German literature (the fairy-tale and romantic narratives, twentieth-century writers such as Kafka, Hesse, Mann, Brecht), issues in mass culture and modernity, problems of German national identity/ies, and cinema and society. A variety of courses in English translation are also offered on the 300- and 400-level. They explore such topics as the Faust legend, aesthetics from Kant to Heidegger, Freud and his legacy, opera from Mozart to Strauss, the German novel, political theory and cinema, the Frankfurt School, and feminist theory. It may be possible to arrange a German section for courses taught in English, either informally or formally (for credit). Students are encouraged to discuss this possibility with instructors.

Students wishing to begin German language at Cornell enroll in GERST 121–122. Those successfully completing this sequence and those placing into the 200-level may pursue further language study or begin with the literature and cultural studies tracks in German Studies. The beginning sequence of 200-level courses in German Studies, with readings and discussion in German, is designed to provide further grounding in the language as well as introduce German literature and cultural studies. More advanced courses introduce majors and other qualified students to a broad variety of literary and cultural topics. (Beginning in spring 1998, GERST 201 and GERLA 203 were replaced by GERST or GERLA 200.)

Sequence of courses

First level: German 121–122; after completion, placement into German 123 or 200, 205

Second level: German 200, 202, 204, 205–206.

Third level: German 301, 302, 303–304, 306, 307.

Further 300- and 400-level literature and culture courses.

Advanced Standing

Students with an AP score of 4 or better are automatically granted three credits in German. Students with an AP score of 4 or better, an LPG score of 65 or higher, or a SAT II score of 680 or higher must take the CASE examination for placement in courses above GERST 200. Students coming to Cornell with advanced standing in German and/or another subject are encouraged to consider a double major and to discuss the options with the director of undergraduate studies as early as possible.

The Majors

The department offers two options for the major: German literature/culture and German area studies, the latter a more broadly defined sequence that includes work in related disciplines. The course of study in either major is designed to give students proficiency in reading, speaking, and writing in German, to acquaint them with German culture, and to help them develop skills in reading, analyzing, and discussing German texts in relevant disciplines. For both majors, there is a wide variety of courses co-sponsored with other departments (Comparative Literature; Government; History; Music; Theatre, Film, and Dance; Women's Studies).

The department encourages double majors and makes every effort to accommodate prospective majors with a late start in German. Students interested in a major should consult the director of undergraduate studies, Peter Gilgen, 180 Goldwin Smith Hall.

German (Literature/Culture)

Although the emphasis of this track is on literature, majors may also pursue individual interests in courses on film and visual culture, theater and performing arts, music, intellectual and political history, and women's studies that have a substantial German component. Please consult with the director of undergraduate studies.

Admission: By the end of their sophomore year, prospective majors should have successfully completed GERST 202, GERST 220, or GERST or GERLA 204.

To complete the major, a student must:

1. Demonstrate competence in the German language by successful completion of two 300-level courses with intensive language work (GERST 301, 302, GERST or GERLA 303, 305) or the equivalent.
2. Complete six courses in German Studies at the 300 level or above. One of these must be the Senior Seminar (GERST 410).

German Area Studies

Students select courses from the Department of German Studies as well as courses with a substantial German component from other departments, such as Comparative Literature; Government; History; Music; Theatre, Film, and Dance; Women's Studies.

Admission: By the end of their sophomore year, prospective majors should have successfully completed GERST 202, GERST 220, or GERST or GERLA 204.

To complete the major, a student must:

1. Demonstrate competence in the German language by successful completion of two 300-level courses with intensive language work (GERST 301, 302, GERST or GERLA 303, 305) or the equivalent.
2. Complete six courses with a substantial German component at the 300 level or above. Three of these must be in German Studies, including the Senior Seminar (GERST 410).
3. Select a committee of one or more faculty advisors to help formulate a coherent program of study. One of the advisors must be from the Department of German Studies.

Study Abroad

The department encourages undergraduate majors to consider studying abroad for 1–2 semesters, normally during the junior year, as regular students at a German-speaking university. Interested students should consult Bonnie Buettner or Gunhild Lischke as early as possible.

Honors

Eligibility: A student wishing to receive honors in German Studies must have a GPA of 3.5 in all courses relevant to the major.

Committee: Candidates for honors form an advisory committee consisting of an advisor from German Studies and at least one additional faculty member.

Honors essay: During the first term of their senior year, students determine the focus of their honors essay through an appropriate course, GERST 453, under the direction of their advisors. During the second term they complete an honors essay, GERST 454, which will be evaluated by the committee.

Determination of honors: An oral examination concludes the process. Honors will be determined by the essay, the exam, and grades in the major.

Fees. Depending on the course, a small fee may be charged for film rental or photocopied texts for course work.

Freshman Writing Seminars

See Freshman Seminar booklet for course times and descriptions.

GERST 109 From Fairy Tales to the Uncanny: Exploring the Romantic Consciousness
Fall or spring. 3 credits. B. Buettner, P. Gilgen, and staff.

GERST 111 Workshop in German Studies
Fall. 3 credits. H. Deinert.

GERST 130 Metropolis, Modernity, and Mass Culture: The Roaring Twenties, German-style
Fall or spring. 3 credits. B. Buettner, P. Gilgen and staff.

GERST 150 Imagining Germany/s
Fall or spring. 3 credits. B. Buettner, P. Gilgen and staff.

GERST 151 Kafka, Hesse, Brecht, and Mann
Spring. 3 credits. H. Deinert.

GERST 170 Marx, Nietzsche, Freud
Fall or spring. 3 credits. G. Waite and staff.

[GERST 175 Cinema and Society
Not offered 1999–2000.]

GERST 180 Towards the Net.Citizen: Writing and New Communication Technologies
Fall. 3 credits. B. Buettner and staff.

Courses Offered in German

All courses are now designated GERST. Courses in earlier years were designated either GERLA or GERST. Course numbers remain the same.

GERST 121 Elementary German I
Fall or spring. 4 credits. Intended for students with no prior experience in German or with a language placement test (LPG) score below 37, or an SAT II score below 370. G. Lischke and staff.
Elementary German I is designed to familiarize students with basic vocabulary and syntax so they can communicate about everyday life. Videos and audio tapes facilitate listening comprehension and insight into German culture. Daily practice in section provides the opportunity to learn vocabulary and syntax.

GERST 122 Elementary German II
Fall or spring. 4 credits. Prerequisite: German 121, LPG score 37–44, or SAT II 370–450. Students who obtain an LPG score of 56 or above after German 122 attain qualification and may enter a 200-level course; otherwise, successful completion of German 123 is required for qualification. G. Lischke and staff.
Elementary German II, the second semester of elementary German, presupposes that students have not yet learned narrative past, subjunctive, passive or dependent word order. Topics include travel, leisure activities, work and the media, including TV, newspaper, film and fiction. There is also discussion of a timeline of key events in Germany from 1917–1989.

GERST 123 Continuing German
Fall or spring. 4 credits. Limited to students who have previously studied German and have an LPG score 45–55 or SAT II 460–570. Satisfactory completion of German 123 fulfills the language qualification requirement. Staff.
German 123 is a course on the beginning intermediate level. Students will further develop their language proficiency by communicating about broad cultural topics and themes. To provide each student with a maximum opportunity for speaking in German and getting as much help and feedback as possible, much of the work in class will be done in pairs and/or small groups.

GERST 200 Contemporary Germany
Fall and spring. 3 credits. Prerequisite: qualification in German (LPG score 56–64 or SAT II score 580–670 or GERST or GERLA 123 or equivalent or permission of instructor). Fulfills the Arts and Sciences language proficiency requirement and can be used in partial fulfillment of the Arts and Sciences humanities distribution requirement. Staff.
An intermediate language course designed to provide an introduction to modern German culture and literature while developing language proficiency. Students examine issues that shape German society, literature, and thought as reflected in short stories, poems, socio-cultural and political texts, video, and audio materials. Selected themes include "Beyond the Wall: German Unification," "Germany: a Multi-cultural Society?", "Speaking and Identity," and "Musikszene." Oral and written work and individual and group presentations emphasize accurate and idiomatic expression. Successful completion of the course enables students to continue with more advanced courses in language, literature and culture.

GERST 202 Exploring German Literature
Fall or spring. 3 credits. Prerequisite: GERST or GERLA 200, GERST or GERLA 203 or equivalent or permission of instructor. Taught in German. Can be used in partial fulfillment of the humanities distribution requirement. B. Buettner, P. Gilgen, and staff.
In this intermediate course, we will read and discuss a number of works belonging to different literary genres by major German-speaking authors, such as Kafka, Walser, Brecht, Mann, Frisch, Dürrenmatt, Bachmann, and others. We will explore questions of subjectivity and identity in modern society, of human existence as existence in language, and of the representation of history in literary texts. Activities and assignments in this course will focus on the development of reading competency in different literary genres, the use of accurate and idiomatic expressions, the expansion of students' German vocabulary, and the systematic review of select topics in German grammar.

GERST 204 Intermediate Conversation and Composition
Fall or spring. 3 credits. Prerequisite: GERST or GERLA 200, GERST or GERLA 203 or GERST 201, or GERST or GERLA 205 or placement by examination (placement score and CASE). Staff.
Emphasis on improving oral and written expression of idiomatic German. Enrichment of vocabulary and appropriate use of language in different conversational contexts and written genres. Material consists of readings in contemporary prose, articles on current events, videos, and group projects. Topics include: awareness of culture, dependence of meaning on perspective, interviews with native German speakers, German news broadcasts, reading German newspapers on the internet.

GERST 205 Business German I
Fall. 3 credits. Prerequisite: qualification in German (German 123 or an LPG score of 56–64 or an SAT II score between 580–670). Successful completion of GERST or GERLA 205 fulfills the language proficiency requirement. G. Lischke.
Learn German and understand German business culture at the same time. This is a German language course that examines the German economic structure and its major components: industry, trade unions, the banking system, and the government. Participants will learn about the business culture in Germany and how to be effective in a work environment, Germany's role within the European Union, the dual education system, the importance of trade and globalization, and current economic issues in Germany. The materials consist of authentic documents from the German business world, TV footage and a Business German textbook.

GERST 206 Business German II
Spring. 3 credits. Prerequisite: proficiency in German (GERST or GERLA 205, GERST or GERLA 200, GERST or GERLA 203, GERST 201 or placement by examination (placement score and CASE)). G. Lischke.
This course is a continuation of GERST or GERLA 205; however students without previous knowledge of Business German are welcome. This is a German language course that examines the German economic structure and its major components: industry, trade unions, the banking system, and the government. Participants will learn about the business culture in Germany and how to be effective in a work environment, Germany's role within the European Union, the role of the German Bundesbank, the importance of trade and globalization, and current economic issues in Germany. The materials consist of authentic documents from the German business world, TV footage and a Business German textbook. At the end of the course, the external Goethe Institut exam "Deutsch für den Beruf" will be offered.

[GERST 220 Was ist deutsch?
Not offered 1999–2000. B. Buettner.]

GERST 301 Scenes of the Crime: German Mystery and Detective Fiction
Fall. 4 credits. Prerequisite: GERST 202, or 220, or GERST or GERLA 204, or equivalent or permission of instructor. Taught in German. P. Gilgen.
An exploration of German crime, detective, and mystery writing in texts ranging from the eighteenth century to contemporary fiction. Authors to be studied may include: Kleist, E. T. A. Hoffmann, Kafka, Dürrenmatt, Handke, Schatten, Süskind. This course aims at improving proficiency in aural and reading comprehension, as well as speaking and writing skills, with emphasis on vocabulary expansion, advanced grammar review, and stylistic development. Recommended for students interested in a combined introduction to literature and high-level language training. This course may be counted toward the requirement for 300-level language work in the major.

GERST 302 Youth Culture: Adolescence in German Fiction
Spring. 4 credits. Prerequisite: GERST 202 or 220 or GERST or GERLA 204 and GERST 301 or equivalent or permission of instructor. Taught in German. A. Schwarz.
Examination of literary and cultural approaches to childhood, youth and adolescence in texts ranging from the late 18th century to the present. Authors include: Hoffmann, Keller, Goethe, Mann, Walser, Musil, Zweig, Handke, Kaschnitz. Aimed at further improving students' proficiency in aural and reading comprehension, as well as in speaking and composition skills. Focus on high-level grammar review, stylistic and expository refinement and vocabulary expansion. Recommended for students wishing to combine intensive language training with reading and discussion of short fiction.

GERST 303 Advanced Conversation and Composition
Fall or spring. 4 credits. Prerequisite: GERST or GERLA 204, GERST 202, GERST 220, or placement by examination (CASE). Staff.
Further enrichment of vocabulary and emphasis on improving students' oral and written style. Study of the language of different text types, including journalistic and literary texts. Discussion of current events provides insight into the historical, political and social-issues of German-speaking countries. Individual and group projects provide an opportunity for each student to pursue his/her field of interest and share it with the class.

[GERST 304 Advanced Conversation and Composition
Spring. 4 credits. Prerequisite: German 303 or placement by examination (CASE). Not offered 1999–2000.]

[GERST 306 Zeitungsdeutsch
Spring. 4 credits. Not offered 1999–2000. Staff.]

GERST 307 Modern Germany
Fall. 4 credits. Prerequisite: GERST 202 or GERST or GERLA 204 or GERST 220 or equivalent or permission of instructor. Taught in German. L. Adelson.
Introduction to the history of postwar Germany, the development and unification of the two Germanys, and their societies. The

emphasis is on cultural and social institutions as well as political and intellectual debates. Focal topics include responses to the Nazi past, Germany and Europe, protest movements, migration patterns, women, mass media, and popular culture. We will consider the changes taking place in Germany today in light of the recent past. Some films will also be shown.

[GERST 353 Kleist #
Not offered 1999–2000.]

[GERST 354 Schiller #
Not offered 1999–2000.]

[GERST 357 Major Works of Goethe (1749–1832) #
Not offered 1999–2000.]

Courses offered in English

It may be possible to arrange a German section for courses taught in English, either informally or formally (for credit). Students are encouraged to discuss this possibility with instructors.

[GERST 237 The Germanic Languages (also Linguistics 237)
Fall. 4 credits. Not offered 1999–2000. W. Harbert, M. Diesing.]

GERST 318 "1800" #
Spring. 4 credits. Taught in English. P. Gilgen.
This course examines the period from 1770 to 1830, a period of decisive social and cultural change in Germany, which led to the emergence of nationalism, historicism, classicism, romanticism, the invention of "literature," as well as the development of the systems of Kantian and post-Kantian philosophy. The course will include a selection of texts from different genres and other artifacts (opera, the fine arts) and will give a survey of the cultural and intellectual developments during the period. Readings may include Lessing, Kant, Herder, Goethe, Schiller, Fichte, Hölderlin, Mozart, Novalis, F. Schlegel, A. W. Schlegel, Kleist, Beethoven and Hegel as well as other authors and artists. While most readings will consist of shorter selections, a number of longer works will also be read. The goals of this course are to examine (the emergence and concept of) literature and its social function, and to introduce the students to the vibrant debates and main events of German cultural and intellectual history around 1800.

[GERST 320 Postwar German Novel
Not offered 1999–2000.]

GERST 330 Political Theory and Cinema (also COM L 330, GOVT 370 and THETR 329)
Spring. 4 credits. G. Waite.
This course provides an introduction to some fundamentals of current film analysis and political theory and their relationship to one another. Our investigation has two main aspects. On the one hand, we will be interested in the work of filmmakers who have been particularly concerned with reshaping ideas about politics in the cinematographic medium. On the other, we will attempt to develop a way of reading political theory using techniques borrowed from cinema and vice versa—thus forging between these two disciplines productive analogies that are not necessarily based on influence. We will study not only Hollywood but also alternative and foreign films; similarly, we will find political theory in obscure places, as well as more obvious ones. Particular focus on post-Marxist, psychoanalytic, postmodernist, and postcolonial topics and approaches. Filmmakers/theoreticians include: David Cronenberg, Gilles Deleuze, Alfred Hitchcock, Fredric Jameson, Pier Paolo Pasolini, Gillo Pontecorvo, Ridley Scott, Kidlat Tahimik, Slavoj Zizek.

GERST 340 Metropolis: Urban Sites in Literature
Fall. 4 credits. Readings and discussions in English (texts will be available in German). A. Schwarz.
An interdisciplinary study of metropolitan life focusing on Berlin and Vienna (1890–1999) as major centers of artistic modernity and historical change. Topics of investigation include: the city as both the product and source of artistic production; the interrelationship between literary concepts of montage, collage, and their architectural counterparts (Bauhaus et al.); the tension between private and public spaces, and the status of crowds, anonymity, and the flaneur. We will also analyze the rise of an avant-garde movement in an urban environment. Focus on short fiction, architectural theory, sites and art history, film, political and literary manifestos. Authors include: Fontane, Broch, Benn, Benjamin, Döblin, Simmel, Johnson, Rilke, Kohlhaas, Vidler.

[GERST 374 Opera and Culture (also MUSIC 374 AND ITALL 374)
Not offered 1999–2000.]

[GERST 378 German Aesthetic Theory: From Kant to Hegel #
Not offered 1999–2000.]

[GERST 383 German Literature of the Twentieth Century
Not offered 1999–2000.]

GERST 395 Rilke: The Duino Elegies and Sonnets to Orpheus
Spring. 4 credits. In English translation. We will use a bilingual edition for the benefit of those who know German. H. Deinert.
We will discuss the ten elegies and fifty-five sonnets both as documents of their time and in the context of intellectual history. In 1922, the same year that saw the publication of Joyce's "Ulysses", Eliot's "Waste Land", and Valéry's "Charmes", Rilke's "Duino Elegies", more than ten years in the making, and "Sonnets to Orpheus" were finally completed in a burst of creative energy that astonished even the poet. One of Germany's greatest lyrical poets along with Klopstock, Goethe and Hölderlin, Rilke attempts nothing less than the creation of a modern myth, secular religiosity in which the relationship between God and humans is replaced by one between man and Angel, the latter, like Nietzsche's Superman, but a projection of human possibilities and aspirations. A member of a generation still numbed by the destruction and social and political upheaval wrought by World War I, Rilke defines the role of humans in terms of preservation and conservation, of exuberant service to what is transitory, be they natural or cultural phenomena: "transient, they look to us for deliverance, us, the most transient of all" (IX. Elegy).

[GERST 396 German Film (also COM L 396 and THETR 396)
Not offered 1999–2000.]

Advanced Undergraduate and Graduate Courses

[GERST 403 The Afro-Europeans
Not offered 1999–2000.]

GERST 404 Operatic Contacts (also COM L 408, MUSIC 405, S HUM 405, THETR 405)
Fall. 4 credits. Ability to read music helpful but not required. Limited to 15 students. A. Groos.
For description, see S HUM 405.

[GERST 404 Modern German Syntax
Spring. 4 credits. Prerequisites: German 304 or equivalent and Linguistics 101 or 303. Not offered 1999–2000. M. Diesing.
An application of selected theoretical syntactic models to problems in the syntax of modern German.]

[GERST 405 Introduction to Medieval German Literature I #
Not offered 1999–2000.]

[GERST 406 Introduction to Medieval German Literature II #
Not offered 1999–2000.]

GERST 407 Deutsch als Fremdsprache—Teaching German as a Foreign Language
Fall. 3 credits. Intended primarily for graduate students preparing to teach German. TBA. G. Lischke.

[GERST 408 Uncanny Communities
Not offered 1999–2000.]

[GERST 409 Spinoza and Virtual Ideology
Not offered 1999–2000.]

GERST 410 Senior Seminar #
Fall. 4 credits. Open to all students with an adequate command of German. Prerequisite: any German course at the 300 level or equivalent or permission of instructor. Texts and seminar discourse in German. H. Deinert.
Topic: Kleist. 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 against Napoleon.

[GERST 412 German Literature from 1770 to 1848 #
Not offered 1999–2000.]

[GERST 413 Women around Freud (also COM L 412 and WOMNS 413)
Not offered 1999–2000.]

GERST 414 History into Fiction: Nazis and the Literary Imagination (also ENGL 404, COM L 404, and NES 404)
Fall.
For description, see COM L 404.

[GERST 415 Marx, Nietzsche, Freud (also COM L 425 and GOVT 473)
Not offered 1999–2000.]

[GERST 417 Faust: Transformations of a Myth (also COM L 417) #
Not offered 1999–2000.]

[GERST 418 Thomas Mann
Not offered 1999–2000.]

[GERST 428 Genius and Madness in German Literature (also COM L 409)
Not offered 1999–2000.]

[GERST 430 Brecht, Artaud, Müller, Wilson (also COM L 430 and THETR 420)
Not offered 1999–2000.]

[GERST 435 Introduction to Literary Theory (also COM L 435)
Not offered 1999–2000.]

GERST 441 Introduction to Germanic Linguistics (also LING 441)
Fall. 4 credits. Prerequisite: LING 101 or permission of instructor. W. Harbert.
For description, see LING 441.

[GERST 447 Reading Freud: Gender, Race, and Psychoanalysis (also COM L 447 and WOMNS 447)
Not offered 1999–2000.]

GERST 451–452 Independent Study
451, fall; 452, spring. 1–4 credits each term. Prerequisite: permission of instructor.

GERST 453 Honors Research
Fall. 4 credits. Staff.

GERST 454 Honors Thesis
Spring. 4 credits. Staff.

GERST 457/657 Imagining the Holocaust (also COM L 483/683, ENGL 458/658, and JWST 458/658)
Spring. 4 credits. D. Schwarz.
For description, see ENGL 458/658.

[GERST 472 Poetry of the 1990s (also COM L 472)
Not offered 1999–2000.]

[GERST 492 The Advance of Humanism: Aspects of the European Enlightenment #
Not offered 1999–2000.]

[GERST 495 The Aesthetic Theory of the Frankfurt School (also COM L 495)
Not offered 1999–2000.]

[GERST 496 Theorizing the Public Sphere (also COM L 496 and HIST 496)
Not offered 1999–2000.]

[GERST 498 German Literature in Exile
Not offered 1999–2000.]

Graduate Courses

Note: For complete descriptions of courses numbered 600 or above consult the appropriate instructor.

[GERST 600 Special Topics in Feminist Theory (also ANTHR 600 and COM L 600)
Not offered 1999–2000.]

[GERST 606 Topics in Historical Germanic Phonology #
Spring. 4 credits. Prerequisite: Ling 441. Not offered 1999–2000. W. Harbert.
The development of the sound system from Proto-Germanic to its daughter languages.]

[GERST 607 Topics in Historical Germanic Morphology #
Fall. 4 credits. Prerequisite: Ling 441. Not offered 1999–2000. Staff.
The Germanic verbal system and its Indo-European origins.]

[GERST 608 Topics in Historical Germanic Syntax #
Fall. 4 credits. Prerequisite: Ling 441. 1999–2000. W. Harbert.
A diachronic and comparative investigation of syntactic processes in the older Germanic languages.]

[GERST 615 Jews in German Culture Since 1945 (also JWST 615)
Not offered 1999–2000.]

GERST 617 Literature and Affect (also COM L 625)
Fall. 4 credits. Discussion and texts in English (German texts will be available). A. Schwarz.
By focusing on two predominant affects within traditional and contemporary thought—melancholy and anxiety—the goal of this class is to investigate the relationship between moods, dispositions, affects, and literary representation. In order to discuss the impact of melancholy and anxiety on processes of communication and signification, particular attention will be paid to their relation to philosophical and psychoanalytic models of understanding; their relation to rhetorical figures as well as to metaphors of spatiality and the body (questions of spatial and "mental" orientation, states of suspension, corporeal integrity). Our readings will be directed by the following concerns: are melancholy and anxiety mental disorders, philosophical concepts, natural dispositions, or literary genres? Focus on the relationship of affects to artistic production and the constitution of subjectivity. Authors include: Hegel, Benjamin, Kierkegaard, Heidegger, Kristeva, Freud, Butler, Abraham, Torok, Nietzsche, Goethe, Hölderlin, Büchner, Rilke, Benn, Walser.

GERST 618 "The Science of the Experience of Consciousness": Hegel's *Phenomenology of Spirit* (and Beyond)
Fall. 4 credits. P. Gilgen.
Centered on a close reading of the *Phenomenology of Spirit*, this course examines its problematic position vis-à-vis Hegel's subsequent system of philosophy. Intended as a ladder that would lead up to philosophical knowledge, the *Phenomenology* is and, at the same time, is not (yet) philosophy. This undecided position of the text is reflected in the text, and it poses the question of the possibility, the status, and the options of philosophy after the *Phenomenology* (which then leads to the question whether such philosophy would or would not coincide with philosophy after Hegel). The examination of three prominent constellations in the reception history of the *Phenomenology* will, on the one hand, address contemporary theory's vast debt to Hegel (primarily to the *Phenomenology*) and will, on the other hand, lead us back to the primary text by forcing repeated reexaminations of its philosophical arguments as well as its textual structure. We will begin this examination by tracing the aftermath of the *Phenomenology* in post-Hegelian German thought (especially in the works of "Left-Hegelians" such as Feuerbach and Marx, among others). In a second stage, we will focus on the intense reception of Hegel—for the most part the Hegel of the *Phenomenology*—in France during the years immediately preceding and following World War II, especially Jean Hyppolite's seminal commentary and Alexander Kojeve's influential lectures, published as *Introduction to the Reading of Hegel*. Finally, the presence of the *Phenomenology* in contemporary theory will be addressed in readings that may include Francis Fukuyama, Jacques Derrida, Judith Butler, John Sallis, and Donald Phillip Verene.

[GERST 621 Issues in Gay and Lesbian Studies (also WOMNS 621)
Not offered 1999–2000.]

[GERST 624 Seminar in Medieval German Literature II
Not offered 1999–2000.]

[GERST 626 Nuremberg
Not offered 1999–2000.]

[GERST 627 Baroque (also COM L 626)
Not offered 1999–2000.]

[GERST 629 The Enlightenment
Not offered 1999–2000.]

[GERST 630 Classicism and Idealism
Not offered 1999–2000.]

GERST 631–632 Academic German I and II
631, fall; 632, spring. 3 credits each term. Limited to graduate students. Prerequisite: for German 632, German 631 or equivalent. Staff.
Intended primarily for beginners with little or no previous German knowledge. Emphasis in 631 on acquiring basic German reading skills. Emphasis in 632 on development of the specialized vocabulary of student's field of study.

GERST 634 German Romanticism
Fall. 4 credits. Most readings are in German; discussion and papers are in English. Students from other disciplines are welcome. Anchor course. G. Waite.
Structured introduction to German literature, philosophy, criticism, and painting from c. 1789 to c. 1830 in the context of European developments. The larger social context requires readdressing aesthetic and poetic questions to a romantic "school" (Heine), a "German ideology" (Marx and Engels), a "Romantic ideology" (McGann), "Art and the Industrial Revolution" (Klingender), and "the flight from reality of the artistic period" (Lukács). Crucial and related issues include gender and political economy; the Spinoza debate; the trope of the automaton; and understanding critically the reception of this ostensible object by subsequent history: what is the ulterior motive behind literary periodization and (literary) history?

[GERST 635 The Gates to Modernity: From Karlsbad to the 1848 Revolution
Not offered 1999–2000.]

[GERST 637 19th-Century Fiction: The Realist Project
Not offered 1999–2000.]

[GERST 647 German Literature from 1949 to 1989: Questions about Identity
Not offered 1999–2000.]

GERST 650 Culture in the Weimar Period
Spring. 4 credits. Prerequisite: reading knowledge of German. Anchor course. D. Bathrick.
This survey course will treat major developments in the area of German culture (literature, cinema, painting) between 1900 and 1933. Individual representative texts will be studied and discussed in their relation to the cultural, political, and social contexts out of which they emerge. Lectures and discussions will focus both on detailed interpretation of individual works as well as on the general historical background and developments of the period.

[GERST 652 Culture in Germany 1933–1945
Not offered 1999–2000.]

[GERST 653 Opera (also COM L 655 and MUSIC 679)
Not offered 1999–2000.]

[GERST 656 Aesthetic Theory: The End of Art (also COM L 656)
Not offered 1999–2000.]

GERST 660 Visual Ideology (also COM L 660 and THETR 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 philosophy, psychoanalysis, historiography, sociology, literary theory, mass media criticism, feminism, and Marxism. We will try especially to develop: (1) a general theory of "visual ideology" (the gender, social, racial, and class determinations on the production, consumption, and appropriation of visual artifacts under modern and postmodern conditions); and (2) contemporary theoretical practices that 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 ARCH 338/638 and COM L 661)
Not offered 1999–2000.]

[GERST 663 Nietzsche and Heidegger (also COM L 663)
Not offered 1999–2000.]

[GERST 664 Freud and the *Fin de siècle*
Not offered 1999–2000.]

[GERST 666 Ingeborg Bachmann
Not offered 1999–2000.]

[GERST 667 "Minor" German Literatures?
Not offered 1999–2000.]

[GERST 668 Literature and the Uncanny (also COM L 664)
Not offered 1999–2000.]

[GERST 671 Postcolonial Theory and German Studies
Not offered 1999–2000.]

[GERST 672 German Opera Topic: Wagner (also MUSIC 674)
Not offered 1999–2000.]

[GERST 674 Contemporary Poetry and Culture: 1968–1993 (also COM L 674, ENGL 697 and SPAN L 674)
Not offered 1999–2000.]

[GERST 675 After the Divide: German Critical Theory of the Seventies and Eighties (also COM L 675 and HIST 675)
Not offered 1999–2000.]

[GERST 679 Bertolt Brecht in Context (also COM L 679 and THETR 679)
Not offered 1999–2000.]

[GERST 685 Gramsci and Cultural Politics (also COM L 685 and GOVT 675)
Not offered 1999–2000.]

[GERST 686 Althusser and Lacan (also COM L 686, GOVT 679, and FRLIT 623)
Not offered 1999–2000.]

[GERST 687 The Politics of Culture in the German Democratic Republic
Not offered 1999–2000.]

[GERST 689 Art and Truth: The Aesthetic Theory of Theodor W. Adorno (also COM L 689)
Not offered 1999–2000.]

[GERST 690 Feminist Criticism and Theory (also WOMNS 690)
Not offered 1999–2000.]

GERST 696 Conceptualizing Cultural Contact (also COM L 696 and NES 696)
Spring. 4 credits. Prerequisite: reading knowledge of German and English. L. Adelson.
Since the West German and Turkish governments signed a labor recruitment agreement in 1961, the Turkish population in the Federal Republic has become the largest group of "foreigners" to reside permanently in Germany. While Turks have borne the brunt of xenophobic hostility in a country that may soon grant them citizenship, a lesser known fact is that Turkish-German authors of several generations have been producing German literature for over two decades. This includes Turkish emigrés who publish in German translation as well as Turkish-German writers whose literary language of choice is German. Departing from the sociological model that usually interprets this minority literature as a plea for German compassion or intercultural dialogue, this course juxtaposes prose fiction about Turkish-German contact and critical theories of difference with two primary goals in mind: 1) Students will be introduced to representative examples of Turkish-German literature, a cultural phenomenon whose scope and significance have grown, not lessened, over time. 2) Various modes of conceptualizing cultural contact within a given country will be explored and compared, methodologically in relation to each other and analytically with regard to the Turkish-German field. Exemplary rather than comprehensive readings structure the syllabus, but theories discussed will include those that address situational marginality, migrant literature, borderland cultures, postcolonial hybridity, translating alterity, and intercultural hermeneutics. Literary selections include works by Güney Dal, Aras Oren, Aysel Özakin, Emine Sevgi Ozdamar, Zafer Senocak, and Feridun Zaimoglu.

[GERST 699 German Film Theory (also COM L 699 and THETR 699)
Not offered 1999–2000.]

GERST 753–754 Tutorial in German Literature
Fall and spring. 1–4 credits per term. Prerequisite: permission of instructor.

Dutch

DUTCH 121–122 Elementary Dutch
121, fall or summer; 122, spring or summer. 4 credits each term. Prerequisite: permission of instructor. M. Briggs.
Intensive practice in listening, speaking, reading, and writing basic Dutch in meaningful contexts. The course also offers insight into Dutch language, culture, and society.

DUTCH 203 Intermediate Composition and Conversation
Fall. 3 credits. Prerequisite: qualification in Dutch or permission of instructor. M. Briggs.
Improved control of Dutch grammatical structures and vocabulary through guided conversation, compositions and reading, drawing on all Dutch-speaking cultures. Taught in Dutch.

DUTCH 204 Intermediate Composition and Conversation
Spring. 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 such as newspapers, literature, and history, with emphasis on the students' interests and specializations. Taught in Dutch.

DUTCH 300 Directed Studies
Fall or spring. 1–4 credits variable. Prerequisite: proficiency in Dutch or permission of instructor. M. Briggs.
Individualized advanced Dutch studies. This course aims to provide students with individualized programs which can be anything from advanced mastery in any or all skills to the mastery of Dutch for research. Literature history in support of all disciplines. Taught in Dutch.

Swedish

SWED 121–122 Elementary Swedish
121, fall; 122, spring. 4 credits each term. Prerequisite: for Swedish 122, Swedish 121 or equivalent. L. Trancik.
The aim of this course is to develop skills in listening, speaking, reading and writing within Sweden's cultural context. Work on the internet and interactive computer programs are used in these courses.

SWED 123 Continuing Swedish
Fall. 4 credits. Prerequisite: Swedish 122 or equivalent. L. Trancik.
Development of skills in spoken and written Swedish within Sweden's cultural context.

SWED 203 Intermediate Swedish
Spring. 3 credits. Prerequisite: Swedish 123 or permission of instructor. L. Trancik.
Intermediate to advanced level instruction utilizing audio-visual material and text to enhance language comprehension.

SWED 204 Advanced Swedish
Fall. 3 credits. Prerequisite: Swedish 203 or permission of instructor. Taught in Swedish. L. Trancik.
Emphasis on improving oral and written expression of Swedish, including vocabulary, readings in contemporary prose, treatment of specific problems in grammar, and presentation of videos and films.

SWED 300 Directed Studies
Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. L. Trancik.
Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

Related Courses in Other Departments

Government

GOVT 341 Modern European Society and Politics
Spring. D. Schirmer.

GOVT 380 Politics of Modern Germany
Fall. D. Schirmer.

GOVT 669 Modern Social Theory I
Fall. S. Buck-Morss.

GOVT 670 Modern Social Theory II
Spring. S. Buck-Morss.

History

HIST 357 Survey of German History, 1648–1890
Fall. I. V. Hull.

Society for the Humanities

S HUM 406 Subjectivity and the Other I
Fall. F. Neuhouser.

S HUM 416 Subjectivity and the Other II
Spring. F. Neuhouser.

GOVERNMENT

I. Kramnick, chair; B. R. O'G. Anderson, R. Bensel, M. G. Bernal, S. Buck-Morss, R. Bullock, V. Bunce, J. Cowden, M. Evangelista, R. Herring, N. Hirschmann, M. Katzenstein, P. Katzenstein, E. W. Kelley, J. Kirshner, T. J. Lowi, R. McDermott, W. Mebane, K. O'Neill, J. Pontusson, J. Rabkin, E. Sanders, H. Schamis, M. Shefter, V. Shue, A. M. Smith, S. G. Tarrow, N. T. Uphoff, C. Way

Government is what Cornell calls a department that elsewhere might be termed political science. The focus of this discipline is power applied to public purposes. Some faculty concentrate on purposes, some on applications. Some engage in the close reading of great texts of political philosophy, while others analyze the behavior of power-wielders and publics in this and other societies. Government is divided into four subfields: U. S. politics, comparative politics (other nations), political theory (philosophy), and international relations (transactions between nations).

To accommodate new courses or course changes, a supplementary announcement is prepared by the department. Before enrolling in courses or registering each term, students are requested to consult the current supplement listing courses in government, available in 125 McGraw Hall.

The Major

To be admitted to the major, a student must pass two government courses.

To complete the major, a student must (1) pass two of the introductory government courses (Government 111, 131, 161, 181); (2) pass an additional course in one of the remaining subfields (American government, comparative government, political theory, or international relations). This course may be any course offered in the government department, including introductory 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 200-level or above; (4) complete at least one seminar-style course in government which may be applied toward the 28 credits. These courses include those numbered 400.XX 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 upper-level). 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) all courses used to fulfill 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. Government majors may apply to the Cornell-in-Washington program to take courses and undertake a closely supervised externship during a fall or spring semester.

Study Abroad in Geneva. French, history, and government majors, or other students with a commitment to international experience, may study abroad in Geneva, Switzerland. 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 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 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, architecture, physical education, and French language, civilization and history.

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.

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.

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 information.

European Studies Concentration. Government majors may elect to group some of their required and optional courses in the area of European studies, drawing from a wide variety of courses in relevant departments. Students are invited to consult Professors P. Katzenstein, J. Pontusson, and Tarrow for advice on course selection and foreign study programs.

Model European Community Simulation. Undergraduates with an interest in the European Union, public affairs or debating may participate in an annual European Union simulation held, on an alternating basis, in April at SUNY Brockport or in January in Brussels. The simulation provides an opportunity for participants, representing politicians from the members states, to discuss issues and resolutions of currentconcern to the EU.

To prepare for the simulation, a two-credit course is offered by the Government department each year (Government 431 or Government 432). Participation in the simulation is open only to those who register for this course. Anyone interested in participating or finding out more information should contact the Institute for European Studies at 120 Uris Hall, 255–7592.

International Relations Concentration. See the description under "Special Programs and Interdisciplinary Studies."

Honors. In their junior year, Government majors with a G.P.A. of 3.30 in all subjects may join the honors program, which involves a sequence of special courses in the junior and senior year. Application to the honors program will be made in the late spring of the sophomore year and application forms will be available in 125 McGraw Hall. The courses comprising the honors sequence (honors courses) are described below. Students may be admitted to the honors program in the junior or senior year only with the special permission of the Director of Undergraduate Studies.

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
Fall and summer. 3 credits. V. Bunce. This course provides a survey of the institutions, political processes, and policies of contemporary states. It focuses on the conditions for and workings of democracy. Looking at Western Europe, we will analyze institutional variations among liberal democracies, and their political implications. We will then probe the origins of democracy in

Western societies and the reasons why communism and other forms of authoritarian rule have prevailed elsewhere. Finally, we will explore the impetus behind and the obstacles to democratization in the Third World and the erstwhile Communist Bloc. Throughout this survey, problems of democracy will be related to problems of economic development, efficiency, and equality.

GOVT 161 Introduction to Political Philosophy #
Spring. 3 credits. N. Hirschmann.
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.
P. Katzenstein.
An introduction to the basic concepts and practice of international politics.

First-Year Writing Seminars

GOVT 100 Freshman Seminars
Fall, spring, or summer. 3 credits.
Seminars will be offered in fall, spring, and summer terms. Consult the listings for the Freshman Seminar Program in the section "Special Programs and Interdisciplinary Studies," the supplement issued by the department, and the Freshman Seminar booklet for course descriptions and instructors.

Major Seminars

GOVT 400 Major Seminars
Fall or spring. 4 credits.
These seminars, emphasizing important controversies in the discipline, cap the majors' experience. Thus preference in admission is given majors over nonmajors and seniors over juniors. Topics and instructors change each semester. To apply, students should pick up an application in 125 McGraw Hall during the course selection period the semester before the seminar is given.

The following courses are open to sophomores, juniors, and seniors without prerequisites unless otherwise indicated.

American Government and Institutions

Government 111 is recommended.

GOVT 302 Social Movements in American Politics (also American Studies 302)
Spring. 4 credits. E. Sanders.
From populism to environmentalism, social movements directed at reform of national policies and political structures have been an earmark of American politics. This course will begin with an examination of late nineteenth-century agrarian and labor movements and move through progressivism, a variety of 1930s upsurges, civil rights, and more or less contemporary environmental, consumer, feminist, and peace movements. The focus will be on the conditions that gave rise to these movements, their internal resources, and external alliances and their ultimate impact on the national state (as well as vice versa).

[GOVT 303 Introduction to American Political Parties
4 credits. Not offered 1999–2000.]

GOVT 304 Public Opinion and Political Participation
Fall. 4 credits. J. Cowden.
Government 304 is a survey course about the nature and impact of public opinion and mass political behavior. We will examine classic and contemporary scholarship on the following topics: the role of public opinion in democratic theory; the measurement of opinions; the political sophistication of the electorate; racial and political intolerance; political socialization; party identification and party systems; media effects; candidate preference; turnout and abstention; attitudes about distributive justice; and the intersection between public opinion and public policy.

[GOVT 305 Atomic Consequences: The Incorporation of Nuclear Weapons in Post-War America
4 credits. Not offered 1999–2000.]

GOVT 306 Latino Politics in the United States
Spring. 4 credits. P. Caban.
During the last two decades, the U.S. has undergone a dramatic demographic transition in which people of Latin American and Caribbean descent have emerged as the fastest growing racial/ethnic minority. At the local and state levels Latinos constitute a political force that has fundamentally reconfigured the public policy making process in certain regions of the country. Their growing electoral strength also promises to inject new issues and perspectives into national level politics. This course focuses on the emergence of Latino political identity and the complex forms of Latino political participation and engagement in the United States.

[GOVT 308 Science in the American Polity 1800–1960
3 credits. Not offered 1999–2000.]

[GOVT 309 Science in the American Polity
4 credits. Not offered 1999–2000.]

[GOVT 310 Power and Poverty in America
4 credits. Not offered 1999–2000.]

[GOVT 311 Urban Politics
4 credits. Not offered 1999–2000.]

GOVT 313 The Nature, Functions, and Limits of Law
Spring. 4 credits. Undergraduates only.
R. Hillman.
A general education course for students at the sophomore and higher levels. Law is presented not as a body of rules but as a set of varied techniques for resolving conflicts and dealing with social problems. The roles of courts, legislatures, and administrative agencies in the legal process is analyzed, considering also the constitutional limits on their power and practical limits of their effectiveness. Assigned readings consist mainly of judicial and administrative decisions, statutes and rules, and commentaries on the legal process. Students are expected to read assigned materials before each class and to be prepared for participation in class discussion.

[GOVT 316 The American Presidency (also American Studies 316)
4 credits. Not offered 1999–2000.]

GOVT 317 Campaigns and Elections
Fall. 4 credits. W. Mebane.
This course examines campaigns and elections, focusing primarily on national elections in the United States. Topics include the relationship between elections and the economy, the weakness of the American party system, voter turnout, individual voting decisions, negative campaigning, and the noncompetitiveness of congressional elections. We examine several theories that explain these phenomena, including in particular the theory of rational choice. Course requirements include one or two papers based on original analysis of election survey data.

GOVT 318 The American Congress
Spring. 4 credits. M. Shefter.
The role of Congress in the American political system. Topics to be discussed: the political setting within which Congress operates, the structure of Congress, the salient features of the legislative process, and recent congressional behavior in a number of policy areas.

GOVT 320 Public Opinion and Public Choice
Spring. 4 credits. Prerequisite: Government 111 or permission of the instructor.
W. Mebane.
A fundamental paradox in democracy is the fact that a government the people control will only rarely be a government that does what the people want. This is not to say that government NOT by the people is better (it's usually worse). This course explores this problem, contrasting the answers given by the concept of public opinion and the formal theory of social choice. We encounter the paradox in several American political institutions, including elections, legislatures, and bureaucracy.

[GOVT 324 Legal Reasoning and Legal Adaptation: A Comparison of American and Talmudic Law
4 credits. Not offered 1999–2000.]

GOVT 327 Civil Liberties in the United States
Spring. 4 credits. J. Rabkin.
An analysis of contemporary issues in civil liberties and civil rights, with emphasis on Supreme Court decisions. Cases are analyzed in terms of democratic theory and the social and political context in which they arose.

GOVT 328 Constitutional Politics: The United States Supreme Court
Fall. 4 credits. J. Rabkin.
The course investigates the role of the Supreme Court in American politics and government. It traces the historical development of constitutional doctrine and the institutional role the court has played in American politics.

GOVT 353 Feminism Movements and the State (also Women's Studies 353)
Fall. 4 credits. M. Katzenstein.
This course focuses on women's activism and the American state. The subject emphasis and format (lecture, sections, tutorials) of this course changes each year and is announced on the first day of class. Active class discussion and extensive writing will be encouraged whatever the particular format of this coming year's class organization.

Interested students should pre-register (in order that we may estimate possible class number), but final admission to the class is contingent on application to be completed at the first meeting of the class.

[GOVT 405 Government and the Economy (also GOVT 705)
4 credits. Not offered 1999–2000.]

[GOVT 406 Politics of Education (also GOVT 706)
4 credits. Not offered 1999–2000.]

GOVT 408 Politics of the American Civil War (also American Studies 430)
Fall. 4 credits. R. Bensel.
The Civil War, along with the Founding of the nation in the late eighteenth century, is one of the two most important influences on the course of American political development. Arising out of intense ideological, cultural and economic competition between the slave South and the free labor North, the conflict created two new national states: a northern Union that replaced the loose federation of the antebellum period and a southern Confederacy that perished at Appomattox. In this course, particular attention will be paid to: (1) the political economy and culture of plantation slavery in the antebellum South; (2) the apparent inevitability of collision between the slave and free states and their respective societies; (3) the military, political, and economic strategies that determined, on both sides, the course and duration of the war; (4) the limits and possibilities of reform of southern society during Reconstruction; and (5) the impact of the Civil War on the subsequent development of the United States.

GOVT 409 Racial Prejudice and Political Intolerance
Spring. 4 credits. J. Cowden.
This course explores the nature, scope, and etiology of intolerance and its implications for the operation of politics in the United States. Readings will include many of the "classics" in political science, political psychology, psychoanalysis, and social psychology, dating from the 1930s to the present.

GOVT 412 American Political Parties and Elections
Spring. 4 credits. J. Cowden.
This seminar examines changes in the character of political parties and the behavior of the electorate. It also considers the changing relationship between political parties and elections, on the one hand, and other political processes and institutions, on the other.

GOVT 413/613 Finance, Federalism, and Politics
Spring. 4 credits. W. Mebane.
"All politics is local politics," some say. This course gives sustained attention to that proposition. We examine the dependencies which exist in the United States between political outcomes and local economies. Fiscal federalism, the consequences local taxing and spending have for economic growth, the pork barrel, and the effects local economic conditions have on elections are among the topics considered. Theoretical suggestions from economics and regional science are reviewed, along with research from political science. Students are also introduced to a number of recently organized data collections which offer chances for new, systematic research in this area.

GOVT 419 The Politics of Scandal (also GOVT 619)
Spring. 4 credits. M. Shefter, J. Rabkin.
This seminar will discuss the politics of "scandal" and "reform" in constitutional doctrine, American history, and recent experience.

[GOVT 427 The Politics of Environmental Protection in America
4 credits. Not offered 1999–2000.]

GOVT 428 Government and Public Policy: An Introduction to Analysis and Criticism
Fall. 4 credits. T. J. Lowi.
Government 428 concentrates on history and criticism of U.S. policies and the politics associated with them. Particular attention given to the origins and character of the regulatory state and the welfare state.

GOVT 429 Government and Public Policy: An Introduction to Analysis and Criticism
Spring. Open to undergraduates. 428 and consent of instructor are required for 429. T. J. Lowi.
Government 429 is an opportunity to pursue further the research begun in 428.

Comparative Government

Government 131 is recommended.

GOVT 218 Introduction to Korea (also ASIAN 218) @
Fall. 3 credits. J. J. Choi.
An interdisciplinary introduction to Korean history and culture, including geography, ethnography, language, literature, philosophy, religion, political economy, government, music, and art (sculpture, architecture, and painting), with an overview of Korean history from the Three Kingdoms Period to the present, focusing on the March 1, 1919, Independence Movement, the Korean War, the 1960 Student Revolution, the 1980 Kwangju Massacre, and other events.

[GOVT 251 The Politics of Economic Life
4 credits. Not offered 1999–2000.]

[GOVT 252 Contemporary Palestinian Society (also NES 298)
3 credits. Not offered 1999–2000.
See Near Eastern Studies 298 for description.]

[GOVT 332 Modern European Politics
4 credits. Not offered 1999–2000.]

[GOVT 333 Government and Politics of the Former Soviet Union
4 credits. Not offered 1999–2000.]

GOVT 334 Political Economy of East Asia
Spring. 4 credits. R. Bullock.
This lecture course examines East Asian political economy in historical and comparative perspective. Central questions include: Why have Japan, South Korea, and Taiwan developed so rapidly in the postwar era? Can we identify an East Asian mode of development? What does the region's growth mean for other countries and for the international economy? Are Southeast Asian countries following a similar trajectory today? Particular topics include Japanese colonialism, industrial policy and its critics, domestic political consequences of rapid growth, political corruption, US-Japan economic conflict, and recent attempts at political-economic liberalization.

[GOVT 335 America in the World #
4 credits. Not offered 1999–2000.]

[GOVT 336 Postcommunist Transitions
4 credits. Not offered 1999–2000.]

GOVT 338 Comparative Political Economy
Fall. 4 credits. C. Way.
This course examines the juncture of politics and the economy in the advanced industrial democracies. Why do some countries have large, inclusive welfare states while others have minimal social programs? Is the welfare state in decline, and if so why? Does it really make any difference for the economy whether parties of the left or right govern? Do strong unions have negative effects on the economy, or can they actually boost economic performance? What does increasing globalization of the world economy mean for the constraints and opportunities facing governments in managing the economy and providing social welfare? How will the Euro and increasing European integration change the world? Are all market economies pretty much the same, or are there varieties of capitalism that differ in important ways? We will use a variety of theoretical perspective to provide some insight into these and other questions, paying particular attention to evaluating the theoretical arguments with both systematic and historical evidence.

GOVT 340 Latin American Politics @
Spring. 4 credits. H. Schamis.
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 in order to understand the fundamental historical processes as well as to explain the significance of competing theoretical frameworks that have shaped the debate in the field. The course will focus on the political economies of the region in order to analyze the role of groups and classes under different political regimes and contrasting strategies of development.

GOVT 341 Modern European Society and Politics (also SOC 341)
Spring. 4 credits. J. Pontusson and D. Schirmer.
This interdisciplinary course explores the contested meaning(s) of citizenship in contemporary European societies, situating recent developments in an historical perspective. In postwar Europe, citizenship took on social and industrial connotations which are largely absent in the U.S. The tension between this expanded notion of citizenship and market economics is a central feature of current political debates, not least in the emergent democracies of Eastern Europe. At the same time, the process of European economic and political integration recasts the role of nation states and their relationship to their citizens. Under the general theme of citizenship, the course will explore the political economy of European integration, nationalism and the formation of transnational identities, class structure and gender relations, the realignment of political ideologies and partisan allegiances, social movements, civil society and the future of European welfare states.

[GOVT 342 United Germany in the New Europe
4 credits. Not offered 1999–2000.]

[GOVT 343–345 State, Society, and Language in Ancient Egypt (also NES 368/369) @ #
4 credits each term. Not offered 1999–2000.]

[GOVT 346 Modern Japanese Politics @
4 credits. Not offered 1999–2000.]

GOVT 347 Government and Politics of China @
Spring. 4 credits. V. Shue.
An introduction to the main currents in China's domestic politics over the last sixty years. Topics include the revolutionary rise of communism; Maoism, in theory and in practice; the politics of bitterness during the "Cultural Revolution"; the evolving roles of the party and the military, and of peasants, workers, and intellectuals in the polity; the prospects for democracy, perceived social inequality, violence, corruption, and other pressing problems that have emerged with the reforms under Deng Xiaoping.

[GOVT 349 Political Role of the Military
4 credits. Not offered 1999–2000.]

GOVT 351 India
Fall. 4 credits. M. Katzenstein.
How well do India's political institutions function in the face of the social and economic challenges of the 1990s? We will take up a range of issues that have been hotly debated in India over the last ten years—economic restructuring, Hindu nationalism, child labor, gender inequality, among others—considering what these controversies reveal about the character of the Indian state. Each week will be organized around a controversial question as presented in articles, books, and films.

GOVT 354 Capitalism, Competition and Conflict in the Global Economy
Spring. 4 credits. P. Katzenstein.
Unemployed auto workers in Detroit and the wood stoves in New England signal an important change in America's relation to the world economy. This course characterizes these changes in a number of fields (trade, money, energy, technology), explains them as the result of the political choices of a declining imperial power that differs substantially for the choices of other states (Japan, Germany, Britain, France, the small European states, and Korea), and examines their consequences for America and international politics.

[GOVT 355 International Relations of the Ancient Near East
4 credits. Not offered 1999–2000.]

[GOVT 356 Enlarging the New Europe: Labor, Business, and Politics (also ILRIC 337)
3 credits. Not offered 1999–2000.]

[GOVT 357 Understanding Russia Today
4 credits. Not offered 1999–2000.
For description see, Russ L 330.]

GOVT 358 Modern History of the Middle East: Changing Politics, Society, and Ideas @
Spring. 4 credits. M. Bloom.
For description, see NES 390.

[GOVT 415 Race, Gender, and Organization
4 credits. Not offered 1999–2000.]

[GOVT 430 Democracy, Power, and Economic Reform
4 credits. Not offered 1999–2000.]

[GOVT 431 Model European Union
2 credits. Not offered 1999–2000.]

GOVT 432 Model European Union II
Fall. 2 credits. J. Pontusson.
This two-credit course is designed to prepare students to participate in the annual Model European Union Simulation held, on an alternating basis, at SUNY Brockport and in Brussels. The simulation provides an opportunity for participants, representing politicians from the member states of the European Union, to discuss issues and resolutions of current concern to the EU. The preparatory course introduces students to the EU, the country that the Cornell team will represent, and the issues to be discussed at the simulation. A substantial part of travel costs for the Cornell team will be paid by the Institute for European Studies, and course enrollment will be restricted by budgetary considerations. Students enrolled in this course are required to write a research paper.

GOVT 433 The Politics of Economic Liberalization in the Developing World @
Fall. 4 credits. H. Schamis.
What drives the current processes of economic liberalization taking place in most of the developing world? What kinds of constraints and opportunities do governments embarked upon such policy reforms face? What types of factors account for their success or failure? What is the relationship between the international dimension of this phenomenon and the domestic political conditions? This seminar addresses these questions by examining the interplay of domestic and international ideas, local and foreign actors, 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
4 credits. Not offered 1999–2000.]

[GOVT 436 Environmental Politics and Policy
4 credits. Not offered 1999–2000.]

[GOVT 437 Contemporary China: Society and Politics @
4 credits. Not offered 1999–2000.]

[GOVT 438 Contemporary China: Political Economy @
4 credits. Not offered 1999–2000.]

GOVT 439 Japan in International Politics @
Spring. 4 credits. R. Bullock.
The focus of the course is 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 440 The Political Economy of Market Reform (also GOVT 630)
4 credits. Not offered 1999–2000.]

[GOVT 442 Feminist Politics and Policy in the United States and Europe (also GOVT 655)
4 credits. Not offered 1999–2000.]

[GOVT 443 Proseminar in the Politics of South Asia @
4 credits. Not offered 1999–2000.]

GOVT 444 Afrocentrism
Spring. 4 credits. M. Bernal.
The seminar will begin with a survey of African-American writings about African history from David Walker's *Appeal* in 1829 to W. E. B. DuBois's *The Negro* and *Black Folk Then and Now*. We shall then read from the works of "Afrocentrist" writers of history including Chancellor Williams, Yosef ben-Yochanen and Chiekh Anta Diop as well as those of sympathetic scholars such as St. Clair Drake and Shomarka Keita. After examining the historical utility of these writings, we shall turn to Afrocentrism as a social, political, and pedagogical movement reading the works of such figures as Molefi Asante, Charles Finch, Asa Hilliard and Leonard Jeffries. In this section we shall be investigating the relationship of Afrocentrism to more directly political movements as well as the objections to it from those who dislike its neglect of issues of class and gender. In the last section, we shall consider the portrayal of Afrocentrism as a "bogey" discussing selections from the works of Arthur Schlesinger, Dinesh d'Souza, Mary Lefowitz and others.

[GOVT 445 Stalinism as Civilization
4 credits. Not offered 1999–2000.]

[GOVT 446 Social Welfare and International Competitiveness
4 credits. Not offered 1999–2000.]

GOVT 454 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
4 credits. Not offered 1999–2000.]

[GOVT 468 Global and Domestic Dimensions of Science and Technology Policy (also S&TS 425)
4 credits. Not offered 1999–2000.]

Political Theory

Government 161 is recommended.

[GOVT 260 Social and Political Philosophy (also Philosophy 260)
4 credits. Not offered 1999–2000.]

GOVT 293 Inequality, Diversity and Justice
Fall. 4 credits. R. Miller.
See Philosophy 193 for description.

[GOVT 361 Modern Ideologies: Liberalism and Its Critics #
4 credits. Not offered 1999–2000.]

[GOVT 362 Politics of Sexuality (also Women's Studies 262)
4 credits. Not offered 1999–2000.]

[GOVT 364 The Selfish Individual and the Modern World
4 credits. Not offered 1999–2000.]

[GOVT 366 American Political Thought from Madison to Malcolm X (also History 316 and American Studies 366) #
4 credits. Not offered 1999–2000.]

[GOVT 368 Global Climate and Global Justice (also Philosophy 368)
4 credits. Not offered 1999–2000.]

GOVT 369 Introduction to Feminist Political Thought (also Women's Studies 269)
Fall. 4 credits. N. Hirschmann.
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.

GOVT 370 Political Theory and Cinema (also GERST 330, COM L 330, THETR ARTS 330)
Fall. 4 credits. G. Waite.
See German Studies 330 for description.

GOVT 375 Visual Culture and Social Theory (also ART H 370 and Comp. Lit. 368)
Fall. 4 credits. S. Buck-Morss.
Introduction to critical concepts for the analysis of visual culture, in specific socio-historical contexts.

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 racism," or cultural racism, scientific racism and contemporary hybrid racism. We will then examine the politically ambiguous "ethnicity theory." In the second half of the course, we will consider the works by Marable on African American political economy; women of color feminist theorists; native American theorists; Takaki on Asian American labor history; and Hero on Latinos/Latinas and American politics. Although we will discuss American multicultural history in some detail, our primary focus will be on an investigation of these works' theoretical foundations.

[GOVT 461 Interpreting Race and Racism
4 credits. Not offered 1999–2000.]

[GOVT 462 Modern Political Philosophy
4 credits. Not offered 1999–2000.]

GOVT 465 Reconceiving Liberalism (also Phil 447)
Fall. 4 credits. R. Miller.
For description see Philosophy 447.

[GOVT 466 Feminism and Gender Discrimination
4 credits. Not offered 1999–2000.]

GOVT 467 Radical Democratic Feminisms
Fall. 4 credits. A. M. Smith.
Radical Democratic Feminisms is an advanced feminist theory seminar. We will focus on contemporary political discourses that are influenced by socialist feminism, radical democratic pluralism, critical race theory, and radical anti-racist and anti-heterosexist multiculturalism. The reading list will include works by Sheila Rowbotham, Joan Scott, Michele Barrett, Lynne Segal, Zillah Eisenstein, Frances Fox Piven, Barbara Ehrenreich, Jacqui Alexander, Chandra Talpade Mohanty, Judith Butler, Julia Epstein, Anne McClintock, Angela Davis, Alice Echols, Dangerous Bedfellows, Lisa Duggan, Nan Hunter, Amy Gluckman and Betsy Reed, Elizabeth Grosz, Elspeth Probyn, Katha Pollitt, Renata Salecl, Patricia J. Williams, Ellen Willis, Gayatri Spivak, Jeffrey Escoffier, Barbara Epstein, and bell hooks. Students should have completed at least one course in feminist theory and at least one course in social theory or political theory before taking this course.

[GOVT 468 Global and Domestic Dimensions of Science and Technology Policy
4 credits. Not offered 1999–2000.]

[GOVT 469 Limiting War (also Phil 369)
4 credits. Not offered 1999–2000.]

[GOVT 473 Marx, Nietzsche, Freud (also German Studies 415)
4 credits. Not offered 1999–2000.]

[GOVT 474 Community, Nation, and Morality
4 credits. Not offered 1999–2000.]

International Relations

Government 181 is recommended.

GOVT 294 Global Thinking (also Philosophy 294) @
Spring. 4 credits. No prerequisites; intended for freshmen and sophomores. Fulfills geographical distribution requirement. H. Shue.
The analysis taught in this course is global in two different respects: international subjects and interdisciplinary methods. We look in detail at questions raised by one of the most important and most difficult issues facing international society: when, if ever, should other nations unilaterally or multilaterally intervene militarily into ethnic conflicts like those in Bosnia and Rwanda in this decade? Both of these recent cases, one in Europe and one in Africa, raise fundamental questions about the kind of world we are constructing for the 21st century. To what extent is the system of nation-states we now have either desirable or unavoidable? Does every ethnic group have a right to a self-determining and sovereign state? When is the use of military force morally justified? Should trials for war crimes or crimes against humanity be routinely held after military conflicts? These and other ethical questions need to be answered in light of the best available knowledge about the political dynamics of foreign interventions and the changing international legal regime, bringing together political science, law, and ethics. The course is team-taught by leading faculty researchers from the three fields listed.

GOVT 380 The Politics of Modern Germany
Fall. 4 credits. D. Schirmer.
"Learning from History" in the sense of "learning from failure" is one of the basic modes of political modernization. Thus, structures and functioning of German postwar politics are inseparably tied to interpreting the causes of the political instability of the Weimar Republic and the rise of Nazism. Therefore, the course will employ the interpretation of history as a general framework for the introduction into German politics. Topics will include the constitutional concept of the Grundgesetz (basic law), the political culture, the electoral and party systems, parliament and government, interest groups and Germany's liberal corporatism, and the federal system. We will also try to evaluate to which degree German politics have been transformed by the process of unification.

[GOVT 382 International Relations of East Asia @
4 credits. Not offered 1999–2000.]

[GOVT 383 Theories of International Relations
4 credits. Not offered 1999–2000.]

GOVT 385 American Foreign Policy
Fall. 4 credits. M. Bloom.
This course will provide an overview of the history of American foreign policy, concentrating on the period between 1914 and the present. Various theoretical approaches to the study of American foreign policy will be covered, including international, domestic and individual levels of analysis. These interpretations will be used to examine events including: the First World War and the League of Nations; the rise of American hegemony; various crises of the Cold War, including the U-2 crisis, the Suez and Berlin crises, and the Cuban missile crisis; and the Korean, Vietnamese and Gulf Wars. Emphasis will be placed on security as opposed to economic foreign policy issues.

GOVT 386 The Causes of War
Spring. 4 credits. C. Way.
This course surveys leading theories of the causes of interstate war—that is, large scale organized violence between the armed forces of states. Why is war a recurring feature of international politics? Are democracies more peaceful than other types of states, and if so what explains this "democratic peace"? Why do democratic publics seem to reward threats to use force by "rallying around the flag" in support of their governments? Does the inexorable pattern of the rise and fall of nations lead to cycles of great power wars throughout history? These and other questions will be examined in our survey of theories of war at three levels of analysis: the individual and small groups, domestic politics, and the international system. Topics covered include: 1) historical patterns in warfare; 2) theoretical explanations for war; 3) evaluation of the evidence for the various explanations; 4) nuclear weapons; 5) ethics and warfare; and, 6) the major security problems of the coming decades, civil war, and the prospects for peace in the future.

[GOVT 387 Political Psychology in International Relations
4 credits. Not offered 1999–2000.]

[GOVT 388 International Political Economy
4 credits. Not offered 1999–2000.]

[GOVT 389 International Law
4 credits. Not offered 1999–2000.]

[GOVT 391 Chinese Foreign Policy @
4 credits. Not offered 1999–2000.]

[GOVT 392 International Relations of the Middle East (also NES 395) @
4 credits. Not offered 1999–2000.]

GOVT 393 Introduction to Peace Studies (also SOC 310)
Fall. 4 credits. J. Reppy and R. Williams.
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 394 Comparative Foreign Policy
4 credits. Not offered 1999–2000.]

[GOVT 395 Palestinian Nationalism (also NES 399)
4 credits. Not offered 1999–2000.]

[GOVT 475 The Politics of International Monetary and Financial Relations
4 credits. Not offered 1999–2000.]

[GOVT 477 Rational Choice Approaches to International Relations
4 credits. Not offered 1999–2000.]

[GOVT 482 International Relations of East Asia @
4 credits. Not offered 1999–2000.]

[GOVT 483 The Military and New Technology (also S&TS 483)
4 credits. Not offered 1999–2000.]

[GOVT 491 Conflict, Cooperation, and Norm: Ethical Issues in International Affairs
4 credits. Not offered 1999–2000.]

Honors Courses

Late each spring a limited number of sophomore 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 493 Studying Politics: The Junior Honors Seminar
Fall and spring. 4 credits. Fall, V. Shue; spring, R. Bensel.
The seminar will meet twice weekly under the supervision of a senior faculty member with numerous classes being led by other members of the department faculty. The seminar will survey the broad range of what we mean by "the study of politics" and the various methods we enlist to carry out the study. The seminar will be writing intensive, requiring at least five papers.

GOVT 494 Honors Seminar: Thesis Clarification and Research
Fall. 4 credits. E. Sanders.
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 amount of 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 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 606 Field Seminar in International Relations
Fall. 4 credits. M. Evangelista.
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
4 credits. Not offered 1999–2000.]

Methodology

GOVT 601 Scope & 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
4 credits. Not offered 1999–2000.]

GOVT 605 Comparative Methods
Spring. 4 credits. J. Pontusson and C. Way.
This seminar provides a survey of different methodological approaches to the study of comparative politics: single case studies, comparative case studies based on Millian logic, qualitative comparative analysis, and a variety of quantitative methods. Substantive works will be used to illustrate each approach. Throughout, the discussion will emphasize methodological issues that are common to all forms of comparative inquiry.

[GOVT 707 Game Theory for Political Science
4 credits. Not offered 1999–2000.]

American Government and Institutions

[GOVT 609 Political Parties and Elections
4 credits. Not offered 1999–2000.]

GOVT 611 The Political Economy of American Development, 1860–1900
Fall. 4 credits. R. Bensel.
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 ends 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 consequent 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 II: Social Movements and State Expansion in the Twentieth Century
4 credits. Not offered 1999–2000.]

GOVT 613/413 Finance, Federalism, and Politics
Spring. 4 credits. W. Mebane.
For description see Government 413.

GOVT 615 State and Economy in Comparative Perspective
Spring. 4 credits. R. Bensel.
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 618 Politics, Markets, and the Middle Classes
4 credits. Not offered 1999–2000.]

GOVT 619 The Politics of Scandal
Spring. 4 credits. M. Shefter and J. Rabkin.
See Government 419 for description.

[GOVT 620 The United States Congress
4 credits. Not offered 1999–2000.]

[GOVT 623 The Politics of Courts
4 credits. Not offered 1999–2000.]

[GOVT 628 Bureaucracy and Law
4 credits. Not offered 1999–2000.]

[GOVT 629 Cleavages and Coalitions in Contemporary American Politics
4 credits. Not offered 1999–2000.]

[GOVT 703 Political Economy
4 credits. Not offered 1999–2000.]

[GOVT 705/405 Government and the Economy
4 credits. Not offered 1999–2000.]

[GOVT 706 The Politics of Education
4 credits. Not offered 1999–2000.]

Comparative Government

[GOVT 630 The Political Economy of Market Reform
4 credits. Not offered 1999–2000.]

[GOVT 632 Politics and Society in Western Europe
4 credits. Not offered 1999–2000.]

[GOVT 633 European Party Systems and Political Change
4 credits. Not offered 1999–2000.]

[GOVT 634 Genetic Engineering: Politics and Society in Comparative Perspective
4 credits. Not offered 1999–2000.]

GOVT 638 Latin American Political Economy
Spring. 4 credits. H. Shamis.
The central goal of this seminar is to examine the magnitude and scope of the decades-long process of economic transformation in the region and capture its implications for political stability. In order to do so, we will adopt a historical political economy approach. Old concepts—populism, corporatism, nationalism—will be reviewed in light of new developments. Different economic phases and strategies—export-led growth, import-substituting industrialization, market-oriented reform—will be analyzed in light of the region's changing social structures, unstable political institutions, and shifting preferences and ideologies of social actors. And classic theoretical approaches—Modernization, Dependency, Bureaucratic-Authoritarianism—will be reevaluated in light of the current convergence toward marketization and democratization.

[GOVT 639 Studying Political Culture
4 credits. Not offered 1999–2000.]

[GOVT 642 Comparative Political Economy: East and Southeast Asia
4 credits. Not offered 1999–2000.]

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 politics, political culture, and political economy. Special attention to problems of research and interpretation.

[GOVT 648 Political Economy of Change: Rural Development in the Third World
4 credits. Not offered 1999–2000.]

[GOVT 652 Southeast Asia Seminar: The Philippines (also Asian Studies 601)
4 credits. Not offered 1999–2000.]

GOVT 653 The Plural Society Revisited (also Asian Studies 607)
Fall. 4 credits. B. Anderson.
John Furnivall's concept, invented 40 years ago, posited colonial society as one in which race (and ethnicity), class, occupation, and residence were distributed more or less isomorphically. The seminar will review the utility of the concept in light of subsequent research on colonial Asia, and its applicability to developments since the achievement of independence. It will also consider the relevance of the concept to (uncolonized) modern Thailand. The core problematic issue will be the relationship between classification (naming) and power.

[GOVT 655 Gender, Politics and Welfare Policies in Europe and the U.S. (also GOVT 442)
4 credits. Not offered 1999–2000.]

[GOVT 656 Comparative Political Economy
4 credits. Not offered 1999–2000.]

GOVT 657 Comparative Democratization
Fall. 4 credits. 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 Contentious Politics (also SOC 660)
4 credits. Not offered 1999–2000.]

GOVT 692 The Administration of Agricultural and Rural Development
Spring. 4 credits. N. Uphoff.
For description, see INTAG 603.

GOVT 731 Political Ecology
Spring. 4 credits. R. Herring.
Political ecology studies the intersection of the politics of economic change and policies of states with interests in the environment—whether in conservation or transformation. It is centrally concerned with the sources of change in landscapes, both proximate and distal—and therefore with the political economy of development—and equally with human responses to ecological dynamics: scarcity, degradation, threat, and opportunity. Politics respond to and shape evolution of ecological systems, in both intended and unintended ways. Reciprocally, social movements around both protection of particular environments and opposition to state efforts to protect or change ecological systems introduce new political cleavages. Differing conceptualizations of public goods in ecological systems give rise to divergent problems of policy and collective action. Arenas cross boundaries: international environmental "soft law" is a product of domestic enviromental politics and simultaneously a source of new politics on the ground. The course is seminar in format and explicitly comparative in method; materials will be drawn from both the history of industrial societies and currently transitional ("less developed") societies.

GOVT 732 Postsocialist Transformations
Fall. 4 credits. V. Bunce and M. Evangelista.
This is a seminar in comparative and international politics that examines the political and economic, domestic and international experiences of the 27 countries that once made up the Soviet Union and Eastern Europe. Among the topics addressed will be explanations of why socialism and socialist states collapsed; how democratization relates to economic reform; and why relations among the nations of the region and the new states of the region are cooperative or conflictual.

GOVT 733 State, Market Economy and Civil Society in Contemporary South Korea
Fall. 4 credits. J. J. Choi.
This seminar aims to analyze basic aspects in Korea politics and society since World War II, with special emphasis on the basic categories of society, the state, market economy and civil society. These categories broadly match with the state-making, industrialization, and democratization which have been the main forces in shaping the history of contemporary Korea.

Political Theory

GOVT 663 Political Theories of Power
Fall. 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
4 credits. Not offered 1999–2000.]

[GOVT 665 American Political Thought: From Madison to Malcolm X
4 credits. Not offered 1999–2000.]

GOVT 667 Major Figures in Modern Political Theory
Spring. 4 credits. N. Hirschmann.
This seminar will focus on three figures in modern political theory who present contrasting yet curiously related visions of politics. Emphasis will be placed on analytical treatment of historical works, and the course will strive to integrate historical and analytical political philosophy through weekly student papers and presentations of primary and secondary sources. Newer critical methods, such as feminism and postmodernism, may be utilized to locate a critical reading of texts within contexts of cultural history.

GOVT 669 Modern Social Theory I
Fall. 4 credits. S. Buck-Morss.
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 as the legitimation of power, and social institutions as social constraints. The methods of critical theory, structuralism, post-structuralism, and feminism will be considered.

GOVT 670 Modern Social Theory II
Spring. 4 credits. S. Buck-Morss.
Issues raised by neo-Marxism, critical theory, post-structuralism, and feminism.

GOVT 671 Graduate Seminar in Feminist Political Theory
Fall. 4 credits. N. Hirschmann.
The course is open to undergraduates who have taken Government 463 or other courses in feminist theory, with permission of the instructor. 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 relevant to feminism as an academic, intellectual, and political enterprise.

GOVT 674 Theory and Practice of Nationalism
Fall. 4 credits. 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)
4 credits. Not offered 1999–2000.]

[GOVT 676 Theories of Governmentality
4 credits. Not offered 1999–2000.]

[GOVT 678 Classics in Political Thought: Adam Smith and David Hume
4 credits. Not offered 1999–2000.]

[GOVT 679 Althusser and Lacan
4 credits. Not offered 1999–2000.]

GOVT 760 Theoretical Approaches to Ideology
Spring. 4 credits. A. M. Smith.
An investigation of what is casually referred to as the "politics of meaning" is of course central to political theory and political science as a whole. However, profound controversies revolve around the definition of "ideology," its location in the social, its relationship to the interests of dominant groups, the means by which it is circulated throughout diverse social sites, its ability to displace traditional modes of thought, and the processes by which it penetrates and re-constructs the world views of the dominanted. We will lay the groundwork for the seminar by examining key texts on ideology by Marx. We will trace the multiple meanings of the term in his work and their various implications. Next we will discuss the ways in which Adorno, Horkheimer, Gramsci, Althusser, Hall and Laclau have re-articulated Marx's formulations. We will address the Freudian and Lacanian interventions in ideology studies with respect to the concepts of the unconscious and mis-identification. Then we will explore the problem of ideological analysis and historicity, with reference to classical texts in the structuralist, science and technology studies, and feminist traditions. Finally, we will conclude the seminar with a discussion of the incorporation of sedimented discourse in everyday practice with reference to the work of Bourdieu.

International Relations

[GOVT 681 Politics of Transnationalism
4 credits. Not offered 1999–2000.]

[GOVT 682 International Relations of the Middle East
4 credits. Not offered 1999–2000.]

GOVT 684 Strategies of Inquiry for International and Comparative Politics
Fall. 4 credits. C. Way.
This course provides a survey of different approaches to studying international and comparative politics through examination of important research agendas in both sub-fields. In surveying research using both qualitative and quantitative approaches, we will pay special attention to bridging the gaps that often lead to the compartmentalization of these two research styles and study ways of fruitfully combining multiple methods. Although the course has methodological goals, these will be pursued through reading and discussing important applications (e.g., the democratic peace, rally effects, cabinet formation and dissolution, economic disputes and bargaining between states, welfare state development and retrenchment, exchange rate politics, etc). We will focus on the problems of identifying interesting questions, formulating appropriate strategies for answering them, ascertaining the appropriate methodological tools with which to conduct the research, acquiring the knowledge necessary to read and understand literature using a variety of methods, and writing up results so they can be published. The major course requirement is a piece of original research on a topic of the student's choosing.

[GOVT 685 International Political Economy
4 credits. Not offered 1999–2000.]

[GOVT 686 International Strategy
4 credits. Not offered 1999–2000.]

[GOVT 687 International Environmental Policy
Not offered 1999–2000.]

[GOVT 688 Political Economy and National Security
4 credits. Not offered 1999–2000.]

GOVT 689 International Security Politics
Spring. 4 credits. P. Katzenstein.
This course will provide an overview of theoretical and research topics in the area of international security policy. This course will cover several theoretical perspectives, including rational choice and psychological approaches to the study of security issues. These perspectives will be used to examine various substantive topics including war and deterrence, balance of power, alliance politics, domestic constraints on foreign policy and military strategy. Less attention will be paid to issues involving economic cooperation and sanctions.

GOVT 691 Normative Elements of International Relations
Fall. 4 credits. H. Shue.
We examine selected normative elements of international affairs, divided into three inter-locking 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 of individual persons, nation-states, and international regimes. Questions considered 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?

[GOVT 694 Research Design and Grant Writing
4 credits. Not offered 1999–2000.]

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 assistant in 125 McGraw Hall.

GREEK

See Department of Classics.

HEBREW

See Department of Near Eastern Studies.

HINDI-URDU

See Department of Asian Studies.

HISTORY

I. Hull, chair; V. Caron, director of graduate studies; T. Borstelmann, director of undergraduate studies; S. Blumin, V. Caron, S. Cochran, P. R. Dear, M. C. Garcia, S. Greene, P. Holquist, P. R. Hyams, J. J. John, C. Kammen, M. Kammen, S. L. Kaplan, J. V. Koschmann, D. C. LaCapra, W. F. LaFeber, T. L. Loos, R. L. Moore, J. M. Najemy, M. B. Norton, C. Peterson, J. R. Piggott, S. Pohl, R. Polenberg, W. B. Provine, M. J. Roldon, J. H. Silbey, B. Strauss, E. Tagliacozzo, D. Usner, M. Washington, R. Weil, J. H. Weiss, D. Wyatt

Emeritus: D. A. Baugh, K. Biggerstaff, W. M. Pintner, F. Somkin, B. Tierney, O. W. Wolters

The popularity of history among Cornell students is due to its usefulness as preparation for graduate, professional, or law school and for any career that requires critical thinking and good writing; the reputation of the faculty for scholarship, teaching, and advising; and most of all, the intrinsic interest of the discipline. A wide variety of introductory and advanced courses is offered. The department is particularly strong in ancient, medieval, and modern European history; in American, Latin American, 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 First-Year Writing Seminars.

1) Take 9 history department courses (for either 3 or 4 credits each), completing all of them with a grade of C or better. (Courses taken for entry may count towards fulfilling the major.)
2) Of the total 9 courses:
   a) 4 must be outside of American history and
   b) 3 must be in history before 1800.

   Courses used to fulfill Requirement (1) above may also be used to fulfill Requirement (2), in respect both to (a) and (b) if applicable. A course in American history before 1800 may be used to fulfill Requirement (2b). A course before 1800 in a field other than American history can be used toward fulfillment of both Requirements (2a) and (2b).
3) Of the total 9 courses, one must be a 400-level seminar. History 400 may be used to fulfill this requirement. Appropriate 400-level seminars may be used to fulfill Requirements (2a) and (2b).

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 the 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 10 courses in history (for 3 or 4 credits each). 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. 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 the Honors Committee. History 401 is a 4-credit course that permits honors candidates to conduct research and to begin writing the honors essay. At the end of the first semester of the senior year, as part of the requirements for History 401, the student submits to the supervisor a ten-to-fifteen page overview, or, alternatively, a preliminary draft of some part of the thesis along with an outline of the whole and meets with a committee consisting of the student's supervisor and one other department member who will eventually serve as a reader of the thesis. That committee then recommends whether the student may proceed to enroll in History 402, Honors Thesis, during the final semester of the senior year. History 402 is a 4-credit course that permits honors candidates to complete the honors essay and to demonstrate their understanding of the ways in which the themes explored in the thesis fit into a larger historical context.

The completed thesis is evaluated by three readers, including the two faculty members who administered the preliminary oral interview in December.

The text of the honors essay may not exceed sixty pages except by permission of the chair of the honors committee and the student's supervisor. Two copies are due during the third or fourth week of April. In May each honors candidate is given an oral examination administered by the supervisor; examination focuses on the essay as well as the specific subfield of history in which the student has conducted research (e.g., Periclean Athens, seventeenth-century science, nineteenth-century America).

To qualify for a bachelor of arts degree with honors in history, a student must (1) sustain at least a 3.5 cumulative average in all history courses and (2) earn at least a cum laude grade on the honors essay and on the oral examination.

Cornell-in-Washington Program. History majors may apply to the Cornell-in-Washington program to take courses and undertake a closely supervised externship during a fall or spring semester.

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-level courses come in two kinds: seminars or lecture courses. Neither kind has prerequisites and both admit freshmen. 200-level seminars (which are identified by the name "seminar" in the title) are similar to first-year writing seminars, except that there is greater emphasis on subject matter and less on writing.

200-level lecture courses cover a relatively broad geographical area, period of time, or subject.

300–399–level courses may have specified prerequisites or deal with more-specialized subjects than do those numbered 250–299. Admission of freshmen varies from course to course and is indicated in the course descriptions.

400–499 are upper level undergraduate courses.

600–699 and 700–799 are graduate level courses.

Comparative History

[HIST 274 Foodways: A Social History of Food and Eating #
Spring. 4 credits. Not offered 1999–2000. 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 1990s.]

[HIST 360 Early Warfare, East and West #
Spring. 4 credits. Not offered 1999–2000; next offered 2000–2001. 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 380 Social History of Western Technology #
4 credits. Not offered 1999–2000. J. Weiss.
For description, see History of Science.]

[HIST 393 Images of Humanity in Medieval China (also Asian Studies 393) @ #
Fall. 4 credits. Prerequisite: any course on premodern China or Chinese religions, or permission. Not offered 1999–2000. C. Peterson.]

[HIST 405 Population and History #
4 credits. Open to sophomores. Not offered 1999–2000. S. L. Kaplan.]

[HIST 409 Seminar on Work in Europe and America #
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. S. L. Kaplan.
A comparative study of the meaning of work in different societies from premodern times to the present. Emphasis on the "representations" of work of the actors themselves who worked, as well as of those, who for various critical reasons, did not work. The seminar will examine not only ideology but also the organization, practice, and physical place of work. It will explore theory as well as "cases," and draw on anthropological and sociological as well as historical materials.]

[HIST 432 The City in History: Europe and America #
Spring. 4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. 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 451 Lord and Peasant in Europe: A Seminar in Social History #
4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. S. L. Kaplan.]

HIST 454 The Herodotean Moment: The Uses and Abuses of "Western Civilization" (also Government 454) #
Spring. 4 credits. Limited to 20 students. Prerequisite: permission of instructor. J. Najemy, 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. Readings include selections from Herodotus's *Histories,* Virgil's *Aeneid,* Augustine's *City of God, The Song of Roland,* Petrarch, Pico, Machiavelli, Montesquieu, Flaubert, Shelley's *Hellas,* Arnold, Hegel's *Philosophy of History,* James Mill's *History of British India*, and, from secondary critical literature, Tzvetan Todorov's *The Conquest of America* and Edward Said's *Orientalism.*

History of Science

HIST 250 Technology in Society (also Engineering General Interest 250, Electrical Engineering 250, and Science and Technology Studies 250)
Fall. 3 credits. R. Kline.
For description, see ENGRG 250.

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 281 is not a prerequisite to 282. Not offered 1999–2000. 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 sciences 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. This course covers the eighteenth, nineteenth, and early twentieth centuries.]

HIST 287 Evolution (also Biology-General Courses 207, Science and Technology Studies 287)
Fall. 3 credits. W. Provine.
For description, see BIO G 207.

HIST 292 Inventing an Information Society (also Engineering General Interest 298, Electrical Engineering 298, and Science and Technology Studies 292)
Spring. 3 credits. R. Kline.
For description, see ENGRG 298.

[HIST 380 Social History of Western Technology #
Spring. 4 credits. Not offered 1999–2000. J. Weiss.
Studies in the interaction between technological changes and social changes in Western Europe and America since the eighteenth century. Readings and lectures will deal both with instances of social transformation that accompanied technological changes and with the role of technology in social thought and cultural expression. Special attention to three periods: Britain during the Industrial Revolution, America in the nineteenth century, and America during the Vietnam War.]

[HIST 415 Seminar in the History of Biology (also Biology-General Courses 467, Biology and Society 447, Science and Technology Studies 447)
Summer. 4 credits. Not offered 1999–2000. W. Provine.
Specific topic changes each year.]

HIST 525 Seminar in the History of Technology (also Science and Technology Studies 525)
Fall. 4 credits. R. Kline.
For description, see S&TS 525.

HIST 616 Enlightened Science (also Science and Technology Studies 416)
Fall. 4 credits. P. R. Dear and M. A. Dennis.
"Science" is a term that is often associated with "rationality." The idea that "reason," rather than "faith" or "tradition" should be the pre-eminent guide to practical action has deep roots in the thought of 18th-century Europe, the period known as the Enlightenment. The practice and image of science in the Enlightenment shows how this ideal was developed and understood, and what its meanings and implications were. Those meanings, and their associated values, remain strongly with us today. This course will investigate our current scholarly understanding of many themes and issues relating to "enlightened science," as well as studying writings of the period itself in a variety of topical areas, from political economy to astronomy and natural history, in several national contexts including Scotland, France, and Germany. We will attempt to view these materials from the perspective both of developments from earlier periods and in relation to the later consequences of this ideology.

[HIST 680 Seminar in Historiographical Approaches to Science (also Science and Technology Studies 680)
Fall. 4 credits. Not offered 1999–2000. P. R. Dear.
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. Not offered 1999–2000. 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 the study of recent historiography in selected areas, and an examination of primary source materials intended to critique and test those historiographical approaches. Topics will include: credibility and social status; the academic environment; philosophy and court culture; the situated meaning of experiment.]

HIST 711 Introduction to Science and Technology Studies (also Science and Technology 711)
Fall. 4 credits. S. Hilgartner.
For description, see S&TS 711.

American History

HIST 101 Introduction to American History (also American Studies 103) #
Summer and fall. 4 credits. 101 is not a prerequisite to 102. D. Usner.
A survey of American history from the beginnings through the Civil War. Topics include cultural encounters in the age of Columbus, European colonization the American Revolution, the early republic, antebellum reform movements, the coming of the Civil War.

HIST 102 Introduction to American History
Summer and spring. 4 credits. 101 is not a prerequisite to 102. M. C. Garcia.
An introductory survey of the development of the United States since the Civil War.

HIST 201 Seminar: Immigration and Ethnicity in Twentieth-Century U.S.
Spring. 4 credits. Seminar designed for underclassmen but open to all students. Enrollment limited to 15 students. Prerequisite: permission of instructor. M. C. Garcia.
This seminar will look at immigration to the United States in the twentieth century, highlighting the experiences of several groups as case studies. We will analyze the "push/pull" historical-structural factors that compelled people to come to the United States; the nature of cultural and structural assimilation; nativist movements; the evolution of U.S. immigration policy; the formation of ethnic identity in U.S. society. Attention will be given to current issues such as immigration reform, bilingual education; and the multiculturalism debate.

[HIST 202 Comparative Migration in the Americas (also American Studies 204)
Spring. 4 credits. Not offered 1999–2000. M. C. Garcia.
A seminar examining migration both within and to the Americas in the 19th and 20th centuries. Topics to be discussed are the reasons for population movements; immigration policies; social, economic, and political accommodation; nativist and restrictionist responses; women and migration; remittances and transnationalism. Among the immigrant-receiving nations studied are Argentina, Brazil, Canada, Cuba, Mexico, and the United States.]

HIST 208 Seminar: The Era of Franklin D. Roosevelt (also American Studies 208)
Fall. 4 credits. Seminar designed for underclassmen but open to all students. Enrollment limited to 15 students. Prerequisite: permission of instructor. R. Polenberg.
The impact of the Great Depression and World War II on American politics, law, and culture.

[HIST 209 Seminar: Political History of Indians in the United States (also American Indian Studies 209) #
Fall. 4 credits. Seminar designed for underclassmen but open to all students. Enrollment limited to 15 students. Prerequisite: permission of instructor. Not offered 1999–2000. D. Usner.
An investigation of political organization and change among Native American societies. Discussions and assignments examine forms of tribal government, diplomacy, and warfare, as well as political relations with European colonies and the United States. Specific topics include pan-Indian confederacies, Indian policy, struggles over sovereignty, and Indian strategies of autonomy and resistance.]

HIST 210 The Atlantic World from Columbus to Equiano
Spring. 4 credits. R. J. Weil and M. B. Norton.
After Europeans first crossed the Atlantic in the late fifteenth century, the ocean became a vast highway linking the European powers—Spain, France, Britain, and the Netherlands—with their colonial outposts in America. This seminar will explore the Atlantic world through reading such primary sources as the log of Christopher Columbus and the autobiography of Olaudah Equiano, an Anglo-African sailor, and recent scholarly examinations of the slave trade and other aspects of the Atlantic economy. Intended primarily for sophomore prospective history majors; open to others by permission of instructors.

[HIST 213 Asian American History (also Asian American Studies 213)
Fall. 4 credits. Not offered 1999–2000. Staff.
Comparative introductory history of Asian Indians, Chinese, Filipino, Japanese, and Koreans in the U.S. from about 1850 to World War II. Themes include U.S. expansionism in the Pacific, Asian migrant labor in Hawaii and the American West, the anti-Asian movement, and Asian resistance.]

HIST 214 Seminar on American Foreign Policy (also American Studies 214)
Fall. 3 credits. Prerequisite: permission of instructor. W. LaFeber.
Topic for 1999: U.S. presidents and foreign policy in the Cold War and after.

[HIST 238 History of Women in the Professions, 1800 to the Present (also American Studies 258, Women's Studies 238, and Human Development 258)
Spring. 3 credits. Not offered 1999–2000. J. Brumberg.
For description, see HDFS 258.]

HIST 251 Black Religious Traditions from Slavery to Freedom (also American Studies 251, Religious Studies 251)
Spring. 4 credits. Sophomore seminar. Letter only. M. Washington.
A survey on the black religious and spiritual traditions during bondage and the early years of freedom. The course will examine slave religion, the rise of black churches in the North, the formation of black churches after the Civil War, the independent church movement and the churches' role in social protest.

HIST 260 Introduction to U. S. Latino History, Part I (also Latino Studies Program 260 and American Studies 259)
Spring. 4 credits. M. C. Garcia.
This course introduces students to the history of Latinos in the United States. We will focus specifically on the history of Chicanos (Mexican Americans) and Central Americans. Part II of this course, History 261, focuses on the history of Puerto Ricans, Cubans, and Dominicans in the U.S. (students are not required to take both courses). Among the topics that will be addressed are: historical immigration patterns and the "push/pull" factors that compelled migration to the United States; the social and political events that shaped the evolution of these Latino communities; the role of cultural identity, race, class, and gender in shaping experience; the role of foreign policy in formulating immigration policy.

HIST 261 Introduction to U.S. Latino History, Part II (also Latino Studies 261 and American Studies 261)
Fall. 4 credits. M. C. Garcia.
This survey will discuss the history of Latinos from the Caribbean: the Puerto Ricans, Cubans, and Dominicans. Students will be introduced to some of the most important historical and theoretical works in this field. Topics to be discussed include the push-pull/historical-stuctural factors that influenced migration to the United States; the historical evolution of these communities; the role of cultural identity, as well as race, class, and gender in shaping experience; the intersection of foreign policy and immigration policy.

HIST 273 Women in American Society, Past and Present (also Women's Studies 273) #
Spring. 4 credits. M. B. Norton.
A survey of women's experiences in America from the seventeenth century to the present. Among the topics to be discussed are women's familial roles, the changing nature of household work, the women's rights movement, employment of women outside the home, racial and ethnic differences in women's experiences, and contemporary feminism.

[HIST 276 American Indian History, 1500–1850 (also American Indian Studies 276 and American Studies 272) #

Fall. 4 credits. Not offered 1999–2000; next offered 2000–2001. 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 (also American Indian Studies 277)

Summer and spring. 4 credits. Not offered 1999–2000; next offered 2000–2001. 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)

Spring. 4 credits. Letter only. Not offered 1999–2000. M. Washington.

Historical exploration of African-American women from a sociopolitical perspective. Topics include women in Africa, slavery and freedom, sexuality, labor, the family, gender crossracially that begins with the African background and ends at 1900.]

HIST 304 American Culture in Historical Perspective, 1880–1980 (also American Studies 304)

Spring. 4 credits. M. Kammen.

An introduction to the study of modern American culture. Emphasis upon the role of culture in the quest for national identity; the function of cultural myths and myth making; the advent of modernism; 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 311 The Structure of American Political History (also American Studies 311) #

Fall. 4 credits. Not offered 1999–2000; next offered 2000–2001. J. Silbey.

Examines the course of American politics from the eighteenth century to the Gilded Age, focusing on the development of American political culture, the nature of decision making, and the role of interest groups, political parties, and political elites in shaping our political history.]

[HIST 312 The Structure of American Political History

Spring. 4 credits. Not offered 1999–2000; next offered 2000–2001. J. Silbey.

A continuation of History 311 but can be taken independently. Examines the course of American politics from the 1890s to the present, focusing on the massive transformation of American political life in the late nineteenth and twentieth centuries in response to industrialism and urbanization, the depression and the international crises from the 1930s to the 1990s.]

[HIST 313 U.S. Foreign Relations, 1750–1912 #

Fall. 4 credits. Open to freshmen with permission of instructor. Not offered 1999–2000; next offered 2000–2001. W. LaFeber.

Examines the development of the U.S. continental and global empires by analyzing policy and policymakers from Benjamin Franklin to Woodrow Wilson. Emphasis is placed on domestic events that shaped foreign policy. In conjunction with HIST 313, a special course, 301, for discussion and guided research will be offered.]

[HIST 314 History of American Foreign Policy, 1912 to the Present

Summer and spring. 4 credits. Not offered 1999–2000; next offered 2000–2001. T. Borstelmann.

Students examine the emergence of the United States as a world power in the twentieth century. The course focuses on the domestic sources of foreign policy and the assumptions of the major policymakers (Wilson through 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 increasingly 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) #

Fall. 4 credits. Not offered 1999–2000. I. Kramnick.

For description, see GOVT 366.]

[HIST 318 American Constitutional Development

Fall. 4 credits. Not open to freshmen. Not offered 1999–2000; next offered 2000–2001. R. Polenberg.

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 of privacy; the contemporary Supreme Court.]

[HIST 321 Colonial North America to 1763 #

Fall. 4 credits. Not offered 1999–2000; next offered 2001–2002. 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 324 Varieties of American Dissent, 1880–1900 (also American Studies 324)

Fall. 4 credits. Not offered 1999–2000. N. Salvatore.

The idea of dissent in American society raises a variety of images. Civil rights activists, striking workers, and student radicals of the 1960s are familiar enough symbols of dissent. But might we understand a Pentecostal believer, filled with the spirit of his or her God in critiquing contemporary society, as an example of American dissent? This course will explore the varieties of economic, political, and cultural dissent in America between 1880 and 1990, and will examine how understanding dissent in its specific historical context illuminates major aspects of American life and culture.]

[HIST 325 Age of the American Revolution, 1754–1815 #

Spring. 4 credits. Not offered 1999–2000; next offered 2000–2001. 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 #

Spring. 4 credits. Not offered 1999–2000; next offered 2000–2001. D. Usner.

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 interethnic 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 329 Indians, Settlers, and Slaves in the Early South (also American Indian Studies 329) #

Fall. 4 credits. Not offered 1999–2000; next offered 2000–2001. D. H. Usner.

History of the American South from the sixteenth century to the early nineteenth century with an emphasis on intercultural relations. Topics include colonization of the region by Spain, England, France, and the United States, American Indian adaptation and resistance, the evolution of slavery, African American relations with European and Indians, and the role of racial ideology and ethnic identity in the formation of the South as a distinct section of the United States.]

[HIST 330 The Age of Jackson, 1815–1850 (also American Studies 330) #

4 credits. Not offered 1999–2000. J. Silbey.]

HIST 331 The American Civil War and Reconstruction 1850–1877 (also American Studies 331) #

Spring. 4 credits. J. Silbey.

An analysis of the factors leading up to the breakup of the Union, the impact of the war in North and South, and the problems of restoration and reconstruction of the seceded states.

HIST 332 The Urbanization of American Society: 1600–1860 (also American Studies 332) #

Fall. 4 credits. S. Blumin.

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 American Studies 333)
Spring. 4 credits. 332 is not a prerequisite to 333. S. Blumin.
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 335 African-American History from Slavery to Freedom #
Fall. 4 credits. Letter only. Not offered 1999–2000; next offered 2001–2002. M. Washington.
Introductory course on African-Americans from 1619 to 1865. Emphasis will be on life in bondage, the free black communities, and racism. Other topics include African cultural heritage, the slave trade, religion, the family, and the black freedom struggle.]

[HIST 336 Capitalism and Society in Developing America, 1607–1877 (also American Studies 336) #
Fall. 4 credits. Not offered 1999–2000. S. Blumin.
An examination of American society in the context of capitalist development, and of capitalism as a social phenomenon. The transformation of pre-industrial colonies into an industrializing nation; the development of social classes; the emerging ethos of free enterprise.]

[HIST 337 Entrepreneurialism and Organization in the Age of the Corporation: Capitalism and Society in Modern America, 1840–2000 (also American Studies 337)
Spring. 4 credits. Not offered 1999–2000. 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, 1925–1960
Summer and fall. 4 credits. Not open to freshmen. Not offered 1999–2000; next offered 2000–2001. R. Polenberg.
Topics include the Sacco-Vanzetti case; 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
Summer and fall. 4 credits. Not open to freshmen. R. Polenberg.
Topics include the Supreme Court and civil rights; Kennedy, Johnson, and social reform; the Vietnam War and Watergate; politics and the presidency from Carter to Clinton; and class, race, and ethnicity in modern America.

[HIST 345 The Intellectual and Cultural Life of Nineteenth-Century Americans (also American Studies 345 and Religious Studies 345) #
Fall. 4 credits. Not offered 1999–2000. R. L. Moore.
An 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 American Studies 346)
Fall. 4 credits. R. L. Moore.
American thought and culture from 1890 to the present. Emphasizes the intellectual impact of major political and economic events and the adaptation of social ideas and values to new conditions.

[HIST 359 American Families in Historical Perspective (also American Studies 359, HD 359, and Women's Studies 357)
Spring. 3 credits. Prerequisite: HD 150 or one 200-level social science or history course. S–U grades optional. Human ecology students must register for HD 359. Not offered 1999–2000. J. Brumberg.
For description, see HDFS 359.]

[HIST 375 The African-American Workers, 1865–1910: The Rural and Urban Experience (also ILRCB 385) #
Fall. 3 credits. Prerequisite: juniors and seniors, or permission of instructor. Not offered 1999–2000. N. Salvatore.
For description, see ILRCB 385.]

[HIST 376 The African-American Workers, 1910–the present: Race, Work, and the City
Not offered 1999–2000. N. Salvatore.
For description, see ILRCB 386.]

HIST 378 Topics in U.S. Women's History (also American Studies 378 and Women's Studies 378)
Fall. 4 credits. Preference given to students who have taken Hist/WS 273, Hist/WS 303, or Hist/WS 238. Others: by permission of instructor only. M. B. Norton.
Topic for 1999: Gender and Sexuality in America. A colloquium course, limited to 20 students. Students will read and discuss some of the new scholarly work on gender and sexuality in American history. They will also prepare several written and oral presentations based on their analyses of primary sources in the Cornell Human Sexuality collection and elsewhere.

HIST 411 Undergraduate Seminar in American Political History
Spring. 4 credits. Prerequisite: permission of instructor. J. Silbey.
Topic for spring 2000: Abraham Lincoln.

HIST 414 Motivations of American Foreign Policy
Fall. 4 credits. Prerequisite: permission of instructor. W. LaFeber.
Topic for Fall 1999: technology and its perceived effect on U.S. foreign relations, 1840–1990s.

[HIST 418 Undergraduate Seminar in the History of the American South
4 credits. Not offered 1999–2000; next offered 2000–2001. J. Silbey.]

HIST 419 Seminar in American Social History (also American Studies 419)
Spring. 4 credits. S. Blumin.
Topic for 2000: Race, class and the American city in the nineteenth and twentieth centuries. Offered in Cornell-in-Washington program.

HIST 421 Undergraduate Seminar in Cultural History (also American Studies 421)
Spring. 4 credits. Prerequisite: permission of instructor. M. Kammen.
Topic for Spring 2000: the annual cycle of the seasons in nature and in Western culture, with contextual attention to pagan origins, syncretism in the cycle of the Christian calendar year; psychological connections between the human life cycle and the seasons; and the more recent impact of industrialization as well as urbanization on societal feelings about the seasons. Emphasis upon the United States and seasonal implications for the history of consumerism. Sources will include art, literature, the writings of eminent naturalists, and materials concerning festivals and holidays. A mix of primary and secondary source readings.

HIST 426 Undergraduate Seminar in Early American History
Spring. 4 credits. M. B. Norton.
Topic for Spring 2000: The Early Modern Atlantic World. Recent scholarship has emphasized the links among the French, Spanish, Portuguese, and English colonies and homelands in the period between the late 15th century and the early 19th century. The seminar will look at this Atlantic world from a variety of perspectives. Each student is expected to complete a substantial research paper.

HIST 428 Comparative History of Colonial North America
Fall. 4 credits. D. Usner.
This seminar will consider ways of comparing how different European empires, especially Spain, France, and England, colonized North America from the 16th through the 18th centuries. Settlement patterns, labor systems, trans-Atlantic connections, and Indian relations will be examined for similarities and differences across imperial boundaries. Borders between colonial and frontier regions, where empires came face-to-face, will also be explored. Problems and opportunities for comparative study, found in old and new scholarship on early America, will be critically discussed.

[HIST 429 Undergraduate Seminar in Indians of Eastern North America (also American Indian Studies 429) #
Spring. 4 credits. Not offered 1999–2000; next offered 2000–2001. 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 430 America in the Camera's Eye (also American Studies 430.2)
Fall. 4 credits. R. L. Moore.
Photographs and films have become archives for historical research. From the era of Matthew Brady's Civil War images, the United States has been recorded by documentary

photographers who have called attention to the country's progress and it's poverty. Hollywood filmmakers have also recorded endless images of the American landscape and placed against that landscape fictionalized accounts of the country's history and its social problems. What can we learn from these images? What is their relation to written texts and to other documents that tell us about the past? How truthful is documentary? How misleading is Hollywood? One key text will be James Agee's and Walker Evans' *Let Us Now Praise Famous Men*. The seminar will meet once each week for discussion and periodically during the semester to view films.

[HIST 432 The City in History: Europe and America #
Spring. 4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. 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. Not offered 1999–2000; next offered 2000–2001. R. Polenberg.
Topic: freedom of speech, censorship, and the Supreme Court.]

[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. Prerequisite: permission of instructor. Not offered 1999–2000. R. L. Moore.
A reading and research seminar concerned with popular culture in nineteenth-century America (publications, performances, and audiences).]

HIST 458 Female Adolescence in Historical Perspective (also Women's Studies 438 and Human Development 417) #
Fall. 3 credits. Limited to juniors and seniors. Prerequisite: permission of instructor. J. Brumberg.
For description, see HD 417.

[HIST 484 Seminar in the History of American Labor: Race, Work, and the City (also ILR 304)
Fall. 4 credits. Open to juniors and seniors only with the permission of the instructor. Not offered 1999–2000. N. Salvatore.
For description, see ILRCB 304.]

HIST 486 Seminar on the 1960s
Fall. 4 credits. T. Borstelmann.
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, and the Nixon administration. A substantial research paper will be required.

HIST 487 Spanish Borders and French Frontiers in American History (also S HUM 417)
Spring. 4 credits. Limited to 15 students. Prerequisite: permission of instructor. D. Usner.
For description see S HUM 417.

HIST 500 Undergraduate Research Seminar (also American Studies 500)
Fall and spring. 8 credits each term. S. Blumin 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. Not offered 1999–2000. 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 present. Several comparative sessions will be devoted to government as a patron of culture in other societies. A research paper is required.]

[HIST 607 Writing Seminar on African-American Women
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1999–2000; next offered 2000–2001. M. Washington.
This course is designed for students actively engaged in a writing project on African-American women's history. Students must have already done the research and most of the reading for their papers prior to enrollment. Reading and class discussion will focus on style, methodology, and theory. An extensive research paper is due at the end of the semester.]

HIST 608 African-American Women
Spring. 4 credits. Prerequisite: permission of instructor. Letter only. M. Washington.
A reading and discussion topics seminar focusing on the experiences of African-American women in nineteenth-century America, including the Caribbean. Topics include women and labor, abolitionism, women's rights, sexuality and race relations, education and racial uplift, black women's literature, marriage and family.

[HIST 610 Afro-American Historiography
Fall. 4 credits. Letter only. Not offered 1999–2000; next offered 2000–2001. M. Washington.
Reading and discussion course focusing on the way historians write and interpret the Black experience in America. Students will be concerned with individual historians, various schools of thought, and historical approaches.]

[HIST 613 Seminar on American Diplomatic History
Fall. 4 credits. Not offered 1999–2000; next offered 2000–2001. T. Borstelmann.
A reading and research seminar in twentieth-century American diplomatic history, emphasizing the Cold War period and interpretive approaches to U.S. foreign policy. A research paper is required.]

[HIST 617 Seminar in American Cultural History
4 credits. Not offered 1999–2000. Semester/TBA. R. L. Moore.]

HIST 618 Seminar in American Cultural History
Spring. 4 credits. R. L. Moore.
A reading and research seminar concerning selected topics in nineteenth century America.

HIST 621 Graduate Seminar in American Cultural History
Fall. 4 credits. M. Kammen.
The history of cultural criticism in the U.S. during the 20th century. Emphasis on the problem of cultural stratification and on the shifts from genteel to popular mass culture. A research paper will be required.

[HIST 624 Graduate Seminar in American Indian History (also American Indian Studies 624)
Spring. 4 credits. Not offered 1999–2000. D. Usner.
This seminar examines, through a selected series of major topics and problems, the historical study of North American Indians. Various approaches in history—together with anthropology, political science, folklore, and other disciplines—are explored. Emphasis is placed on current interpretations and directions.]

[HIST 626 Graduate Seminar in the History of American Women (also Women's Studies 626)
Spring. 4 credits. Not offered 1999–2000; next offered 2000–2001. M. B. Norton.
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
Fall. 4 credits. Prerequisite: permission of instructor. M. B. Norton.

[HIST 633 Seminar in Nineteenth-Century American History
4 credits. Prerequisite: permission of instructor. Not offered 1999–2000; next offered 2000–2001. J. Silbey.]

[HIST 634 Seminar in Nineteenth-Century American History
Spring. 4 credits. Not offered 1999–2000; next offered 2000–2001. J. Silbey.
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
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1999–2000; next offered 2000–2001. R. Polenberg.
A graduate research seminar that will examine American legal and constitutional history.]

[HIST 683 Seminar in American Labor History (also ILRCB 783)
Fall. 3 credits. Prerequisites: graduate students only. Not offered 1999–2000. N. Salvatore.
For description, see ILRCB 783.]

[HIST 710 Colloquium in American History
Spring. 4 credits. Required of all first-year graduate students in United States history. Not offered 1999–2000. M. Kammen.
Examination of 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 249 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 considering 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 295 Colonial Latin America @ #
Fall. 4 credits. M. Roldan.
Survey of Spanish America from the rise of pre-Columbian civilizations through the European conquest, the establishment and development of colonial societies, imperial rivalries in the New World, the background of the independence movements, and the achievement of political independence.

HIST 296 Modern Spanish America @
Spring. 4 credits. T. Holloway.
Survey of the Latin American nations from independence to the present. Major themes include the persistence of neocolonial economic and social institutions, the development of nationalist and populist politics, revolutionary movements of the twentieth century, and United States–Latin American relations.

HIST 347 Agrarian Societies in Latin American History @ #
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 History of Brazil @
Fall. 4 credits. T. Holloway.
A survey of Brazilian history from colonial times to the present. Recent 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 424 Art and Politics in Twentieth-Century Latin America
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1999–2000; next offered 2000–2001. M. Roldan.
This seminar will examine how the intersection of art and politics shaped culture, ideology, and identity in Latin America from the Mexican Revolution to the dictatorships of the late twentieth century. Topics may include muralism and the Mexican Revolution; the artist as muse and activist (Frida Kahlo); working class and immigrant culture in Argentina and the tango; samba as social and political protest in Brazil; gender and politics in exiled women's literature; the appropriation of public spaces as artistic forum and means of communication under authoritarian regimes.]

HIST 445 Prostitutes and Patriots: Urban Culture and the Construction of Citizenship in Latin America, 1880–1950 (also History 645)
Fall. 4 credits. Prerequisites: History 295 and/or 296 suggested. Permission of instructor required. Enrollment limited to 15. M. Roldan.
Unprecedented demographic and economic changes gave rise to debates by the late nineteenth century regarding the definition of citizenship and the limits of individual participation in Latin American societies. These debates centered on the city—the symbol of both "progress" and "disorder". Rising tensions were expressed through the trope of the "prostitute" (disease and loss of control) and the "patriot" (science, statesmanship and order). The course examines changing notions of the private/public; the regulation of sexuality and gender; popular mobilization; and the construction of the nation.

HIST 470 Violence, Nation, Myth: The Americas (1770–1940).
Spring. 4 credits. M. Roldan and S. Samuels.
Marchum 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. We will examine the intersection of domestic and national violence and myth, and the significance of frontiers, borders, and marginality as these are contested in struggles over slavery, family violence, transnational migration, and sexual, racial or ethnic identity.

[HIST 649 Seminar in Latin American History
Spring. 4 credits. Not offered 1999–2000. Staff.]

African History

[HIST 255 Cultures and Ecology in Precolonial Africa @ #
Fall. 4 credits. Not offered 1999–2000; next offered 2001–2002. S. E. Greene.
This course will examine the history of Africa, from the origins of humankind up to 1800 by focusing on a number of controversial issues about the African past. Why did humankind emerge in Africa? Who were the ancient Egyptians? What "race" were they and is this important anyway? If so, why? How did the ecological environments of the past shape African cultures and their histories? What role did women play in early African societies and what can this information tell us about how human societies have operated from time immemorial? What role did the slave trade play in influencing the current economic position of Africa and race relations in the U.S. today?]

[HIST 391 Riot and Revolution in Nineteenth Century Africa: The Birth of the Modern
Spring. 4 credits. Not offered 1999–2000; next offered 2000–2001. S. E. Greene.
The beginning of the nineteenth century witnessed the rapid and often times forceful expansion of Islam in West Africa, the end of the Atlantic slave trade, the transformation of the Zulu from a small, inconsequential people to the largest and most powerful ethnic group in South Africa, and the wild fire spread of Swahili as a lingua franca in east and central Africa. This course explores these revolutionary changes and the upheavals that accompanied them as Africa remade itself to face the modern era. Lectures, readings and discussions will focus on the causes and consequences of these events and their significance for understanding contemporary Africa.]

[HIST 407 The Colonial Encounter
Spring. 4 credits. Prerequisite: permission of instructor. Not offered 1999–2000; next offered 2000–2001. S. Greene.
The course examines the way colonizer and colonized influenced the culture, history and identity of the other. Emphasis is on exploring the colonial encounter as a phenomenon in itself as well as both sides of the unequal equation that linked specific European countries (for example, France, England, Germany, Netherlands) with the states they colonized in Africa and Asia. This linkage challenged, at different times in different places, pre-existing understandings of self, country, and culture, as well as notions about the other.]

[HIST 434 Gender and Sexuality in the Social History of Africa (also Women's Studies 477) @ #
Spring. 4 credits. Not offered 1999–2000. S. Greene.
This course will examine the history of gender relations in Africa during the precolonial and colonial periods. Among the questions to be explored: what was the nature of gender relations in precolonial Africa; how were these relations affected by the entrance of Islam, the Atlantic slave trade, and other changes that affected particular African societies; what factors influenced the nature and extent of that impact; how did African men and women define gender and sexual identities and how did particular historical forces such as colonialism and the entrance of Christianity and Islam affect these identities.]

HIST 443 The European as Other (also S HUM 404)
Fall. 4 credits. Prerequisite: permission of instructor. Limit 15. S. Greene.
For description see S HUM 404.

Asian History

[HIST 190 Introduction to Asian Civilizations @ #
Spring. 4 credits. Not offered 1999–2000. C. Peterson, D. Wyatt.
An introduction to the distinctive cultures of China, India, Japan, and Southeast Asia that features an intensive examination of selected topics and periods of particular significance in the history of each.]

HIST 191 Introduction to Modern Asian History @
Fall. 4 credits. S. Cochran, T. Loos.
The history of Asia-Pacific from the nineteenth century to the present, focusing on relations of China, Japan, and Southeast Asia with each other and with the West.

HIST 207 The Occidental Tourist: Travel Writing and Orientalism in Southeast Asia (also Asian Studies 207)
Spring. 4 credits. Letter grade only. T. Loos.

Students read travel literature written by white westerners about Southeast Asia in the 19th and early 20th centuries. The course also assigns primary texts (in translation) by Southeast Asians about their travels abroad and about white westerners in their home countries. Introduces the concept of Orientalism and explores cultural transformation in the 'contact zone.'

HIST 218 Introduction to Korea (also Asian Studies 218)
Fall. 3 credits. Y. J. Park.
For description see Asian Studies 218.

HIST 230 Seminar in History and Memory: The Asia-Pacific War
Fall. 4 credits. Seminar designed for underclassmen but open to all students. Enrollment limited to 15 students. Prerequisite: permission of instructor. J. V. Koschmann.
This seminar will examine what is at stake when the fighting between Japan and its former enemies in the Pacific during World War II is remembered, memorialized, and (re)constructed as historical narrative by Japanese, Americans and others. By exploring the legacies of such events and processes as the Rape of Nanking, live testing of biological and chemical warfare agents, sexual slavery, and incendiary bombings of Hiroshima and Nagasaki, the seminar will offer an opportunity to reflect in a more general way on the politics of historical representation and memory.

[HIST 243 Seminar: China and the West before Imperialism @ #
Spring. 3 credits. Seminar designed for underclassmen but open to all students. Enrollment limited to 15 students. Prerequisite: permission of instructor. Not offered 1999–2000; next offered 2000–2001. C. Peterson.
What accounts for the first great passion for things Chinese in the West (from the sixteenth to the nineteenth centuries) followed by the hostility characteristic of imperialism? This seminar explores this question relying heavily on original sources to trace the China vogue in thought, literature and art and comparing the Western image with the realities of China of that day.]

[HIST 244 Seminar: History of Siam and Thailand
Fall. 4 credits. Seminar designed for underclassmen but open to all students. Enrollment limited to 15 students. Prerequisite: permission of instructor. Not offered 1999–2000. D. Wyatt.
An examination of the long history of the central position of the Indochina Peninsula, based on close reading of the primary sources (in translation).]

HIST 289 The U.S. Vietnam War (also Asian Studies 298)
Spring. 3 credits. K. W. Taylor.
This course will survey events in Vietnam, the U.S., and elsewhere related to the U.S. policy of intervention in Vietnam between 1954 and 1975. Readings will include historical narratives, memoirs, and literature. The course will evaluate the standard winner (Hanoi) and loser (U.S.) narratives and how they have silenced southern Vietnamese voices.

HIST 293 History of China up to Modern Times @ #
Fall. 4 credits. C. A. Peterson.
A survey of the principal developments in the history of China from the earliest times to the eighteenth century that also undertakes a topical introduction to Chinese culture and civilization, in part by the use of visual materials.

HIST 294 History of China in Modern Times @
Spring. 4 credits. S. Cochran.
A survey that concentrates on the rise of the last imperial dynasty in the seventeenth and eighteenth centuries, the upheavals resulting from domestic rebellions and foreign imperialism in the nineteenth century, and the twentieth-century efforts to achieve social mobilization, political unity, and commercial expansion.

[HIST 297 Japan Before 1600 @ #
Fall. 4 credits. Not offered 1999–2000. J. Piggott.
This course explores Japan before 1600 from a variety of perspectives. Analysis of primary sources, including literary and archaeological artifacts, is emphasized. History 297 is a good introduction to issues of premodern historical study and to the general study of East Asia. (Graduate students or more advanced undergraduates who would like to do a research project should register for History 497).]

HIST 298 State, Society, and Culture in Modern Japan @
Spring. 4 credits. J. V. Koschmann.
A survey of Japan from early-nineteenth century to the present, which attempts to connect the political, socio-economic, and imaginative realms of modern Japanese life so as to achieve a complex view of modern Japanese society. Pays particular attention to the changing situation of women and women's movements, Japan's relations with Asia and the U.S., and problems of historical representation and consciousness. Readings will include Japanese works in translation as well as secondary sources.

[HIST 322 History of *Samurai* # @
Spring. 4 credits. Not offered 1999–2000. J. Piggott.
This course explores the role of the *samurai* at various epochal moments, and the effects *samurai*-centered governance has had on society and culture writ broadly up to the early modern era. This is very much a hands-on course in which analysis and writing are emphasized. Graduate students are welcome but they should register for History 522 after consultation with the instructor.]

HIST 326 History of the Samurai II
Fall. 4 credits. J. Piggott.
We will continue study of themes and issues introduced in History 322, wherein we traced the origins of the *samurai* from eighth-century roots through the era of the first *bakufu*, or warrior government, during early medieval times. This course will cover the *samurai* during the remaining centuries of the medieval age, through 1600.

[HIST 360 Early Warfare, East and West #
Spring. 4 credits. Not offered 1999–2000. C. A. Peterson.
For description see Comparative History.]

[HIST 388 Vietnamese Histories (also History 688 and Asian Studies 385/685)
Fall. 3 credits. Not offered 1999–2000. K. Taylor.
For description see Asian Studies 385.]

[HIST 393 Images of Humanity in Medieval China (also Asian Studies 393) @ #
Fall. 4 credits. Permission required. Not offered 1999–2000. C. A. Peterson.]

HIST 395 Southeast Asia to the Eighteenth Century @ #
Fall. 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 translated primary sources.

HIST 396 Southeast Asian History from the Eighteenth Century (also Asian Studies 396)
Spring. 4 credits. S-U option. T. Loos.
Surveys the modern history of Southeast Asia with special attention to colonialism, the Chinese diaspora, and socio-cultural institutions. Considers global transformations that brought "the West" into people's lives in Southeast Asia. Focuses on the development of the modern nation-state, but also questions the narrative by incorporating groups that are typically excluded. Assigns primary texts in translation.

HIST 416 Undergraduate Seminar on Gender and Sexuality in Southeast Asia (also Asian Studies 416 and Woman's Studies 416)
Fall. 4 credits. Letter grade only. T. Loos.
Students consider the relationships among colonialism and gender and sexual identity formation in Southeast Asia. Using material from a wide range of fields including anthropology and literature, the course complicates a simplistic East/West and male/female binary.

[HIST 420 Japan in the Year 1000: *The Tale of Genji* in Historical Perspective @ #
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. J. Piggott.
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 422 China Goes Global (also S HUM 422, ASIAN 420, COM L 444)
Spring. 4 credits. Prerequisite: permission of instructor. Limited to 15 students.
For description see S HUM 422.

[HIST 448 Family and Gender Relations in Premodern Japan # @
Spring. 4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. J. Piggott.
An inquiry into structures of family and gender relations in the classical and medieval periods. Themes will include kinship and family organization, state formation, and gender construction. Those interested in comparative perspectives are encouraged to enroll. "Breadth" reading, primary source materials, and comparative reading placing Japan in an East Asian context will be emphasized. Previous study of premodern Japan and East Asia is recommended.]

[HIST 466 Kings and Shoguns: the *Taiheiki* Age @ #
Spring. 4 credits. Not offered 1999–2000. J. Piggott.
The turn of the fourteenth century witnessed epochal changes in Japan as structures of monarchy, court-*Bakufu* relations, land-holding, judiciary, international relations, and popular culture were deeply affected by the failure of Go-Daigo Tenno's royal restoration. Core readings of the seminar will include portions of the martial epic, the *Taiheiki*, and other materials from which insights into these transformations can be drawn. Previous study of Japanese history, especially History 322, is highly recommended.]

[HIST 489 Seminar in Modern Japanese History @
Fall. 4 credits. Prerequisites: History 298 or equivalent. Not offered 1999–2000. J. V. Koschmann.]

HIST 490 Tales of the Heike—A Marcham Seminar (also Asian Studies 490 and Soc Hum 489)
Fall. 4 credits. Prerequisite: previous study of pre-1600 Japan or permission of an instructor. Limited to 12 students. K. Brazell and J. Piggott.
Medieval Japan was crisscrossed by a growing assortment of itinerant, traditionally blind, minstrel monks who sang the heroic exploits of fighting men of the late twelfth century. The cantos of the *Tales of the Heike* (*Heike Monogatari*) were reportedly woven together by a master chanter named Kakuichi in the 14th century. The cultural historian, Barbara Ruch, has called the *Heike* "Japan's first national epic," because listening to it, enjoying it, identifying with it brought strata and regions together like nothing had ever done before. This seminar will bring a literary specialist and a historian together to lead a group of students in investigating the *Heike* from both literary and historical perspectives.

HIST 492 Undergraduate Seminar in Medieval Chinese History @ #
Fall. 4 credits. Prerequisite: History 190, 293, 360, or permission of instructor. C. A. Peterson.
Topic for fall 1999: China and the nomads, an in-depth examination of their often hostile relations with a comparative unit devoted to Byzantium and its nomadic neighbors.

HIST 493 Problems in Modern Chinese History (also History 693) @
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 495 Asian Kingship and State Formation @ #
Fall. 4 credits. Prerequisite: previous coursework in premodern East Asian history and consultation with the instructor. Not offered 1999–2000. J. Piggott.
The seminar will explore kingship and state formation in comparative perspective. Readings will include theoretical and ethnohistorical work on societies across the globe, East and West. In addition to participating in discussions focused on core readings, seminar members will undertake research projects targeting societies of their choice. Students with an interest in the history of preindustrial societies, political and cultural anthropology, and religion will find the seminar stimulating.]

[HIST 497 Colloquium in Premodern Japanese History @ #
Fall. 4 credits. Not offered 1999–2000. J. Piggott.
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 694) @
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 588 Proseminar in Modern Korean History
Spring. 4 credits. Prerequisite: a course on East Asian history or equivalent. Not offered 1999–2000. J. V. Koschmann.
Designed primarily for graduate students in East Asian Studies who specialize in Chinese and/or Japanese history but need for comparative or other purposes to develop a familiarity with the main problems and contours of modern Korean history. Readings will be selected primarily from English-language works on Korea from the 1870s through the post-World War II era, including Japanese colonial policy and practice in Korea, the Korean War, and the postwar history of the Republic of Korea.]

HIST 598 Colloquium in Modern Japanese History
Spring. 4 credits. J. V. Koschmann.
For graduate students only. Students will attend lectures and do the reading for History 298, participate in a special weekly colloquium, and write a seminar paper.

HIST 609 Modern Japan Studies: The Formation of the Field in History and Literature (also Asian Studies 609)
Fall. 4 credits. J. V. Koschmann and N. Sakai.
The course will provide both a historical introduction to and critical analysis of the constitution of modern Japan studies as a "field" of postwar academic inquiry. While reading texts particularly influential in the early and contemporary formation of the field, we will consider such questions as the domestic and international contexts in which Japanese studies has been institutionalized and maintained, and the relationship between "Japan" as object of area studies discourse and "Japan" as represented in American journalism, popular culture, and politics. Interdisciplinary and team-taught, the course will aim to introduce students to a range of methodologies and approaches developed in historical and critical works, problematizing assumptions in each case. Possibilities for cross-disciplinary research (along lines recently undertaken in areas such as feminist criticism and cultural studies, for example), will also be explored.

[HIST 688 Vietnamese Histories (also History 388 and Asian Studies 385/685
Fall. 3 credits. Not offered 1999–2000. K. Taylor
For description see Asian Studies 385.]

[HIST 691 Chinese Historiography and Source Materials
Spring. 4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. 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.
For description, see HIST 499.

HIST 695 Early Southeast Asia: Graduate Proseminar
Fall. 4 credits. D. Wyatt.
Introduction to the history of Southeast Asia for graduate students.

[HIST 696 Modern Southeast Asia: Graduate Proseminar
Spring. 4 credits. Not offered 1999–2000.
Introduction to the modern history of Southeast Asia for graduate students. Students will be expected to attend the lectures and complete the readings for History 396, and they will meet separately as a group to further explore selected topics.]

[HIST 791 Seminar in Medieval Chinese History
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. C. A. Peterson.]

[HIST 792 Seminar in Medieval Chinese History
Spring. 4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. C. A. Peterson.]

[HIST 795 Seminar in Modern Southeast Asian History
Fall. 4 credits. Permission of the instructor. Not offered 1999–2000.]

HIST 796 Seminar in Southeast Asian History
Spring. 4 credits. Prerequisite: reading knowledge of relevant languages. D. Wyatt.

HIST 797 Seminar in Japanese Thought
Spring. 4 credits. Prerequisite: reading knowedge of Japanese and permission of instructor. J. V. Koschmann.

[HIST 798 Seminar in Japanese Thought
4 credits. Prerequisite: reading knowedge of Japanese and permission of instructor. Not offered 1999–2000. J. V. Koschmann.]

Near Eastern History

HIST 206 From Empire to Empire: Palestine under late Ottoman and British Rule, 1799–1948 (also Near Eastern Studies 265)
Fall. 4 credits. M. LeVine.
This course examines the social history of Palestine during the late Ottoman and Mandate periods from a variety of disciplinary perspectives with the goal of helping students better understand the continuities of changes that occurred in the transition from Ottoman to British rule.

HIST 253 Introduction to Islamic Civilization I (also Near Eastern Studies 255, Religious Studies 255)
Spring. 3 credits. D. Powers.
For description see NES 255.

[HIST 254 Islamic History: 600–1258 (also Near Eastern Studies 257 and Religious Studies 257) @ #
Fall. 3 credits. Not offered 1999–2000. D. Powers.
For description, see NES 257.]

[HIST 317 Islamic History: The Age of Ibn Khaldun (also Near Eastern Studies 356)
Spring. 4 credits. Prerequisite: NES 257 or equivalent. Not offered 1999–2000. D. Powers.
For description, see NES 356.]

[HIST 372 Introduction to Islamic Law (also History 652, Near Eastern Studies 351/651, Religious Studies 350) @ #
Fall. 4 credits. Enrollment is limited to 25 students. Not offered 1999–2000. D. Powers.
For description, see NES 351.]

[HIST 461 Seminar in Islamic History 600–750 (also History 671, Near Eastern Studies 451 and 650, and Religious Studies 451) @ #
Spring. 4 credits. Enrollment is limited to 25 students. Not offered 1999–2000. D. Powers.
For description, see NES 451.]

[HIST 652 Introduction to Islamic Law (also History 372, Near Eastern Studies 351/651, Religious Studies 350)
Fall. 4 credits. Enrollment is limited to 25 students. Not offered 1999–2000. D. Powers.
For description, see NES 351.]

[HIST 671 Seminar in Islamic History (also History 461, Near Eastern Studies 451, and 650, and Religious Studies)
Spring. 4 credits. Not offered 1999–2000. D. Powers.
For description, see NES 451.]

Ancient European History

HIST 151 Introduction to Western Civilization #
Summer and fall. 4 credits. S. Pohl.
A survey of European history from Antiquity to the Renaissance and Reformation. Important themes will include the influence of ancient culture on medieval society, the development of and conflict between secular and ecclesiastical governments, European encounters with the non-Europeans, the culture and role of minority groups within European society, and the roles of women.

HIST 203 War and Diplomacy in Korea
Spring. 4 credits. B. Strauss.
Korea's challenging location between great powers, its long struggle between independence and outside control, and its tragic division, all make for a singular case study in the history of war and diplomacy. This course will examine that history with particular focus on the Imjin War (1592–1598) and the Korean War (1950–1953). Topics include geopolitics, military tactics and strategy on the Korean peninsula, Admiral Yi Sun-Shin as strategist and tactician, the effect of war on Korean society; and the pattern of Korean relations with China, Japan, Russia (and other northern Asian powers), and the United States.

[HIST 228 Seminar: War and Peace in Greece and Rome
Fall. 3 credits. Not offered 1999–2000. B. Strauss.
A study of war and peace in the ancient Mediterranean world in light of modern theories of international relations. The course will test the validity of modern theories against ancient models and will ask what the ancient experience can contribute to modern theory and practice. Case studies include the Peloponnesian War, the Second Punic War, Alexander's conquests, and the defense of the Roman Empire.]

[HIST 232 Seminar: Eyewitness to War in the Ancient World
Fall. 3 credits. Not offered 1999–2000; next offered 2000–2001. B. Strauss.
A study of ancient soldier-historians who participated in the campaigns about which they later wrote. Topics include historicity, autobiography, propaganda, prose style. Readings include selections from Thucydides, Xenophon, Julius Caesar, Josephus, Ammianus Marcellinus as well as, for comparative purposes, modern soldier-historians.]

HIST 265 Ancient Greece from Homer to Alexander the Great #
Spring. 4 credits. Open to freshmen. B. Strauss.
A survey of Greece from the earliest times to the end of the Classical period in the late fourth century B.C. The course focuses on the Greek genius: its causes, its greatness, its defects, and its legacy. The Heroic Age, the city-state, ancient democracy, and the intellectual ferment of the Greek Enlightenment are the main topics of study. Readings in translation from Homer, Aristophanes, Sophocles, Herodotus, Thucydides, Plato, Aristotle, and from the evidence of ancient inscriptions, coins, art, and architecture.

[HIST 268 A History of Rome from Republic to Holy City #
Summer and spring. 4 credits. Open to freshmen. Not offered 1999–2000; next offered 2000–2001. J. Ginsburg.
A survey of Rome and its empire from the beginning to late antiquity. This course will explore the formation of Rome's Mediterranean empire and its political, social and economic consequences; the constitutional and social struggles of the late Republic; the transition from Republic to Principate; society and state under the Caesars; the nature and limits of governing a world empire; the interaction of pagans, Christians and Jews in the Roman world.]

[HIST 367 Representations of Women in Ancient Greece and Rome (also Classics 363 and Women's Studies 363)
Spring. 4 credits. Not offered 1999–2000. L. Abel and J. Ginsburg.
For description, see Class 363.]

[HIST 452 The Tragedy of Classical Athens, 462–404 B.C. #
Spring. 4 credits. Prerequisite: permission of instructor. Not offered 1999–2000; next offered 2000–2001. B. Strauss.
The nature of Athenian democracy, society, and culture in the "golden age" of Athens. The course will examine the influence of Athenian political life on the great tragedians of the age and the influence of tragedy on the Athenians' conception of their character and history. Readings from Herodotus, Thucydides, Aeschylus, Sophocles, Euripides, Aristophanes, Plato, Aristotle, and Plutarch.]

[HIST 453 Crisis of the Greek City-State, 415–336 B.C. #
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1999–2000; next offered 2000–2001. B. Strauss.
The fortunes of the city-state and citizen in an age of uncertainty. The focus is on Athens with some attention paid to the wider Greek world. Topics include the nature of Athenian politics, Athenian society, cultural change, and war between the city-states, crisis as a historical concept, and anthropology and ancient Greece. Readings in translation include Thucydides, Sophocles, Euripides, Aristophanes, Plato, Aristotle, Demosthenes, and Xenophon.]

[HIST 463 Gender and Politics in the Roman World (also Classics 463 and Women's Studies 464) #
Not offered 1999–2000. J. Ginsburg.
For description, see CLASS 463.]

HIST 464 Murder, Warfare and the State: Violence in Europe, 1300–1800
Fall. 4 credits. Permission of instructor. S. Pohl.
An inquiry into forms of and attitudes toward violence in late medieval and early modern Europe. Questions to be explored include: How violent was premodern Europe compared to modern Europe? How did the various cultural legitimations of violence change over time? We will examine these questions by analyzing forms of interpersonal violence as well as violence orchestrated by the state, such as warfare and capital punishment.

HIST 469 Equality and Inequality in Ancient Greece (also Classics 469)
Fall. 4 credits. Prerequisite: History 265, Classics 211 or 217, or written permission of the instructor. B. Strauss.
We will examine equality and inequality in Archaic and Classical Greek city-states ca. 650–400 B.C., with an eye toward politics, society and economics, culture, and gender relations. The course will focus on concepts and institutions such as ancient democracy, tyranny, and oligarchy, "middling" ideology, and slavery, as well as theories of equality. All readings in English.

[HIST 473 Roman Society and Politics under the Julio-Claudians (also Classics 480) #
Spring. 4 credits. Prerequisite: Classics 212, History 268, or permission of instructor. Not offered 1999–2000. Next offered 2000–01. J. Ginsburg.
For description, see Classics 480.]

HIST 630 Topics in Ancient History (also Classics 632)
Fall. 4 credits. B. Strauss.

Medieval, Renaissance, and Early Modern European History

HIST 151 Introduction to Western Civilization #
Fall. 4 credits. S. Pohl.
For description see Ancient European History.

HIST 152 Introduction to Western Civilization #
Summer and spring. 4 credits.
R. L. Moore and M. Steinberg.
For description see Modern European History.

[HIST 204 Seminar: Age of Atlantic Revolution
Fall. 4 credits. Seminar designed for underclassmen but open to all students. Enrollment limited to 15 students. Prerequisite: permission of instructor. Not offered 1999–2000. R. Weil.
"All the Atlantic Mountains shook," wrote the poet William Blake of the revolutions which toppled regimes across Europe and the Americas at the end of the 18th century. This course will explore the ideas, outcomes and connections among events in America, France, Haiti, and Britain, through literary and philosophical texts: Wordsworth, Rousseau, Jefferson, Paine, Burke, Godwin, Tocqueville, and even Jane Austen.]

HIST 211 Specters, Demons and the Dead in European Society, 1200–1800
Spring. 4 credits. S. Pohl.
Premodern Europeans believed that they could interact with supernatural apparitions in a variety of ways. The dead could return to admonish the living, demons might possess men and women, houses could be haunted by specters and poltergeists. What can we learn from a study of these beliefs about the ways in which Europeans regarded sin, punishment, the afterlife, and the role of the devil in their lives? What was the impact of the Reformation or the scientific revolution on these beliefs?

[HIST 231 Seminar: Witchcraft, Magic, and the Occult in Europe, 1400–1700 #
Fall. 4 credits. Seminar designed for underclassmen but open to all students. Enrollment limited to 15 students. Prerequisite: permission of instructor. Not offered 1999–2000. S. Pohl.
A study of attitudes toward magic, witchcraft, astrology, specters and demons in late medieval and early modern Europe and what they reveal to us about religious beliefs, concepts of community, and gender relations. Special attention will be given to the role the Christian Church claimed in defining the occult: which aspects it legitimated and which it condemned. Other topics include the influence of humanism, the Reformation, and the Scientific Revolution on attitudes toward the occult. We shall also undertake an analysis of the historiographical model which opposes "elite" to "popular" ideas. The course emphasizes close analyses of primary works, including literary and visual sources.]

[HIST 233 Seminar: The Politics of Religion in Early Modern Europe
Spring. 4 credits. Not offered 1999–2000. R. Weil.
We will look at the impact of the reformation, counter-reformation and wars of religion on aspects of political, social and cultural life in 16th-and 17th-century Europe, exploring shifts in gender relations, the problem of social control, the effect of religious conflict on the power of the state and its contested boundaries with the church, the relationship of elite and popular religion, and the encounter of European missionaries with other cultures. Students will engage with major historiographical interpretations of the period, as well as with the close reading of primary sources.]

[HIST 234 Seminar: Gender in Early Modern Europe (also WOMNS 234)
Spring. 4 credits. Seminar designed for underclassmen but open to all students. Enrollment limited to 15 students. Prerequisite: permission of instructor. Not offered 1999–2000. 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 257 English History from Anglo-Saxon Times to 1485 #
Fall. 4 credits. Not offered 1999–2000; next offered 2001-2002. P. Hyams.
A survey of the government, social organization, and cultural and religious experience of the English people. Particular stress is laid on land settlement, the unification of the realm, the emergence of state institutions such as Parliament, and changes in economic organization (manors, towns and commerce). The approach will be comparative within a context of contemporary European developments. The course offers students who wish to work on their writing skills an opportunity to do so, especially in the second paper.]

[HIST 259 The Crusades # @
Fall. 4 credits. Not offered 1999–2000; next offered 2000–2001. P. Hyams.
A lecture course examining the Crusading Movement and the States it produced from the eleventh century to the fall of the mainland Kingdom of Jerusalem in 1292. The historical themes this generates are almost unlimited. The course treats the Christianity and Chivalry of the Medieval West, the confrontation of this culture with those of the Mediterranean and Islam, and what is perhaps the cradle of Western Colonialism. The very concept of "Crusade" itself is problematic today and will continue to cast its shadow on U.S. dealings with the Middle East. The sometimes spectacular readings allow students to choose from a very wide range of paper topics, and enjoy an excellent introduction to every aspect of the long-gone world of the Middle Ages.]

[HIST 262 The Middle Ages: Introduction and Sampler (also Religious Studies 265) #
Fall. 4 credits. Not offered 1999–2000. P. Hyams.
As a single-semester introduction to the period, this survey aims to convey what was significant in that area of the "West" that was to become Europe, between the end of the Roman Empire in the West and the Renaissance, from 395 to 1400. It thus takes a critical look at a formative period of Western Civilization. The course is organized into modules. The first of which surveys in five weeks the main public developments in Political and Church History over the period. Other modules focus in some depth on select aspects, such as technology, music, material resources and religions, to other choice samples from the best of medieval culture. . The emphasis is on students finding their own ways to win credit.]

HIST 263 The Earlier Middle Ages (also Religious Studies 263) #
Fall. 4 credits. J. J. John.
A survey of medieval civilization from ca. 300 to ca. 1100 dealing with religious, intellectual, political, and economic developments in Western Europe.

[HIST 264 The High Middle Ages #
Fall. 4 credits. Not offered 1999–2000. P. Hyams.
A survey of medieval civilization 1100–1400, dealing with political, economic, religious, and intellectual developments in Western Europe. Special attention will be paid to the interaction of different kinds of history and to the historian's understanding of literature and its use as a primary source. Lectures and class discussions.]

HIST 275 Authority and Resistance in Europe, 1400–1600 #
Spring. 4 credits. S. Pohl.
A lecture course examining the political, cultural and social transformations during the Reformation era through an exploration of aspects of state formation and ecclesiastical order, social and religious protest and deviant behavior. Specific topics to be covered include the Protestant Reformations and the emergence of confessional churches, law and crime, the peasant rebellions and the early modern witch hunts.

HIST 349 Early Modern England #
Spring. 4 credits. R. Weil.
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 on close reading of contemporary sources, from autobiography and drama to political theory.

HIST 350 The Italian Renaissance (also Romance Studies 221) #
Fall. 4 credits. J. Najemy.
An exploration of intellectual, cultural, religious, and political developments in Italy from the political thought of Dante and Marsilius in the age of the communes, through the several stages of Humanism from Petrarch

to Alberti to Pico, down to the crisis of Italian liberity in the generation of Machiavelli, Guicciardini and Castiglione. The course will seek to problematize the notion of a "Renaissance" in the period's ambivalent attitudes toward history, politics, learning, culture, gender, language, and the role of intellectuals in politics and society. Emphasis will be placed on the close reading of primary sources and on issues of interpretation.

HIST 351 Machiavelli (also Romance Studies 351) #

Spring. 4 credits. J. Najemy.
This course will present Machiavelli in a variety of historical and interpretive contexts: European and Italian politics in the early sixteenth century; the decline of the Florentine republic and the rise of the Medicean principate; Machiavelli's own career in government and his, and the republic's, crisis in 1512–13; the intellectual traditions of Renaissance humanism, political thought, and the revival of antiquity; vernacular literary currents and popular culture; and the remarkable generation of political figures, writers, and theorists with whom Machiavelli associated and corresponded. Emphasis will be placed on a close reading of the major works (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.

HIST 361 The Culture of the Renaissance I (also History of Art 350 and Comparative Literature 361) #

Spring. 4 credits. J. Najemy, C. Lazzaro.
An interdisciplinary exploration of some major themes of Renaissance society and culture from the fourteenth to the sixteenth centuries. Through texts and works of art we investigate Renaissance discourses of antiquity and authority, education and learning, religion and lay culture, politics, gender and family, love and eros, and cross-cultural encounters.

HIST 364 The Culture of the Renaissance II (also Comparative Literature 362, English 325, Religious Studies 362, Music 390)

Spring. 4 credits. Open to freshman with permission. C. Kaske, W. Kennedy.
For description, see COM L 362.

[HIST 365 Medieval Culture, 400–1150 (also Religious Studies 365) #

Fall. 4 credits. Prerequisite: History 263 or permission of instructor. Not offered 1999–2000. J. J. John.
Intellectual and cultural developments in the age of monasticism, from St. Augustine and St. Benedict to St. Anselm and St. Bernard of Clairvaux.]

HIST 366 Medieval Culture, 1100–1300 (also Religious Studies 366) #

Fall. 4 credits. Prerequisite: History 264 or permission of instructor. J. J. John.
The origin and development of the universities will be studied as background for a consideration of the scholastic mentality and its influence on the art, literature, philosophy, science, script, and theology of the period. Readings from Abelard, Hugh of St. Victor, Bonaventure, Thomas Aquinas, Dante, and others.

HIST 368 Marriage and Sexuality in Medieval Europe (also Religious Studies 368, Women's Studies 368) #

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 firmed 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 literature. The goal 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.

[HIST 369 The History of Florence in the Time of the Republic, 1250–1530 #

Spring. 4 credits. Not offered 1999–2000; next offered 2000–2001. 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 crisis of the republic in the time of Machiavelli. Social conflicts, economic structures, guilds, family history, and political and historical ideas are considered in the context of the emergence and transformation of republican government.]

[HIST 377 Gender in Early Modern Europe (also Women's Studies) #

Spring. 4 credits. Enrollment limited to 30. Not offered 1999–2000. 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

Not offered 1999–2000. S. Kaplan.
For description, see Comparative History.]

[HIST 408 Feudalism and Chivalry: Secular Culture in Medieval France, 1000–1300 #

Fall. 4 credits. No prerequisites; History 263 or 264 would help. Not offered 1999–2000. 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. Not offered 1999–2000. S. Kaplan.
For description see Comparative History.]

[HIST 427 Power and Society in Early Medieval Europe and Japan

Spring. 4 credits. Prerequisite: a course in medieval European or Japanese historical studies, or permission of instructor. Not offered 1999–2000. 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 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 446 Law, Crime and Society in Europe, 1400–1700

Spring. 4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. S. Pohl.
This comparative study focuses on Germany, England, France, and Italy and concentrates mainly on the social and legal treatment of crimes of violence. Throughout the course, we shall consider the differences and similarities between English common law and continental legal systems. Major issues to be covered include the role of criminal justice, the fate of customary methods of conflict resolution in a time of increasing legal centralization, and the relationship between cultural and legal change. We shall approach these issues by examining, among other things, the development of criminal procedure, the role of lawyers, contested notions of criminal responsibility, and the self-presentation of defendants. The course emphasizes close readings of primary works, including trial documents and literary sources.]

[HIST 447 Crusaders and Chroniclers

Fall. 4 credits. Not offered 1999–2000. 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 is possible in 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 1999–2000. S. L. Kaplan.]

[HIST 468 The Representation of Eros in the Italian Renaissance #
Spring. 4 credits. Not offered 1999–2000. J. Najemy.]

[HIST 472 Politics and Culture in 18th-Century England #
Spring. 4 credits. Not offered 1999–2000. R. Weil.
Between 1660 and 1800 England experienced imperial and economic expansion, the Enlightenment, and the threat of Revolution abroad and at home. How in this context did people interpret and imagine the nature of the social order, political authority, and the family? We will consider the changing and fiercely contested notions of property, politeness, crime and punishment, sexuality, Empire, slavery and the market.]

[HIST 481 The English Revolution #
Spring. 4 credits. Not offered 1999–2000. R. Weil.
Between 1640 and 1660, England experienced two decades of civil war and revolution and embarked on a fascinating series of attempts to reorganize political and religious life. Women and the lower classes emerged as actors on the political stage, radical religious sects flourished, and the nature of authority was questioned in both the family and the state. This course will explore the political, cultural, religious and social dimensions of the English Revolution, using mostly primary sources.]

[HIST 496 Theorizing the Public Sphere (also Comparative Literature 496 and German Studies 496)
Fall. 4 credits. Not offered 1999–2000; next offered 2000–2001. P. Hohendahl.
For description, see GERST 496.]

[HIST 651 Old English Literature in Its Historical Context (also English 710)
Spring. 4 credits. Not offered 1999–2000. P. Hyams, T. D. Hill.
This graduate course, cross-listed with English 710, might equally be known as "Anglo-Saxon England: History and Literary Context." It studies the written sources for major questions of Anglo-Saxon history in their literary and cultural context. It concentrates on important texts extant in both Latin and Old English. Comparison can illuminate the resources and intentions of writers, compilers, and copyists, the literary and linguistic culture of England, and the ways in which historians might most fruitfully study such texts. Bede's *Ecclesiastical History*, and *Battle of Maldon* and Aelfric's *Collequies*, and selections from the Anglo-Saxon chronicle, *Beowulf*, laws, homilies and wisdom literature are all likely to come under scrutiny. One goal is to reclaim for European religious history a corpus of material that historians neglect because it is in Old English.]

[HIST 653 England—Britain—Europe in the Middle Ages
Fall. 4 credits. Not offered 1999–2000. P. Hyams.
This graduate seminar tentatively explores the coming move from the study of medieval English history to that of the British Isles and its inhabitants within the wider context of Europe and Western Christendom. Readings will mostly be representative original sources. The precise texts and topics studied will depend on the interests (and especially future teaching plans) of participants, but will certainly allow for a critical examination of existing literature on the general and cultural history of England, Scotland, Ireland and Wales.]

HIST 663 Graduate Seminar in Renaissance History
Fall. 4 credits. Open to undergraduates with permission of instructor. J. Najemy.

[HIST 664–665 Seminar in Latin Paleography
664, fall; 665, spring. 4 credits each term. Hours to be arranged. Not offered 1999–2000. J. J. John.]

[HIST 666 Seminar in Medieval History
Fall. 4 credits. Not offered 1999–2000. J. J. John.]

[HIST 669 Politics, Power, and Culture in Early Modern England
Fall. 4 credits. Not offered 1999–2000. R. Weil.
An inquiry into how the ruling class ruled, and what that meant to and for everyone else. Topics include: the invention of the "state," the relationship of central and local power, clientage and corruption, the construction of categories of "public" and "private," representations of monarchy, hegemony and resistance, court culture, the social interpretations of the English Revolution and their critics. Focus is on historiography and methodology, with some engagement with primary sources.]

Modern European History

HIST 152 Introduction to Western Civilization (1600 to the end of World War II) #
Spring. 4 credits. R. L. Moore and M. Steinberg.
This course offers a comparative perspective on the development of modern states, societies, and cultures in Europe and North America. Religious and scientific revolutions in early modern Europe; European expansion and conquest; Enlightenment and revolution; liberalism, capitalism, and communism; the politics of race, slavery, and the new imperialism; the World Wars and the Holocaust; the Cold War; the modern and the post-modern in European and American culture.

[HIST 220 The French Experience: An Introduction (also French Literature 224)
Fall. 3 credits. Not offered 1999–2000. S. Kaplan and M. Greenberg.
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 cinemas. Looking attentively at texts, images and contexts from selected moments in the seventeenth, eighteenth, nineteenth, and twentieth centuries, we will attempt to unravel some of the defining enigmas of the French experience. Two lectures/week in English and one section (one section conducted in English, one in French). Readings available both in French and English translation.]

HIST 252 Russian History to 1800 #
Fall. 4 credits. W. Pintner.
The origin and development of the fundamental social, political, economic, and cultural institutions that have determined the nature of contemporary Russian society.

[HIST 267 History of Zionism and the Birth of Israel (also Jewish Studies 290; Near Eastern Studies 290)
Spring. 4 credits. Not offered 1999–2000. V. Caron.
This course will examine the history of Zionism as an ideology and political movement from its origins in the nineteenth century to the present. Attention will be paid to situating Zionism within the context of modern Jewish, European, and Middle Eastern History. Topics will include: the ideological foundations of Zionism; the role of Theodor Herzl and the rise of political Zionism; the Balfour Declaration; the development of theYishuv; Zionism as a cultural identity for Diaspora Jewry; the British mandate; the Arab-Zionist encounter; Zionist responses to the Holocaust; and Zionism and contemporary Israeli society.]

[HIST 283 Europe in the Technological Age
Spring. 4 credits. Not offered 1999–2000; next offered 2000–2001. J. Weiss.
An introduction to politics, culture, and technology in contemporary Europe. In the sections on politics a survey of party systems and their interactions with social movements is followed by examinations of post-Communist constitution and political structures, the New Germany, and the European Union. The section on European culture pays special attention to the European press and electronic media as shapers and reflectors of cultural values. A section on the struggle over the control of the past deals with tensions and conflicts in European national memories. In the section on Nationalism and ethnicity, political and cultural approaches are combined in consideration of the wars in former Yugoslavia as well as less violent conflicts between nationalists and members of ethnic minorities elsewhere in Europe. The section on technology deals with the design of products and processes as a cultural phenomenon, making cross-national comparisons of some of the social, cultural, and institutional influences on engineering performance.]

[HIST 285 From Medievalism to Modernity: The History of Jews in Early Modern Europe, 1492–1789 (also Near Eastern Studies 245, Jewish Studies 253) #
Fall. 4 credits. Not offered 1999–2000. V. Caron.
This course will examine the history of European Jewry during the centuries of transition from the Middle Ages to the Modern Era. We will examine the extent to which traditional Jewish life began to break down during this period and thus paved the way for the emergence of modern Jewry. Topics will include: the impact of the Spanish Expulsion of 1492; religious, intellectual, and socioeconomic dimensions of the Marrano dispersion, including Lurianic Kabbalah and the messianic movement of Shabbetai Zevi; the establishment of Jewish communities in the West; the end of the "Golden Age" of Polish Jewry and the rise of Hasidism; the changing economic and political role of Jews in the 17th and 18th centuries; and the impact of the Enlightenment.]

[HIST 290 Twentieth-Century Russia and the Soviet Union

Spring. 4 credits. Not offered 1999–2000; next offered 2000–2001. P. Holquist.

An introductory lecture course spanning the lifetime of the USSR (1917–1991), but covering the last years of the Russian Empire and the first years of the post-communist present as well. Geographically, it focuses on the Russian heartland and the non-Russian areas of the Soviet Union. The course will explore the roots and consequences of the Russian Revolution; the nature and evolution of Leninism, Stalinism and Soviet communism; the entrenchment of reform of the post-Stalinist system; and the legacy of communism for the region's new regimes. Students are introduced to a wide variety of historical materials, including documents, essays, memoirs, literature and film.]

HIST 291 Modern European Jewish History, 1789–1948 (also Jewish Studies 252)

Fall. 4 credits. V. Caron.

Jewish life in Europe experienced a profound transformation as a result of the process of Jewish emancipation which began at the end of the eighteenth century. While emancipation offered Jews unprecedented social, economic and political opportunities, it also posed serious challenges to traditional Jewish life and values by making available new avenues of integration. This course will examine the ways in which Jewish and non-Jewish society responded to these new developments from the eighteenth century Enlightenment to the post-World War II era. Topics will include Jewish responses to emancipation, including assimilation and new varieties of religious accommodation; the development of modern antisemitism; the rise of Zionism and the creation of the state of Israel; the modernization of Eastern European Jewry; the impact of mass immigration; and the Nazi era.

HIST 355 The Old Regime: France in the Seventeenth and Eighteenth Centuries #

Fall. 4 credits. S. Kaplan.

A systematic examination of the social structure, economic life, political organization, and collective mentalities of a society that eclipsed all others in its time and then, brutally and irreversibly, began to age. France, in European perspective, from the wars of religion through the age of Voltaire.

[HIST 356 The Era of the French Revolution and Napoleon #

Spring. 4 credits. Not offered 1999–2000. S. Kaplan.

A study of the failure of the traditional system, its dismantling and replacement in France, and the international consequences. Focus will be on the meaning of the revolutionary experience, the tension between the desires to destroy and to create, and the implications of the Revolution for the modern world.]

HIST 357 Survey of German History, 1648–1890 #

Fall. 4 credits. Open to freshmen with permission of instructor. I. Hull.

An examination of the social, political, intellectual, and diplomatic history of the German states from the devastation of the Thirty Years' War, through absolutism, the bourgeois revolutions of 1848, the struggle for unification, to the beginning of the modern industrial state.

HIST 358 Survey of German History, 1890 to the Present

Spring. 4 credits. Open to freshmen with permission of instructor. I. Hull.

An examination of the "German problem," that is the political, cultural, economic and other causes of modern Germany's extreme violence and volatility from 1890 through 1945, and of the consequences thereof on the divided Germany of 1945 to 1989, and on the new German state since 1989.

[HIST 362 European Cultural History, 1750–1870 (also Comparative Literature 352) #

Spring. 4 credits. Not offered 1999–2000. M. Steinberg.

The course will focus on the making of middle-class culture, society, and imagination from the Enlightenment through the French Second Empire. There will be three units with national and thematic foci: Germany in the period of Enlightenment, emancipation, and the burgeoning of national consciousness; questions of law, property, gender, and sexuality in early 19th-century England; modernism and urbanism in Second Empire France. Primary readings (including novels, paintings, and operas) will be considered along with contemporary historical and theoretical readings.]

[HIST 363 European Cultural History, 1870–1945 (also Comparative Literature 353)

Summer and fall. 4 credits. Not offered 1999–2000. M. Steinberg.

This course will focus on problems of modernity, identity, and ideology in comparative European contexts. We will address the politics and culture of German nationalism, French urbanism and religious revival, the cultural origins of psychoanalysis, technological culture (including film), and the cultural origins and dynamics of fascism. As in 362, primary materials (including Wagner, Nietzsche, George Eliot, Freud, Benjamin and Alfred Hitchcock) will be considered along with recent theoretical work.]

[HIST 370 History of the Holocaust (also Jewish Studies 353)

Spring. 4 credits. Each student must enroll in a section. Not offered 1999–2000. V. Caron.

This course will analyze the meaning of the Holocaust from three vantage points: that of European history; that of Jewish history; and that of those states and religious institutions that shared responsibility by having stood by in silence. Topics include: the evolution of modern anti-semitism; the role of anti-semitism in the Nazi ideology and program; the bureaucratization of death; Jewish life in ghettos and concentration camps; the fate of Jews in occupied Europe and the question collaboration; Jewish political behavior under duress; the responses of the Western allies and the Churches; contemporary interpretations of the Holocaust and the meaning of evil.]

[HIST 379 The First World War: Causes, Conduct, Consequences

Fall. 4 credits. Open to freshmen with permission of instructor. Not offered 1999–2000. P. Holquist and I. Hull.

This course examines the long-term and immediate political, social, and cultural causes of World War I, its catastrophic prosecution, and its revolutionary consequences. Recurring themes are: the building of nation-states, the diplomatic and military systems of the nineteenth and twentieth centuries, mass mobilization, the development of mass violence, and the emergence of millenarian visions of the future.]

[HIST 380 Social History of Western Technology

Spring. 4 credits. Not offered 1999–2000; next offered 2000–2001. J. Weiss.

For description see History of Science.]

[HIST 383 Europe, 1900–1945

Spring. 4 credits. Not offered 1999–2000; next offered 2000–2001. J. Weiss.

An investigation of the major developments in European politics between 1900 and the end of the Second World War. Emphasis on the rise and fall of democratic political systems and their alternatives. Topics include the reorientation of liberalism and socialism, the transforming effects of war and depression, the dynamics and diplomacy of fascism, the European response to the economic and ideological influence of America and the Soviet Union, the changes in Eastern Europe during the interwar years, and the interaction between politics and social structure.]

HIST 384 Europe, 1945–1968

Fall. 4 credits. J. Weiss.

A political and social history of Europe between the fall of fascism and the political crises of 1968. Emphasis on the comparative study of the elaboration of democratic institutions and ideologies. Topics include the origins and course of the Cold War in Western and Eastern Europe, Gaullism and Christian Democracy, the emergence of welfare states, liberal-democratic and Communist culture, the end of colonial empires in the West, opposition movements in Eastern Europe, and the general upheaval of 1968.

HIST 385 Europe in 20th Century: 1968–1990

Spring. 4 credits. J. Weiss.

The major political developments in Europe between the upheavals of 1968 and the collapse of Communist regimes. Topics will include the effects of economic turndown in 1973–1974; the response to terrorism; regionalist movements; new ethnic minorities and their opponents; Socialist governments in southern Europe; the arrival of democracy in Spain, Portugal, and Greece; new dynamics in the European Community; the rise of Thatcherism; the war scare of the 1980s; and the final phase of the Cold War.

[HIST 405 Population and History

4 credits. Not offered 1999–2000. S. Kaplan.

For description, see Comparative History.]

[HIST 406 The People in the French Revolution #

Fall. 4 credits. Not offered 1999–2000. S. Kaplan.

The Revolution was nothing if not a mass event. Mass action played a critical part in shaping its course. The "re-invention" of France affected the population down to each village and demanded decisions from virtually every adult. This course will focus on the people as actors: their collective memory, their ideologies, their repertoire of intervention, the formation of a popular political culture. It will examine the encounters between the people (in their multiple incarnations) and the revolutionary elites who sought to articulate and appropriate the Revolution. A major theme will be the tension

between the ambitions to achieve liberty and equality.]

[HIST 409 Seminar on Work in Europe and America
Fall. 4 credits. Not offered 1999–2000. S. L. Kaplan.
For description see Comparative History.]

[HIST 417 History of Jews in Modern France (also Jewish Studies 446; French Literature 413)
Spring. 4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. V. Caron.
This course will explore the integration of Jews into French society from the French Revolution to the present. Topics will include: the debate over Jewish emancipation during the Enlightenment, the French Revolution, and the Napoleonic era; the processes of religious and social assimilation; the rise of antisemitism and the Dreyfus Affair; Jewish responses to antisemitism; the immigrant challenge and refugee crisis of the 1930's; the Vichy era and Jewish resistance during World War II; and the reconstruction of the French Jewish community since 1945.]

[HIST 435 Collective Action and Politics in Modern Europe
Not offered 1999–2000. S. Kaplan, S. Tarrow.
For description, see GOVT 435.]

[HIST 441 Seminar in the European Enlightenment #
4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. Semester/TBA. I. Hull.]

[HIST 451 Lord and Peasant in Europe: A Seminar in Social History #
4 credits. Not offered 1999–2000. S. L. Kaplan.]

HIST 456 Opera, History, Politics, Gender (also WOMNS 454, COM L 459, S HUM 459, ITAL 456, MUSIC 474)
Spring. 4 credits. M. Steinberg and S. Stewart.
The will to social order and the desire to transgress it: this basis conflict in modern culture was negotiated in many places, nowhere more dramatically than in the world of opera. Body and mind; the visceral and the mannered, authority and subversion: these themes are integral to operatic works and culture. This seminar will examine works and contexts of Mozart, Beethoven, Wagner, Verdi, and Puccini alongside issues of German and Italian nationbuilding, liberalism, the continuities of patriarchy, and patterns of cultural identity and cultural difference in modern Europe. We will analyze opera videos in class, and if possible we will arrange an excursion to the Metropolitan Opera in New York City. No technical competence in required, but the seminar should be most interesting to those seeking an upper-level course in cultural history and/or cultural studies.

[HIST 457 Seminar in European Fascism
4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. Semester/TBA. I. Hull.]

[HIST 459 Antisemitism and the Crisis of Modernity: From the Enlightenment to the Holocaust (also Jewish Studies 454)
Spring. 4 credits. Not offered 1999–2000. V. Caron.
This course will examine the role of antisemitism in nineteenth and twentieth century European ideological, political and socioeconomic developments. Attention will be paid to the way in which antisemitism illuminates the underside of European history, allowing us to see how anti-Jewish intolerance and prejudice became embedded in the worldviews of significant sectors of the European population, culminating in the Holocaust. Topics will include: the Christian roots of antisemitism and the extent to which modern antisemitism marks a break with the medieval past; the politicization of antisemitism by both Left and Right; the role of antisemitism in socioeconomic conflicts linked to the rise of capitalism; Jewish responses to antisemitism; antisemitism in the nazi and Fascist revolutions; and contemporary interpretations of antisemitism.]

HIST 462 Popular Culture in European History
Fall. 4 credits. S. L. Kaplan.
An examination of the origins, practices and meanings of popular culture throughout 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.

HIST 467 Seminar in Modern European Political History
Fall. 4 credits. Permission of instructor required. J. Weiss.
Topic for 1999–2000: The Year 1968 as Post War Europe's Turning Point. The course will examine the thought and actions that culminated in the upheavals of 1968. Critical thought, social movements, and political shifts brought fundamental challenges to governments and institutions in both Western and Eastern Europe. Was this the end of one postwar era and the beginning of another?

HIST 474 Topics in Modern European Intellectual and Cultural History (also ComL 474)
Fall. 4 credits. Prerequisite: permission of instructor. D. LaCapra.
Topic for 1999–2000: History and Trauma. The course will investigate the role of traumatic events in history and the attempt in various genres (especially historiography) to "represent" or come to terms with them. The focus will be on the nazi genocide, but comparative issues will also be treated (notably with respect to the problem of slavery). Assignments include works of Tadeusz Borowski, Cathy Caruth, Frantz Fanon, Saul Friedlander, Raul Hilberg, Toni Morrison, and Art Spiegelman. There will also be viewings of testimonies and films, including Part I of Claude Lanzmann's *Shoah*.

[HIST 477 Seminar on the Politics of the Enlightenment #
Spring. 4 credits. Not offered 1999–2000. S. Kaplan.
An inquiry into the historical origins of European (especially French) political, social, and economic thought, beginning in the 1680s, at the zenith of Louis XIV's absolutism, and culminating in the French Revolution a century later. Emphasis is on the relation of criticism and theory to actual social, economic, religious, and political conditions. An effort is made to assess the impact of enlightened thought on the eighteenth-century world and to weigh its implications for modern political discourse. Readings in translation from such authors as Bayle, Montesquieu, Voltaire, Rousseau, Diderot, and others as well as from modern scholarly and polemical literature.]

[HIST 478 Stalinism As Civilization
Fall. 4 credits. Not offered 1999–2000; next offered 2001–2002. P. Holquist.
The collapse of the Soviet Union provides an opportunity to reconsider the entire Stalinist experience, both on the basis of newly accessible documents and from fresh perspectives. This course approaches Stalinism as an entire system, examining the links between high politics, foreign relations, culture and everyday political strategies. Readings will include historical studies as well as newly available primary materials. Knowledge of Russian not required.]

[HIST 488 Seminar in Late Nineteenth-Century European Imperialism
Spring. 4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. I. Hull.
This seminar examines the theories of the "second wave" of European imperialism, and then compares the imperial experiences of Great Britain, France, and Germany. It focuses on the imperialist powers, and on the (often unintended) consequences of their colonial involvement on them. Of special concern are the transformation of nationalism into imperialism, and the effects on the European powers themselves of their experiences of applied racism and the commission of mass violence in their colonies.]

[HIST 605 Graduate Seminar in European Cultural and Intellectual History
Fall. 4 credits. Not offered 1999–2000. M. Steinberg.
The seminar will function as a companion course to History 363. Admission is open to graduate students and, by application to the instructor, to seniors. All participants will be required to attend the lectures in History 363. The seminar readings will focus on the primary readings in History 363 (Nietzsche, Wagner, Eliot, Freud) and will add to them literary and theoretical texts on the themes of subjectivity, ideology, and psychoanalysis.]

[HIST 635 The Gates to Modernity: From Karlsbad to the 1848 Revolution (also German Studies 635)
4 credits. Anchor course. Not offered 1999–2000. P. Hohendahl.
For description, see GER ST 635.]

[HIST 661 Graduate Seminar in Twentieth-Century German History
4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. Semester/TBA. I. Hull.]

HIST 672 Seminar in European Intellectual History
Fall. 4 credits. D. LaCapra.

HIST 673 Seminar in European Intellectual History
Spring. 4 credits. D. LaCapra.

[HIST 674 Graduate Seminar in German History, 1770–1918
Fall. 4 credits. Not offered 1999–2000. Semester, TBA. I. Hull.]

[HIST 675 After the Divide: German Critical Theory of the Seventies and Eighties (also Comparative Literature 675 and German Studies 675)
Fall. 4 credits. Not offered 1999–2000. P. Hohendahl.
For description, see GER ST 675.]

[HIST 678 Seminar in Modern European Social History
Spring. 4 credits. Permission of instructor required. Not offered 1999–2000. J. Weiss.]

HIST 750 European History Colloquium
Fall and spring. 4 credits, each term. Kaplan, Caron (fall); Weiss, Caron (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 between an instructor and a particular student. Students must first gain the consent of a particular instructor to work with them.

HIST 301 Supervised Reading
Fall or spring. 2 credits. Open only to upperclass students. Prerequisite: permission of instructor. 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 Proseminar
Fall. 4 credits. Limited to 14 students. For prospective honors candidates in history. Prerequisite: permission of a member of the Honors Committee is required to register. M. Kammen.
An exploration of major approaches to historical inquiry, analysis, and presentation. Ways of thinking about history along with research methods and organization of the results will be considered by reading and discussing a variety of historical works. Substantive readings will be drawn from several time periods and diverse geographical areas. There will be one short paper during the semester, and a longer final paper which explores the work of a major historian or school of historical writing.

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. Borstelmann, J. V. Koschmann.
The course is designed to introduce entering graduate students to crucial issues and problems in historical methodology that cut across various areas of specialization.

HISTORY OF ART

L. L. Meixner, chair; R. G. Calkins, director of graduate studies; J. E. Bernstock, director of undergraduate studies; P. I. Kuniholm, C. Lazzaro, K. McGowan, A. Pan, A. Ramage, S. Reiss

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 (East and Southeast Asian, African), from antiquity to the present.

The Major

Department majors acquire a broad understanding of the history of art in several chronological and geographical areas: ancient, medieval, Renaissance, Baroque, modern (Europe and U.S.A.), Southeast Asia, China, Japan, and Africa. Additionally, majors practice a range of art historical methods and interpretive strategies, including connoisseurship, dendrochronology, feminism, iconography, semiotics, and social history. Majors are encouraged to locate the history of art within allied humanities fields and the applied arts by taking courses in history, literature, history of architecture, and fine arts. The study of foreign languages is encouraged strongly.

Requirements for the Major

Prospective majors should consult the director of undergraduate studies. 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 be at the 200-level, and one must emphasize material either predominantly before 1800 or outside Europe/U.S.A. These two courses are prerequisites for the major and a grade of C or above is required for admission; courses must be taken for a letter grade. These courses do count toward the total 44 credits. The major in the history of art requires 44 credits, 30 at the 300-level or above. The core requirements: proseminar; one 400-level area seminar; two courses in art outside Europe/U.S.A.; three courses in art predating 1800 (ancient, medieval, or Renaissance/Baroque). Majors must choose at least two courses from different categories. In addition to the 44 credits, majors are required to take two courses, approved by their advisers, in areas related to the history of art.

Honors

To become a candidate for the degree of Bachelor of Arts with honors in the history of art, a student must have a cumulative average of B+ for all courses taken in the department and in all arts and sciences courses. Application to write an 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 art and art outside the West.

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 seminars primarily for advanced undergraduates and graduate students.

500–level courses are seminars primarily for graduate students.

First-Year Writing Seminars

For First-Year Writing Seminar offerings in the History of Art, see the John S. Knight Writing Program's special brochure. These courses may be used as freshman electives but not to satisfy the distribution requirement.

Courses

ART H 200 Art, Archaeology and Analysis (also Architecture 285, MS&E 285, Engineering 185, Geology 200, Physics 200)
Spring. 3 credits. R. Kay.
For description see Geology 200.

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 time of Constantine the Great.

[ART H 221 Minoan-Mycenaean Art and Archaeology (also Classics 221 and Archaeology 221) #
3 credits. Not offered 1999–2000. J. Coleman.
For description, see Classics 221.]

[ART H 224 Archaeology in Action I (also Classics 232 and Archaeology 232) #
3 credits. Prerequisite: permission of instructor. Not offered 1999–2000. P. I. Kuniholm.]

[ART H 225 Archaeology in Action II (also Classics 233 and Archaeology 233) #
3 credits. Prerequisite: permission of instructor. Not offered 1999–2000. P. I. Kuniholm.
Objects from the Classical, Hellenistic, and Roman periods are "dug" out of Cornell basements, identified, cleaned, restored, catalogued, and photographed and are considered in their appropriate historic, artistic, and cultural contexts.]

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. C. Lazzaro.
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. Weekly section meetings are required.

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. E. 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
3 credits. Not offered 1999–2000. 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 280 Introduction to Art History: Approaches to Asian Art @ #
Fall. 3 credits. Not offered 1999–2000. K. McGowan.
Arranged according to selective focus and emphasis rather than broad chronological survey, this course introduces students to the varied responses of the Asian artist in diverse social, geographical and historical contexts. Indian miniature paintings, Japanese prints, high-fired ceramics from Thailand and Vietnam, Indonesian textiles and jewelry, Javanese shadow-puppet theater, and Balinese ritual and performance traditions will be explored. 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 309)
Fall and spring. 4 credits. Prerequisite: permission of instructor. Limited to 10 students. P. I. Kuniholm.
Participation in a research project of dating modern and ancient tree-ring samples from the Aegean and Mediterranean. Supervised reading and laboratory work. A possibility exists for summer fieldwork in Greece and Turkey.

[ART H 319 Art in the Daily Life of Greece and Rome (also Classics 319) #
4 credits. Not offered 1999–2000. A. Ramage.
Classical art is well reflected in the small items of daily life that are neglected frequently in the standard histories. This course looks at the making and decorating of household items in Greece and Rome in a variety of materials from clay to metal. The links between the commissions of the state and the tastes of the people are examined through their material culture.]

[ART H 320 The Archaeology of Classical Greece (also Classics 320) #
4 credits. Not offered 1999–2000. A. Ramage.]

ART H 321 Mycenae and Homer (also Classics 321 and Archaeology 321)
Fall. 4 credits. J. Coleman.
For description, see CLASS 321.

[ART H 322 Arts of the Roman Empire (also Classics 350) #
4 credits. Not offered 1999–2000. 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) #
4 credits. Not offered 1999–2000. A. Ramage.]

[ART H 325 Greek Vase Painting (also Classics 325) #
4 credits. Not offered 1999–2000. A. Ramage.
A stylistic and iconographical approach to an art in which the Greeks excelled. The course will be arranged chronologically from the early (eleventh century B.C.), anonymous beginnings to the "personal" hands of identifiable masters of the fifth and fourth centuries B.C. Styles of cities other than Athens will be stressed.]

[ART H 326 Greek Cities and Towns (also Classics 326) #
4 credits. Prerequisite: Classics/History of Art 220 or permission of instructor. Not offered 1999–2000. J. Coleman.]

ART H 327 Greek and Roman Coins (also Classics 327) #
Spring. 4 credits. A. Ramage.
The varied issues of Greek cities and the Roman state are examined. Coins are considered as art objects as well as economic and historical documents. The changes in design, value, and metals from the origins of coinage to the late Roman period are studied. Lectures, student presentations, and work with the actual examples.

[ART H 328 Greeks and Barbarians (also Classics 322) #
4 credits. Not offered 1999–2000. J. Coleman.
For description, see CLASS 322.]

ART H 329 Greek Sculpture (also Classics 329) #
Fall. 4 credits. J. Coleman.
For description, see CLASS 329.

[ART H 332 Architecture in the Middle Ages (also Architecture 382, Religious Studies 332) #
4 credits. Not offered 1999–2000. R. G. Calkins.
A survey of medieval architecture from the Early Christian period to the Late Gothic (A.D. 300–1500). Considerable emphasis will be placed on the development of structural systems and upon the form, function, and meaning of important medieval buildings.]

[ART H 333 Early Medieval Art and Architecture #
4 credits. Not offered 1999–2000. R. G. Calkins.
Sculpture, painting, and architecture in the period from the late antique through the Carolingian era (A.D. 300–900). The evolution of the early Byzantine tradition will also be considered.]

[ART H 335 Gothic Art and Architecture (also Religious Studies 335) #
4 credits. Not offered 1999–2000. R. G. Calkins.]

ART H 336 Prelude to the Italian Renaissance (also Religious Studies 336) #
Fall. 4 credits. R. G. Calkins.
An examination of Italian art, beginning with twelfth-century Sicily, and with emphasis on thirteenth- and fourteenth-century sculpture, painting, and to a lesser extent, architecture, which includes the works of Duccio, Giotto, the Pisani, and Lorenzetti as the prelude to the Italian Renaissance.

[ART H 337 The Medieval Illuminated Book (also Religious Studies 337) #
4 credits. Not offered 1999–2000. 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. Two lectures, plus a session each week in the Rare Book Room.]

ART H 341 Flemish Painting (also Religious Studies 342) #
Spring. 4 credits. R. G. Calkins.
An examination of Flemish painting in the 15th century, with emphasis on the works of Robert Campin, Jan van Eyck, Roger van der Weyden, Hugo van der Goes, Hans Memling, and ending with Jerome Bosch. Issues of the social, economic, and devotional context will be discussed as they pertain to the particular development of Northern Realism and Symbolism during this century.

[ART H 343 Italian Renaissance of the Fifteenth Century #
4 credits. Not offered 1999–2000.
C. Lazzaro.
This course examines the artistic production of the fifteenth century in its social and cultural context. The new style, which was developed in Florence in the early century and spread to other city-states in Italy, is examined in the context of the new educated class, the increased wealth of the mercantile, urban class, and the new role of family in society.]

[ART H 344 Italian Renaissance of the Sixteenth Century: Leonardo, Michelangelo, and Raphael #
4 credits. Not offered 1999–2000.
C. Lazzaro.
This course focuses on the three great artists of the late fifteenth and sixteenth century, Leonardo, Michelangelo, and Raphael. It examines each as a thinker as well as an artist, through their own writings together with their works of painting, sculpture, and architecture. It also analyses the contemporary constructions of the artist as genius and as courtier in the biographies and other writings about them.]

ART H 345 Rome, Florence, and Venice in the Sixteenth Century #
Spring. 4 credits. C. Lazzaro.
This course examines the distinctive cultural identities of Rome, Florence, and Venice, and how art, architecture, and urban planning served to create the myths and self-images of these cities, their rulers, and society. Topics include the centers of power, relationship of church and state, and private patronage and collections.

[ART H 348 Renaissance Art in Northern Europe: The Sixteenth Century #
4 credits. Prerequisites: History of Art 245, 341, 342, 351 or permission of instructor. Not offered 1999–2000.
S. Reiss.
This course will examine the painting, graphic arts, and sculpture of Northern Europe in the sixteenth century. Principal emphasis will be on art produced in the Netherlands and Germany. Topics to be considered include patronage and audience in different regions of Northern Europe, the importance of fifteenth-century traditions, the impact of Italian art, and the development of specifically northern forms of artistic expression in religious and secular art, including landscape, portraiture, and genre painting. Among the themes we will explore are constructions of gender and representations of women in Northern Renaissance art, attitudes to peasants and the urban lower classes, the impact of the Protestant Reformation and iconoclasm, and the development of the art market in the North. Artists to be considered include Bosch, Bruegel, Dürer, and Grünewald.]

[ART H 350 The Culture of the Renaissance I (also History 361 and Comparative Literature 361) #
4 credits. Each student must enroll in a section. Not offered 1999–2000.
C. Lazzaro, J. M. Najemy.]

ART H 351 The Culture of the Renaissance II (also Comparative Literature 362, History 364, Music 390, Religious Studies 362, English 325) #
Spring. 4 credits. W. J. Kennedy, C. Kaske.
For description, see COM L 362.

[ART H 353 Art and Death in Europe: 1250–1600 #
4 credits. Not offered 1999–2000. S. Reiss.
This course will explore rituals, images, and monuments associated with death and dying in late medieval and early modern Europe. Topics to be considered include cultural attitudes towards death, the impact of the Black Death, the *ars moriendi*, the relation between death and eroticism, funeral rituals, and, especially, tomb sculpture and mortuary structures in Italy, France, the Netherlands, Germany, England, and Spain.]

[ART H 355 Art as Spectacle: The Italian Baroque (also Religious Studies 352) #
4 credits. Not offered 1999–2000. Staff.]

[ART H 358 Religion and Images Across the Early Modern World (also Religious Studies 360) #
4 credits. Not offered 1999–2000. Staff.]

[ART H 360 Painting and Everyday Life in Nineteenth-Century America (also American Studies 360) #
4 credits. Not offered 1999–2000.
L. L. Meixner.
Nineteenth-century American painters often constructed images 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 topical units include New England portraiture and commodity, 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 consider more conflicted attitudes. Our key artists include John S. Copley, George Caleb Bingham, Winslow Homer, Mary Cassatt, and Thomas Eakins. Our readings include art historical texts and others by Poe, Emerson, and Whitman.]

[ART H 361 The Social History of Nineteenth-Century European Painting #
4 credits. Not offered 1999–2000.
L. L. Meixner.]

ART H 362 Impressionism and Society
Fall. 4 credits. L. L. Meixner.
This course discusses French Impressionist images as the products of nineteenth-century public life. By relating Impressionism to the state culture of the Third Republic, including universal expositions, we will trace subversive themes such as criminality, cafe and brothel societies, clandestine prostitution, and class-regulated leisure. Alongside the "Haussmannization" of Paris and urban commodity culture, we will consider French agrarian identity, landscape, and utopia.

ART H 365 Art from 1940 to 1990 (also American Studies 355)
Fall. 4 credits. J. E. Bernstock.
Major artists and movements in the United States since 1940, beginning with Jackson Pollock and Abstract Expressionism, and continuing through recent developments in art. Attention is devoted to the critical reception that artists have received and to artists' statements themselves.

[ART H 370 Visual Culture and Social Theory (also Government 375 and Comparative Literature 368)
4 credits. Not offered 1999–2000. Staff.
For description, see Government 375.]

ART H 371 Architectural History of Washington, D.C.
Fall or spring. Variable credit. Only for students in the Cornell-in-Washington program. Only for non-architects.
P. Scott.
A historical and critical survey of the architecture of Washington. Attention will be given to the periods, styles, architects, and clients—public and private—of the notable buildings and to the urbanscape of the nation's capital. The vocabulary of architectural analysis and criticism will be taught. Field trips required.

ART H 377 African American Art (also AS&RC 304)
Spring. 3 credits. S. Hassan.
For description, see AS&RC 304.

ART H 378 Art in African Culture and Society (also AS&RC 310) @
Fall. 3 credits. S. Hassan.
For description, see AS&RC 310.

ART H 380 Introduction to the Arts of China (also Archaeology 380 and Asian 383) @ #
Fall. 4 credits. A. Pan.
This course offers a survey of the art and culture of China, from the Neolithic period to the twentieth century. We begin with an inquiry into the meaning of national boundaries and the controversy of the Han Chinese people, which will help us identify the scope of Chinese culture. Pre-dynastic (or prehistoric) Chinese culture will be presented through both legends about the origins of the Chinese, and scientifically excavated artifacts. Art of the dynastic and modern periods will be presented in light of contemporaneous social, political, geographical, philosophical and religious contexts. Students will work directly with objects in the Herbert F. Johnson Museum of Art.

ART H 385 Representation and Meaning in Chinese Painting
Spring. 4 credits. A. Pan.
Using major monuments of art, this course introduces various genres of Chinese painting through socio-political and religious history. The focus is on understanding the aesthetic criteria, artistic movements, stylistic transformations, and agendas of different social classes. Weekly sections will meet at the Herbert F. Johnson Museum so that students can gain first-hand experience examining and handling Chinese paintings.

ART H 395 The House and the World: Architecture of Asia @
Spring. 4 credits. K. McGowan.
In many Asian societies, houses are regarded as having a life force or a vitality of their own. This course will examine the role of the house as a living organism in Asia, a symbol of the cosmos encapsulated. Houses also function in many societies as storehouses for material and immaterial wealth; artifacts such as textiles, jewelry, sculptures, and masks function within the house as ancestral heirlooms, conveying their own currents of life force, the power from which serving to blend with the vitality of the house. This accumulation of energy can be conferred upon the inhabitants, or it may exist as a quiet reservoir of power, distinct from its occupants. The indigenous architectural traditions of India, Vietnam, Thailand, Indonesia, and the Philippines will be examined. By studying the inhabited spaces of others, divining their technologies of construction and their applied symbologies, students will be provided with powerful tools for examining the visual skills and sensibilities of other cultures. "The House and the World" will serve as the metaphor for these discoveries.

ART H 396 The Arts of Southeast Asia @ #
Fall. 4 credits. K. McGowan.
The arts of Southeast Asia will be studied in their social context, since art plays a role in most of the salient occasions in life in traditional societies. Special emphasis will be devoted to developments in Indonesia, Thailand, and Cambodia. Among topics covered will be the shadow puppet theater of Java, textiles, architecture, sculpture, and Bali's performance tradition.

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.
C. Lazzaro.
This seminar examines the history of the discipline of art history and focuses on the various approaches and methods of its practitioners. We begin with the early history of the discipline, but concentrate on the twentieth century and the concerns with style, iconography, social history, and the post-structuralist theories of the last decades.

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 Museum Issues
Spring. 4 credits. Prerequisite: permission of instructor. Majors only. All classes will meet in the Johnson Art Museum Study Gallery. L. Meixner.
This seminar gives advanced Art History majors the opportunity to work directly with original objects from collections in the Herbert F. Johnson Museum. The course focuses on art and connoisseurship by questioning the ways quality is determined in works of art. Topics include methods of attribution, fakes and forgeries, technique and media, restoration and conservation, art education and theories of perception. Session leaders include the curatorial staff of the art museum.

ART H 410 Visual Studies in the Diaspora (also Society for the Humanities 410)
Fall. 4 credits. K. Mercer.
For description see Society for the Humanities 410.

ART H 423 Ceramics (also Classics 423 and Archaeology 423)
Fall. 4 credits. A. Ramage.
Bronze Age, Greek, and Roman pottery specimens from Near-Eastern and Mediterranean sites will be studied to provide direct experience of 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 of ceramics. 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 1999–2000.
A. Ramage.]

[ART H 425 Seminar on the Bronze Age Architecture of Asia Minor (also Classics 430 and Archaeology 425) #
4 credits. Prerequisite: permission of instructor. Not offered 1999–2000.
P. I. Kuniholm.
The course will cover major architectural building programs from Neolithic Catal Hüyük, Beycesultan, to the final phases of Troy and Hittite Bogazkoy. The art and archaeology of these civilizations will be taken into account when relevant. Reading knowledge of German useful.]

[ART H 427 Seminar on Roman Art and Archaeology (also Classics 435 and Archaeology 435) #
4 credits. Prerequisite: permission of instructor. Not offered 1999–2000.
A. Ramage.]

ART H 430 America In the Camera's Eye (also History 430 and Women's Studies 430.2)
Fall. 4 credits. R. L. Moore.
For description see History 430.

ART H 434 The Rise of Classical Greece (also Archaeology 434 and Classics 434) #
Spring. 4 credits. Recommended: Classics 220 or History of Art 220, Classics 221 or History of Art 221, or permission of instructor. P. I. Kuniholm.
The art and archaeology of the Greek dark ages. Topics include: site reports, pottery, metalworking, the introduction of the alphabet, the beginnings of coinage, and links with Anatolia and the Near East.

[ART H 448 Studies in Sixteenth-Century European Art #
4 credits. Not offered 1999–2000.
C. Lazzaro.
Constructing the Self in the Sixteenth Century. This seminar examines portraits, self-portraits, autobiographies, and biographies, as well as treatises on etiquette and behavior. In this society, "civility," the mark of class and education, was conveyed through bearing, gesture, manners, and speech, as well as social organization and artistic interests, all of which are evident in both visual and verbal representations of individuals.]

[ART H 450 Women in Italian Renaissance Art (also Women's Studies 451) #
4 credits. Prerequisite: permission of instructor. Not offered 1999–2000.
C. Lazzaro.
This seminar examines representations of the Madonna and Child from the fourteenth and fifteenth centuries, the narrative scenes painted on chests and other domestic furniture, biblical and historical heroines such as Judith and Lucretia, 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 feminst 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 histrocial context, and how they convey social constructs as ideology.]

[ART H 451 Prints of the Fifteenth through the Seventeenth Century #
4 credits. Prerequisite: permission of instructor. Not offered 1999–2000.
C. Lazzaro.
This seminar has several aims: to introduce students to prints—the techniques, styles, and issues of connoisseurship—and to the major printmakers of the period, including Marcantonio Raimondi, Dürer, and Rembrandt; to give students first-hand experience with works of art in the Herbert F. Johnson Museum; and to consider the social and cultural issues raised in the medium of prints and through their unique visual language. These issues include the social hierarchies of class and gender (including witches), moral concerns and religious devotion, the construction and transmission of notions of antiquity and classicism, and the representation of the urban and rural environment. Students will give brief presentations on prints in the collection and longer ones of their own research projects on these and related topics.]

[ART H 456 Seminar in Baroque Art #
4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. Staff.]

[ART H 457 The Sexed Body in Western Art (also Women's Studies 457) #
4 credits. Not offered 1999–2000. Staff.]

[ART H 461 Fin-de-siècle Cultures in Europe, England, and America #
4 credits. Prerequisite: permission of instructor. Auditing is not permitted. Not offered 1999–2000. L. L. Meixner.]

ART H 462 Topics in Early Modernism #
Spring. 4 credits. Prerequisite: permission of instructor. Auditing is not permitted. Not open to freshmen or sophomores. L. L. Meixner.
Topic for Spring 2000: Early Modernism in America. Using the Armory Show (1913) as its center, this interdisciplinary seminar examines the varied expressions of American modernism prior to World War II. Against the backdrop of post-World War I social politics and the Jazz Age, we will examine: the machine aesthetic and kinetic poetry, icons such as the Brooklyn Bridge, O'Keefe, Stieglitz, and the rise of photography at "291," American Dada, the Harlem Renaissance, and the introduction of homoerotic imagery. Aside from major artists, key figures include Gertrude Stein, Dos Passos, Hart Crane, and Ernest Hemmingway.

[ART H 463 Studies in Modern Art
4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. J. E. Bernstock.]

ART H 464 Studies in Modern Art
Spring. 4 credits. Prerequisite: Art History 365 and permission of instructor. Auditing is not permitted. J. E. Bernstock.
Topic for Spring 2000: Problems in Modern Sculpture. This seminar focuses on problems in criticism of twentieth-century sculpture, starting with Rodin. Controversial issues involving public sculpture are also examined.

ART H 466 Women Artists (also Women's Studies 404)
Fall. 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 476 Seminar in American Art
4 credits. Not offered 1999–2000. L. L. Meixner.]

ART H 481 Art of the Tang Dynasty (618–907) @
Fall. 4 credits. Prerequisite: ART H 383 or a course in Chinese history or Chinese literature and permission of instructor required. A. Pan.
This seminar explores art and culture of the Tang dynasty, China's "golden age," by focusing on new discoveries and museum objects representing court, secular, and Buddhist art. We will examine how imperial taste, patronage, and aesthetics influenced painting, calligraphy, gold and silver wares, ceramics, and important architectural and cave-temple sites.

ART H 483 Arts of the Song Dynasty (960–1279)
Spring. 4 credits. A. Pan.
This seminar surveys arts of the Song dynasty, a period of introversion and high refinement. Through readings, class discussions, and visits to the Herbert F. Johnson Museum of Art, students will gain knowledge of painting (landscape, figure, horse, flower-and-bird, literati traditions and theories), calligraphy, Song antiquarianism, imperial patronage, religious art (painting, sculpture and temples), and ceramics.

[ART H 490 Art and Collecting: East and West @
4 credits. Not offered 1999–2000. K. McGowan.]

[ART H 494 Feminist Theory and the History of Art
4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. Staff.]

[ART H 520 Seminar in Classical Archaeology (also Classics 630 and Archaeology 520)
4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. P. I. Kuniholm.]

ART H 531 Problems in Medieval Art and Architecture (also Religious Studies 531)
Fall. 4 credits. Prerequisite: permission of instructor. R. G. Calkins.
Topic for fall 1999: Archaeology of the Book. A detailed investigation of the methods and procedures of examining medieval illuminated manuscripts. Emphasis will be on understanding the hand written book as a functioning object: its production, decoration, use, and reception. Students will conduct research on a facsimile of a medieval manuscript amongst those housed in the Rare and Manuscript Collections, Kroch Library. Discussions, reports on readings and presentations of research paper in class.

ART H 540 Seminar in Renaissance Art
Spring. 4 credits. Prerequisite: permission of instructor. C. Lazzaro.
Topic for Spring 2000: Nature, Cultural Landscape and Gardens in Early Modern Italy. This seminar will examine cultural understandings of nature, the paired concepts of nature and culture, and the representations of nature in gardens. We will consider the human interventions on the land, the cultural significance of plants and animals, the literary pastoral, collections of natural objects, and the flourishing garden tradition.

[ART H 549 Problems in Interpretation in Italian Renaissance Art
4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. 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. Texts by Panofsky and critical discussions of them, Baxandall, Bryson, and others will be read and discussed with reference to particular works of art. The seminar is intended primarily for graduate students in all areas of the 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 555 Baroque Ephemera and Public Performance #
4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. Staff.]

ART H 571 African Aesthetics (also AS&RC 503) @
Spring. 4 credits. S. Hassan.
For description, see AS&RC 503.

ART H 580 Problems in Asian Art (also Asian Studies 602 and Religious Studies 580)
Spring. 4 credits. Prerequisite: permission of instructor. K. McGowan.
Topic for Spring 2000: The Subtle Body—Exploring the Art of Tantra. One of the defining characteristics of Tantra is the attention paid to the human body. In Hindu and Buddhist traditions alike, the esoteric practice of Tantra regards sexual energy as a path to spiritual enlightenment by means of the subtle body. This course examines the particular wisdom contained in texts called Tantras, divining the complex and interpenetrating symbologies which evolve visually in art and architecture, mathematics and music, dance and ritual, magic and metaphysics. Since the essential ingredients of Tantra are presumably older than either Hinduism or Buddhism, we will explore how both religions developed their own distinct variations, which can be seen to have fused with dynamic effect in localized communities throughout history in India, Tibet, Cambodia, Champa, and Indonesia. Special emphasis will be given to the popularity of Hindu Tantra's deliberate critique of caste distinctions, and Buddhist Tantra's prevailing social iconoclasms.

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 1999–2000. Staff.]

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.

HUNGARIAN

See Departments of Linguistics and Russian.

INDONESIAN

See Department of Asian Studies.

FALCON PROGRAM (INDONESIAN)

See Department of Asian Studies.

ITALIAN

See Department of Romance Studies.

JAPANESE

See Department of Asian Studies.

JAVANESE

See Department of Asian Studies.

KHMER (CAMBODIAN)

See Department of Asian Studies.

KNIGHT, JOHN S., WRITING PROGRAM

See John S. Knight Writing Program in "Special Programs and Interdisciplinary Studies."

KOREAN

See Department of Asian Studies.

LATIN

See Department of Classics.

LINGUISTICS

A. Cohn, chair; J. Whitman, director of graduate studies (320 Morrill Hall); M. Diesing, director of undergraduate studies (212 Morrill Hall); J. Bowers, W. Browne, V. Carstens, C. Collins, J. Gair, W. Harbert, S. Hertz, S. McConnell-Ginet, A. Nussbaum, C. Rosen, M. Suñer, J. Wolff, D. Zec.

Visiting: E. Rieken, J. Shimoyama, A. Tsuchida.

Linguistics, the systematic study of human language, 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 Linguistics and linguistic colleagues in other departments span most of the major subfields of linguistics: phonetics and phonology, the study of speech sounds; syntax, the study of how words are combined; semantics, the study of meaning; historical linguistics, the study of language change over time; sociolinguistics, the study of language's role in social and cultural interactions; and applied linguistics, which relates the results of linguistic research to problems of bilingual education, second-language learning, and teaching.

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, or one of the freshman writing seminars offered in linguistics (on topics such as metaphor, American Sign Language, and the science of language). Linguistics 101 and other introductory courses fulfill the social science distribution requirement. Most 100- and 200-level courses have no prerequisites and cover various topics in linguistics (e.g., Ling 118 Varieties of Human Language, Ling 216 Mathematical Linguistics) or focus on the linguistics of a particular geographic region or historical development of particular languages (e.g., Ling 217 History of the English Language, Ling 230 Introduction to Southeast Asian Languages and Linguistics). Some of these courses also fulfill the breadth requirements.

Talks and discussions about linguistics are offered through the Undergraduate Linguistics Forum and the Cornell Linguistic Circle. 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 Professor Molly Diesing (212 Morrill Hall, 255–8635, md20@cornell.edu).

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 314 (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, 402, or Field Methods (Linguistics 300).
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 started 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.

General Linguistics

Fees: Depending on the course, a small fee may be charged for photocopied texts for course work.

First-Year Writing Seminars

LING 100 Language, Thought, and Reality

For descriptions, see freshman writing seminar brochure.

LING 101 Theory and Practice of Linguistics

Fall or spring. 4 credits each term. Fall, J. Whitman; spring, M. Diesing.

An introductory course designed to provide an overview of the science of language, especially its theoretical underpinnings, methodology, and major findings. The course focuses on the basic analytic methods of several subfields of linguistics including phonetics, phonology, morphology, syntax, semantics, language variation, language change, and psycholinguistics.

[LING 118 Varieties of Human Language

Fall. 3 credits. Not offered 1999–2000.

Language diversity has a place in our complex world. Whether spoken by a handful of speakers or by hundreds of millions, each language manages the same tasks of communication and fits in with its social environment. Language identification, literacy, and multilingualism are among the issues touched on.]

LING 170 Introduction to Cognitive Science (also Cognitive Studies 101, Computer Science 101, Philosophy 191, and Psychology 102)

For description, see COGST 101.

LING 201 Introduction to Phonetics and Phonology
Spring. 4 credits. Prerequisite: LING 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: LING 101 or equivalent or permission of instructor. J. Shimoyama.
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 212 Language and Culture
Spring. 3 credits. Not offered 1999–2000. J. Whitman.
We often assume that there is a close relationship between differences in language and cultural variation. This course focuses on that relationship, beginning with an examination of the linguistic relativity hypothesis, which posits a link between basic properties of languages and crosscultural differences in world view. We also examine potential cultural determinants of variation in language: pronouns and honorific systems, systems of ritual and taboo in language, and the impact of narrative organization on grammar. Special attention is paid to 'extreme' forms of language: invented languages from Esperanto to Klingon; glossolalia and trance languages; language games and secret languages.]

[LING 215/715 Psychology of Language (also Psychology 215)
Not offered 1999–2000.
For description, see PSYCH 215.]

[LING 216 Mathematical Linguistics
Spring. 4 credits. Not offered 1999–2000. Staff.
The course is an introduction to the mathematical concepts and techniques most frequently used in theoretical linguistics.]

LING 244 Language and Gender (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 interpret and evaluate speech? How do sociocultural differences in women's and men's roles affect their language use, their relation to language change? What is meant by sexist language? How does conversation structure the social worlds of women and men? Readings draw from work in linguistics, anthropology, philosophy, psychology, literature, and general women's studies and feminist theory.

[LING 246/546 Minority Languages and Linguistics
Spring. 4 credits. Graduate students register under LING 546. Not offered 1999–2000. W. Harbert, W. Browne, V. Carstens, M. Diesing, and M. Suñer.
This course examines minority languages from linguistic, social, and political perspectives. Topics discussed include language death, language maintenance, bilingualism, language contact, official status, and related issues. Languages/language families to be discussed include Spanish in the U.S., Celtic languages, African languages, Yiddish, and others, depending on the special interests of the instructors.]

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. 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 270 Truth and Interpretation (also Cognitive Studies 270 and Philosophy 270)
Not offered 1999–2000.
For description, see PHIL 270.]

LING 300 Field Methods
Spring. 4 credits. Prerequisites: LING 201 and 203 or permission of instructor. C. Collins.
Elicitation, recording, and analysis of data from a native speaker of a non-Western language not generally known to students.

LING 301–302 Phonology I, II
301, fall; 302, spring. 4 credits each term. Prerequisites: for LING 301, LING 201 or equivalent; for LING 302, LING 301 or permission of instructor. Fall, A. Cohn; spring, D. Zec.
301 provides a basic introduction to phonological theory. The first half of the course focuses on basic principles of phonology, patterns of sounds, and their representations. In the second half, the nature of syllable structure and feature representations are explored. 302 provides further refinement of the issues investigated in 301, focusing in particular on metrical theory, Lexical Phonology, autosegmental phonology, and Prosodic Morphology.

LING 303–304 Syntax I, II
303, fall; 304, spring. 4 credits each term. Prerequisites: for LING 303, LING 203; for LING 304, LING 303 or permission of instructor. Fall, C. Collins; spring, J. Bowers.
303 is an introduction to syntactic theory, with emphasis on the classical theory of transformational grammar. 304 is an advanced course, surveying current syntactic models and dealing with such issues as the nature of syntactic representation, levels of representation, principles of universal grammar, and the relation of syntax and semantics.

[LING 306 Functional Syntax
Fall. 4 credits. Prerequisite: LING 101 or permission of instructor. Not offered 1999–2000.
A general survey of syntactic theories that highlight grammatical function and reveal its role in discourse structure.]

LING 309 Morphology
Spring. 4 credits. Prerequisite: LING 101 or equivalent or permission of instructor. V. Carstens.
A general survey course, focusing on the relationship of meaning and form in morphology and introducing techniques of morphological analysis. Current research on form-meaning questions is discussed.

[LING 310 Morphology II
Fall. 4 credits. Prerequisite: LING 203 or permission of instructor. Not offered 1999–2000. Staff.
Considers recent discussions in morphological theory, in particular the relationship of morphology and syntax.]

LING 314 Introduction to Historical Linguistics #
Spring. 4 credits. Prerequisite: LING 201 or permission of instructor. J. Whitman.
A survey of the basic mechanisms of linguistic change, with examples from a variety of languages.

LING 319 Phonetics I
Fall. 4 credits. Prerequisite: LING 201 or permission of instructor. A. Tsuchida.
Provides a basic introduction to the study of phonetics. Topics to be covered include anatomy and physiology of the speech production apparatus, transcription and production of some of the world's sounds, basic acoustics, computerized methods of speech analysis, acoustic characteristics of sounds, speech perception, speech synthesis, stress and intonation.

LING 320 Phonetics II
Spring. 4 credits. Prerequisite: LING 319. A. Tsuchida.
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 325 Pragmatics
Fall. 4 credits. Prerequisite: LING 101 or permission of instructor. Not offered 1999–2000. S. McConnell-Ginet.
An introduction to the study of such topics as speech acts, presupposition, deixis, implicatures, and conversational strategies.]

[LING 334 Non-Linear Syntax
Fall. 4 credits. Prerequisite: LING 303 or equivalent. Not offered 1999–2000. C. Rosen.
Analyses of some twenty diverse languages are examined with the aim of building a formal account of the syntactic constructions existing in the world's languages, and discerning universals that delimit this inventory. Non-linear theory, designed for comparative work, depicts constructions in the abstract, not imagining them as arrays of elements in space. Simultaneously it studies the morphosyntactic systems that relate constructions to their linear realizations.]

LING 350 Representing Language: Knowledge Taught and Untaught (also Cognitive Studies 350)
Fall. 4 credits. J. Gair.
This course will deal with some of the discoveries 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.

[LING 370 Language and Cognition (also Psychology 370)
Spring. 4 credits. Prerequisite: LING 101 or 264 or PSYCH 215, or permission of one of the instructors. Not offered same years as PSYCH 416. Not offered 1999–2000.
Examination of current research on selected topics on language from both linguistic and psychological perspectives. Topics may include: universal grammar and language acquisition, syntactic parsing, word recognition, sentence production, aphasia, and schizophrenic language.]

LING 390 Independent Study in Linguistics
Fall or spring. 1–4 credits variable. Prerequisite: LING 101 or permission of instructor. Staff.
Independent study of linguistics topics not covered in regular curriculum for undergrads.

LING 401 Approaches to Language Typology I
Spring. 4 credits. Prerequisite: LING 101 or equivalent. C. Rosen.
Study of a basic question of contemporary linguistics: in what ways do languages differ, and in what ways are they all alike? Efforts to formalize universals of syntax and to characterize the total repertory of constructions available to natural languages. Common morphological devices and their syntactic correlates. Emphasis on systems of case, agreement, and voice.

[LING 402 Approaches to Language Typology II
Spring. 4 credits. Prerequisite: a course in syntax. Not offered 1999–2000. C. Collins.
A topics-oriented course focusing on the interaction between linguistic theory and crosslinguistic variation.]

[LING 403 Applied Linguistics and Second Language Learning
Fall. 4 credits. Prerequisite: at least one course in applied linguistics, linguistics, psychology, anthropology, communication, cognitive studies, education or literary analysis; or permission of instructor. Not offered 1999–2000. Staff.
This course is an introduction to the field of applied linguistics with focus on different domains of language research as they come to bear on the matter of second language learning. Thus, topics include developmental and experimental psychology of language, textual and discourse analysis, literacy, cognitive consequences of bilingualism, corpora and language teaching, and contact between first and second language communities.]

LING 405 Sociolinguistics
Fall. 4 credits. Prerequisite: LING 101 or permission of instructor. J. Wolff.
The principal work of linguistics is to describe, analyze, and understand the regularities of language systems. How, then, are we to deal with irregularities and variability when they are observed in language? This course will introduce and discuss the most significant issues in the study of language variation, and it will examine some of the methodologies that have been developed to study variation in language use.

We will consider the observable interations between linguistic variables and social factors (e.g., age, sex, ethnicity) and review the main generalizations about these factors that sociolinguistics has arrived at in the last three decades. Some of the problems associated with the quantification and measurement of non-linguistic variables will be discussed and we will evaluate the various ways researchers have dealt with these problems.

LING 406 Ethnolinguistics
Spring. 4 credits. Prerequisite: LING 101 or permission of instructor. J. Wolff.
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 413 Topics in Historical Linguistics #
Fall. 4 credits. Prerequisite: LING 314 or permission of instructor. Not offered 1999–2000. W. Harbert, 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 414 Second Language Acquisition I (also Asian Studies 414)
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. Y. Shirai.
A survey of the quantitative and qualitative research literature on the acquisition of second and additional languages among the adult population. Research carried out in both experimental and natural settings will be considered. Topics include: learner errors and errors analysis; contrastive analysis hypothesis; developmental and variability patterns in the acquisition of syntax, phonology and morphology, including the potential effects of typological and formal universals; pragmatics and discourse; the lexicon, social and cognitive factors in acquisition, communication and learning strategies; theories of second language acquisition.]

[LING 415 Second Language Acquisition II (also Asian Studies 417)
Spring. 4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. Y. Shirai.
This course will examine various issues in second language acquisition research that is particularly relevant to foreign language teaching and learning. Topics covered will include: the role of input (listening/reading) vs. output (speaking/writing); implicit vs. explicit learning; negative vs. positive evidence (including the role of error correction); affective factors (motivation, anxiety); individual differences; teachability hypothesis and syllabus construction; the structure of second language proficiency.]

[LING 420 Approaches to Discourse (also Asian Studies 419 and Comparative Literature 421)
Spring. 4 credits. Prerequisite: at least one course in applied linguistics, linguistics, psychology, sociology, anthropology, or literary analysis, or permission of instructor. Not offered 1999–2000. H. Tao.
Learning another language entails using that language—that is, being able to create and understand discourse in that language. Interdisciplinary studies demonstrate that there are patterns of language use above the sentence level in ordinary conversation and other types of spoken interaction as well as in written texts of various sorts. This course will introduce the various discourse approaches to language from the fields of anthropology, sociology, cognitive psychology, literary analysis, linguistics, and philosophy and focus on the major insights that have proven to be most helpful in understanding second language learning and language use. The topics to be covered include: narrative structure, conversation structure, rhetorical structure, information flow in discourse, and language and social interaction.]

LING 421–422 Semantics I, II
421, spring; 422, fall. 4 credits each term. Prerequisites: for LING 421, LING 203; for LING 422, LING 421 or permission of instructor. Fall, J. Shimoyama; spring, M. Diesing.
421: An introduction to semantics of natural language. The course starts from basic foundational questions concerning the nature of meaning and the empirical domain of semantic theory. Truth-conditional and logical theories and their application to the investigation of the structure of natural languages are extensively explored (with some comparisons with other approaches). Through the study of quantification, scope, anaphora, modalities, presuppositions, and the like, one tries to gain insight into general characteristics of the cognitive apparatus that is at the basis of our capacity for understanding sentences.
422: Guides students into current work in semantic theory. The first half of the course is an introduction to Montague-style semantics, whose influence on current research is quite

extensive. The second half of the course focuses on selected topics that have grown out of (and sometimes against) classical Montague semantics. Such topics are usually drawn from the following: generalized quantifiers and anaphora, type-shifting, problems of tense and aspect, the linguistic relevance of algebraic approaches to properties, propositions, events and thematic roles, and discourse representation theory.

[LING 425 Corpora and Applied Linguistics (also Asian Studies 425)
Fall. 4 credits. Prerequisite: at least one course in applied linguistics, linguistics, psychology, sociology, anthropology, or literary analysis, or permission of instructor. Not offered 1999–2000. H. Tao.
This course introduces the foundations of studies of language based on large quantities of natural language data, the utility of large corpora for language learning and teaching, and the computational skills needed to carry out applied linguistics research based on language corpora. It will be conducted in both lecture and lab session formats. Topics include: the creation of corpora, coding and tagging of corpora, monolingual vs. parallel corpora, native vs. learner corpora, corpora and language pedagogy, corpora and discourse pragmatics, special issues in East Asian language corpora, corpora and lexicon and grammar.]

LING 436 Language Development (also Cognitive Studies 436, Human Development 436, and Psychology 436)
Spring. 4 credits. Open to undergraduate and graduate students. Graduate students should also enroll in HD 633/LING 700/PSYCH 600, a supplemental graduate seminar. Prerequisite: at least one course in developmental psychology, cognitive psychology, cognitive development, neurobiology, or linguistics. B. Lust.
This course surveys basic issues, methods, and research in the study of first-language acquisition. Major theoretical positions in the field are considered in the light of experimental studies in first-language acquisition of phonology, syntax, and semantics from infancy on. The fundamental issues of relationships between language and thought are discussed, as are the fundamental linguistic issues of Universal Grammar and the biological foundations for language acquisition. The acquisition of communication systems in nonhuman species such as chimpanzees is addressed, but major emphasis is on the child. An optional lab course supplement is available (see COGST 450/LING 450/PSYCH 437).

LING 450 Lab Course: Language Development (also Cognitive Studies 450 and Psychology 437)
Spring. 2 credits. Prerequisite: concurrent enrollment in either COGST/HD/LING/PSYCH 436. B. Lust.
This laboratory course will provide undergraduates with an introduction to hands-on research experience in the Cognitive Studies research labs and will meet once a week in group format. It will include several structured modules dealing with topics covered in the survey course, COGST/HD/LING/PSYCH 436, Language Development. They will include training in how to study and analyze original child language data, including the use of selected portions of a large database of child language data from many languages in the Cornell Language Acquisition Lab (CLAL), and training necessary to the collection and analysis of new child language data. Emphasis will be placed on developing research methods in order to test hypotheses.

LING 493 Honors Thesis Research
Fall. 4 credits. Staff.
May be taken before or after LING 494, or may be taken independently.

LING 494 Honors Thesis Research
Spring. 4 credits. Staff.
May be taken as a continuation of, or before, LING 493.

LING 601 Topics in Phonological Theory
Spring. 4 credits. Prerequisites: LING 301 and one higher-level course in phonology. D. Zec.
Selected topics in current phonological theory.

[LING 602 Topics in Morphology
Fall. 4 credits. Prerequisites: LING 301 or 303 or permission of instructor. Not offered 1999–2000. D. Zec.
Selected topics in current morphological theory.]

LING 604 Research Workshop
Fall. 2 credits. S-U grade only. Required of third-year linguistics graduate students. A. Cohn.
This course provides a forum for presentation and discussion of ongoing research, and development of professional skills. Participants must enroll in a concurrent independent study with a special committee member, or a relevant workshop.

[LING 606 Historical Syntax
Spring. 4 credits. Prerequisite: LING 303. Not offered 1999–2000. J. Whitman.
A course on change in language structure, beginning with an overview of widely attested types of syntactic change and proceeding to an introduction of current theoretical treatments. Topics covered include grammaticalization, word order change, and the interplay between morphological and syntactic change. Assumes a basic background in syntax.]

[LING 607 Twentieth-Century Approaches to Language
Fall. 4 credits. Prerequisite: at least one course in linguistics or permission of instructor. Offered alternate years. Not offered 1999–2000. L. Waugh, M. Bernal.
The development of 20th-century approaches to language in America and Europe. Work in 19th-century approaches will also be considered in their relation to 20th-century approaches.]

[LING 608 Discourse Analysis (also Comparative Literature 618)
Spring. 4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. L. Waugh, H. Tao.
Linguistic theory applied to relationships beyond the sentence.]

LING 609 SLA and the Asian Languages (also Asian Studies 610)
Fall. 4 credits. Prerequisite: LING 414–415 or permission of instructor. Y. Shirai.
This course will survey the literature on the acquisition of Asian languages both in first and second language. We will mainly focus on Japanese, Korean, Chinese (Mandarin/Cantonese), but other languages (Thai, Malay, Vietnamese, Burmese, Tagalog, etc.) may be dealt with, depending on faculty/student interest.

LING 616 Syntax III
Fall. 4 credits. Prerequisite: LING 304 or permission of instructor. V. Carstens.
An examination of recent developments in syntactic theory, including "minimalist" approaches to phrase structure, derivations/representations and the nature of economy conditions, and parametric differences.

[LING 633 Seminar in First-Language Acquisition: Cross-linguistic Studies of the Acquisition of Anaphora (also Cognitive Studies 633 and Human Development 633)
Fall. 1–4 credits. Prerequisite: LING 436 or equivalent or permission of instructor. Not offered 1999–2000. B. Lust.
This seminar will review and critique current theoretical and experimental studies of the first-language acquisition of anaphora, with a concentration on insights gained by cross-linguistic study of this area. The seminar will focus on relating current developments in linguistic theory regarding anaphora to current experimental research on first-language acquisition of anaphora. Attention will also be given to the development of research proposals.]

[LING 637 Experimental Research for Language Sciences
Fall. 4 credits. Not offered 1999–2000. Staff.
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: LING 301, 319, or permission of instructor. Offered alternate years. Not offered 1999–2000. S. Hertz.
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 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 Proseminar in Cognitive Studies I, II (also Cognitive Studies 773–774, Computer Science 773–774, Philosophy 773–774, Psychology 773–774)
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.

Linguistics of Particular Languages

Fees: Depending on the course, a small fee may be charged for photocopied texts for course work.

African

[LING 235 Introduction to African Languages and Linguistics @
Fall. 3–4 credits variable. Not offered 1999–2000. 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 431 Structure of an African Language
Spring. 4 credits. Prerequisite: LING 101 or permission of the instructor. Offered alternate years. Not offered 1999–2000. V. Carstens.
A survey of the grammar of an African language in light of current linguistic theory.]

[LING 514 Syntax of African Languages
Spring. 4 credits. Prerequisites: LING 101 and permission of instructor. Not offered 1999–2000. V. Carstens.
Selected topics in the syntax of African languages.]

American Sign Language

LING 111 American Sign Language I
Fall. 4 credits. T. Galloway.
Students with no previous background in American Sign Language (ASL) will be introduced to the nature of a signed language and develop expressive and receptive skills in ASL. Basic grammar and vocabulary will be covered, including explanations of the fundamental parts of a sign, proper use of fingerspelling, and the significance of nonmanual features. Instruction will be supplemented with videotexts allowing students to begin to explore the visual literature of the Deaf community in the United States: stories, poems, and jokes which are unique to Deaf culture. Readings and class discussions will acquaint students with the causes of deafness, the historical development of ASL and its linguistic status, as well as characteristics of deaf education both throughout history and in the present day.

LING 112 American Sign Language II
Fall. 4 credits. Prerequisite: LANG 101, LING 111, or permission of instructor. T. Galloway.
In this intermediate course, students will continue to develop expressive and receptive fluency in ASL. Focus will be on greater descriptive skill, developing intermediate level narratives, and enhancing conversational ability. Advanced grammar and vocabulary will be supplemented with further instruction in the linguistic structure of ASL. Readings, class discussions, and videotexts containing samples of the visual literature of the U.S. Deaf community will continue students' investigation into American Deaf history and the shaping of modern Deaf culture.

Arabic

[LING 416 Structure of the Arabic Language (also Near Eastern Studies 416) @ #
Not offered 1999–2000.
For description, see NES 416.]

Celtic

LING 236 Introduction to Gaelic
Spring. 3 credits. W. Harbert.
This course is an introduction to the history, structure, and current status of the Scottish Gaelic language, oriented around elementary Gaelic texts.

[LING 238 Introduction to Welsh
Spring. 3 credits. Not offered 1999–2000. W. Harbert.
This course surveys the history, structure, cultural and political situation of the Welsh language. It includes several sessions of elementary language instruction and a brief introduction to Welsh literature.]

LING 239/539 The Celtic Languages
Fall. 4 credits. Graduate students register under LING 539. W. Harbert.
This course surveys the history, structure, and political and social situation of the Celtic languages (Welsh, Scottish Gaelic, Irish Gaelic, Breton, Cornish, and Manx). The course includes a few days of introductory language instruction in some of these languages.

LING 437 Celtic Linguistic Structures
Spring. 4 credits. Prerequisite: LING 303. W. Harbert.
This course will treat selected topics in the syntax and morphosyntax of the modern Celtic languages.

LING 623–624 Old Irish I, II
623, fall; 624, spring. 4 credits each term. Prerequisite for LING 624: LING 623 or permission of instructor. E. Rieken.
An introduction to "classical" Old Irish for students with no previous experience with the language.

LING 625 Middle Welsh
Spring. 4 credits. Prerequisite: permission of instructor. W. Harbert.
Students develop a reading knowledge of Middle Welsh through reading prose and poetic texts with emphasis on prose tales, including the *Mabinogi*.

[LING 627 Advanced Old Irish]

Chinese

LING 429 Structure of the Chinese Language (also Asian Studies 429) @
Fall. 4 credits. Prerequisite: proficiency in Chinese or permission of instructor. H. Tao.
This course is an introduction to the structure of Chinese and to general issues related to Chinese linguistics. Special attention will be paid to Chinese discourse and pragmatics and to general questions of language use.

English

LING 217 History of the English Language #
Spring. 4 credits. W. Harbert.
This course explores the development of the English language from its Indo-European beginnings to the present. Topics covered include changes in sound, vocabulary and grammatical structure, external influences, Old English, Middle English, Standard English, dialects, and World Englishes.

LING 242 Diversity in American English
Spring. 3 credits. C. Collins.
This course is a basic introduction to the regional dialects of English spoken in the United States. It is linguistically oriented, introducing the relevant aspects of phonetics, phonology, morphology, and syntax where appropriate. There is an emphasis on the students discovering what features characterize their own dialects (if they speak American English). The class is also of use as an introduction to American English dialects for non-native speakers of English.

LING 311 The Structure of English: Demystifying English Grammar
Spring. 4 credits. J. Bowers.
Do you suffer from grammatical insecurity? In foreign language classrooms, do you find yourself at a loss because you don't know how grammatical terminology applies to English? This course will make English grammar accessible and comprehensible to native speakers who want to understand how the language they use so easily works. In addition to standard grammatical notions, the course will consider dialectal variation, matters of style, how sentence structure conveys viewpoint, and other discourse phenomena.

LING 347 Topics in the History of English
Spring. 4 credits. Prerequisite: LING 217, 314, a course in Old or Middle English, or permission of instructor. W. Harbert.
The course will treat specific topics in the linguistic history of the English language, selected on the basis of the particular interests of the students and the instructor. The topic area for the 1999–2000 academic year will be morphological and syntactic change during the Early Middle English period—a period crucial to the development of the distinctive syntactic properties of Modern English.

[LING 649 Structure of Old English
Spring. 4 credits. Prerequisite: Ling 441. Offered alternate years. Not offered 1999–2000. W. Harbert.
Linguistic overview of Old English, with emphasis on phonology and syntax.]

French

[LING 232 The French Language Today
Fall. 3 credits. Prerequisite: LING 101. Not offered 1999–2000. 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.]

[LING 433 Contemporary Theories of French Grammar
Fall. 4 credits. Prerequisite: permission of instructor. Offered alternate years. Not offered 1999–2000. L. Waugh.
Selected topics in twentieth-century French linguistics.]

[LING 439 Linguistic Structure of French II: Semantics, Pragmatics, and Discourse Analysis
Fall. 4 credits. Prerequisite: qualification in French. Offered alternate years. Not offered 1999–2000. L. Waugh.
A synchronic study and analysis of modern French, with emphasis on semantics, pragmatics, and discourse analysis.]

German and Germanic

[LING 237 The Germanic Languages
Fall. 4 credits. Not offered 1999–2000. W. Harbert, M. Diesing.
This course surveys the history, structure, and use of the modern Germanic languages (English, German, Dutch, Afrikaans, Swedish, Danish, Icelandic, Norwegian, Faroese, and Yiddish).]

LING 241 Yiddish Linguistics (also Jewish Studies 271)
Fall. 4 credits variable. Prerequisite: LING 101 or permission of instructor. M. Diesing.
This course will cover a wide variety of topics relating to the Yiddish language and Yiddish culture, including the structure of Yiddish, the history of the Yiddish language, Yiddish in America (the Yiddish revival, the role of the Yiddish press, etc.), Yiddish as a minority/dying language, and the influence of Yiddish on present-day American English. No previous knowledge of Yiddish required.

LING 315–316 Old Norse
315, fall; 316, spring. 4 credits each term. E. Johannsson.
Old Norse is a collective term for the earliest North Germanic literary languages: Old Icelandic, Old Norwegian, Old Danish, and Old Swedish. The richly documented Old Icelandic will be the center of attention, and the purpose is twofold: the student will gain (a) knowledge of an ancient North Germanic language, important from a linguistic point of view, as well as (b) access to the medieval Icelandic (and Scandinavian) literature.

315: The structure of Old Norse (Old Icelandic), phonology, and morphology, with reading of selections from the Prose-Edda, a 13th-century narrative based on the Eddaic poetry. 316: Extensive reading of Old Norse texts, among them selections from some of the major Icelandic family sagas: Njals saga, Grettis saga, and Egils saga, as well as the whole Hrafnkels saga.

LING 441 Introduction to Germanic Linguistics (also German Studies 441)
Fall. 4 credits. Prerequisite: LING 101 or permission of instructor. W. Harbert.
Survey of major issues in historical Germanic linguistics.

[LING 643 Topics in Historical Germanic Phonology #
Spring. 4 credits. Prerequisite: LING 441. Not offered 1999–2000. W. Harbert.
The development of the sound system from Proto-Germanic to its daughter languages.]

[LING 644 Topics in Historical Germanic Syntax #
Fall. 4 credits. Prerequisite: LING 441. Not offered 1999–2000. W. Harbert.
A diachronic and comparative investigation of syntactic processes in the older Germanic languages.]

[LING 645 Gothic
Spring. 4 credits. Prerequisite: LING 101. Offered alternate years. Not offered 1999–2000. W. Harbert.
Linguistic structure of Gothic, with extensive readings of Gothic texts.]

[LING 646 Old High German, Old Saxon
Spring. 4 credits. Prerequisite: LING 101. Offered alternate years. Not offered 1999–2000. W. Harbert.]

[LING 649 Structure of Old English #
Fall. 4 credits. Prerequisite: LING 441. Offered alternate years. Not offered 1999–2000. W. Harbert.
Linguistic overview of Old English, with emphasis on phonology and syntax.]

Greek

LING 451 Greek Comparative Grammar (also Classics 421)
Fall. 4 credits. Prerequisite: thorough familiarity with classical Greek morphology. A. Nussbaum.
The prehistory and evolution of the sounds and forms of ancient Greek as reconstructed by comparison with the other Indo-European languages.

[LING 455 Greek Dialects (also Classics 425) #
Fall. 4 credits. Prerequisite: basic familiarity with classical Greek morphology. Not offered 1999–2000. A. Nussbaum.
A survey of the dialects of ancient Greek through the reading and analysis of representative epigraphical and literary texts.]

[LING 457 Homeric Philology (also Classics 427) #
Spring. 4 credits. Prerequisite: ability to read Homeric Greek. Not offered 1999–2000. A. Nussbaum.
The language of the Homeric epics: dialect background, archaisms, modernizations. The notion of a Kunstsprache: its constitution, use, and internal consistency. The phonological and morphological aspects of epic compositional technique.]

[LING 459 Mycenaean Greek (also Classics 429) #
4 credits. Prerequisite: thorough familiarity with classical Greek morphology. Not offered 1999–2000. A. Nussbaum.
An introduction to the epigraphy, language, and content of the Linear B tablets with special attention to their implications for Greek historical grammar and dialectology.]

Hungarian

[LING 427 Structure of Hungarian
Fall. 4 credits. Prerequisite: LING 101 or equivalent. Offered alternate years. Not offered 1999–2000. W. Browne.
Survey of phonology, morphology, and syntax of this non-Indo-European language. Topics to be stressed include vowel harmony, consonant assimilation; definite and indefinite conjugations, possessives, verb prefixes, causatives; focus, word order, clause types, movement, intonation.]

Indo-European

LING 131–132 Elementary Sanskrit (also Classics 131–132 and Sanskrit 131–132)
For description, see SANSK 131–132.

[LING 251–252 Intermediate Sanskrit (also Classics 251–252 and Sanskrit 131–132) @ #
Not offered 1999–2000.
For description, see SANSK 131–132.]

[LING 460 Sanskrit Comparative Grammar
Spring. 4 credits. Prerequisite: reasonable familiarity with classical Sanskrit morphology. Not offered 1999–2000. A. Nussbaum.
A survey of the historical phonology and morphology of Sanskrit in relation to the Indo-Iranian and Indo-European comparative evidence.]

LING 617–[618] Hittite
617, fall; [618, spring]. 4 credits each term. Prerequisites: for LING 617, permission of instructor; for LING 618, LING 617 or permission of instructor. E. Rieken.
An introduction to the cuneiform writing system and the grammar of Hittite, followed by the reading of selected texts.

[LING 619 Rigveda
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. C. Minkowski.
Reading and linguistic analysis of selected Vedic hymns.]

[LING 631 Comparative Indo-European Linguistics
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. Staff.
An introduction to the comparative grammar of the Indo-European languages.]

[LING 635–636 Indo-European Workshop
635, fall; 636, spring. 4 credits each term. Prerequisite: permission of instructor. Not offered 1999–2000. Staff.
An assortment of subjects intended for students with previous training in Indo-European linguistics: problems in the reconstruction of Proto Indo-European, topics in the historical grammars of the various IE languages, reading and historical linguistic analysis of texts, and grammatical sketches of "minor" IE languages.]

Italian

[LING 409 Structure of Italian
Fall. 4 credits. Prerequisites: LING 101 or equivalent and qualification in any Romance language. Offered alternate years. Not offered 1999–2000. C. Rosen.
Survey of Italian syntax, using simple theoretical tools to bring hidden regularities to light. Topics include auxiliaries, modals, clitics, reflexive constructions, agreement, impersonal constructions, causatives.]

[LING 410 History of the Italian Language #
Spring. 4 credits. Prerequisites: LING 321 and either Italian 201, 203, or equivalent. Offered alternate years. Not offered 1999–2000. C. Rosen.
Overview of Italian and its dialects from the earliest texts to the present day. Emergence of the standard language. External history and sociolinguistic circumstances.]

Japanese

LING 404 Linguistic Structure of Japanese (also Asian Studies 412) @
Fall. 4 credits. Prerequisites: Japanese 102 or permission of instructor and LING 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.

LING 411 History of the Japanese Language (also Asian Studies 411) @ #
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.

Korean

LING 430 Structure of Korean (also Asian Studies 430)
Spring. 4 credits. Offered alternate years. J. Whitman.
Intensive examination of the syntax and phonology of a non-Indo-European language with the objective of testing principles of current linguistic theory. No previous knowledge of Korean required.

Latin and Italic

[LING 452 Latin Comparative Grammar (also Classics 422)
Fall. 4 credits. Prerequisite: thorough familiarity with classical Latin morphology. Not offered 1999–2000. A. Nussbaum.
The prehistory and evolution of the sounds and forms of classical Latin as reconstructed by comparison with the other Indo-European languages.]

[LING 454 Italic Dialects (also Classics 424) #
Fall. 4 credits. Prerequisite: thorough familiarity with classical Latin morphology. Not offered 1999–2000. A. Nussbaum.
The phonology and morphology of Faliscan, Oscan, and Umbrian studied through the reading of epigraphical texts. Attention to the relations of these languages to Latin and the question of proto-Italic.]

[LING 456 Archaic Latin (also Classics 426) #
Fall. 4 credits. Prerequisite: reading knowledge of Latin. Not offered 1999–2000. A. Nussbaum.
Reading of epigraphic and literary preclassical texts with special attention to archaic and dialectal features. The position of Latin among the Indo-European languages of ancient Italy, the rudiments of Latin historical grammar, and aspects of the development of the literary language.]

Romance

[LING 321–322 History of the Romance Languages #
321, fall; 322, spring. 4 credits each term. Prerequisites: LING 101 or equivalent and qualification in any Romance language. Offered alternate years. Not offered 1999–2000. C. Rosen.
321: Popular Latin. Pan-Romance trends in phonology, morphology, syntax, and the lexicon. Regional divergence. Non-Latin influences. Medieval diglossia and emergence of Romance standards. 322: French, Italian, and Spanish from 850 to 1250 A.D. Analysis of texts. Overview of other languages to the present day. Elements of dialectology.]

LING 323–[324] Comparative Romance Syntax
323, spring; [324]. 4 credits. Prerequisites: LING 101, or equivalent and qualification in any romance language. Offered alternate years. C. Rosen.
Concise survey of romance syntax, covering the salient constructions in six languages with equal attention to their historical evolution and their current state. Grammatical innovation and divergence in a typological perspective.

Russian and Slavic

[LING 417–418 History of the Russian Language (also Russian 401–402) #
417, fall; 418, spring. 4 credits each term. Prerequisites: for LING 417, permission of instructor; for LING 418, LING 417 or equivalent. Offered alternate years. Not offered 1999–2000. W. Browne.
Phonological, morphological, and syntactic developments from Old Russian to modern Russian.]

LING 443–[444] Linguistic Structure of Russian (also Russian 403–404)
443, spring; [444]. 4 credits each term. Prerequisites: for LING 443, LING 101 and permission of instructor; for LING 444, LING 443 or equivalent. Offered alternate years. W. Browne.
A synchronic analysis of the structure of modern Russian. LING 443 deals primarily with morphology and its relation to syntax and 444 with syntax and word order. Topics covered include case theory, the functions of word order, voice, agreement, impersonal constructions, negation, nonuniversal categories, and the relation between morphology and syntax.

LING 661 Old Church Slavonic (also Russian 601)
Fall. 4 credits. This course is prerequisite to LING 662. Offered alternate years. W. Browne.
Grammar and reading of basic texts.

LING 662 Old Russian Texts (also Russian 602)
Spring. 4 credits. Prerequisite: LING 661. Offered alternate years. W. Browne.
Grammatical analysis and close reading of Old Russian texts.

[LING 671–672 Comparative Slavic Linguistics (also Russian 651–652)
671, fall; 672, spring. 4 credits each term. Prerequisites: for LING 671, LING 661 taken previously or simultaneously or permission of instructor; for LING 672, LING 671 or permission of instructor. Offered alternate years. Not offered 1999–2000. W. Browne.
Sounds and forms of the Slavic languages and of prehistoric common Slavic; main historical developments leading to the modern languages.]

South Asian

[LING 341 India as a Linguistic Area
Spring. 4 credits. Prerequisite: LING 101 or permission of instructor. Not offered 1999–2000. J. Gair.
A basic introduction to the linguistic and sociolinguistic character of the subcontinent, with special attention to cross-linguistic family influences and convergence.]

[LING 440 Dravidian Structures
Fall. 4 credits. Prerequisite: LING 101. Not offered 1999–2000. J. Gair.
A comparative and contrastive analysis of the structures of several Dravidian languages.]

[LING 442 Indo-Aryan Structures
Fall. 4 credits. Prerequisite: LING 101. Not offered 1999–2000. J. Gair.
Typological discussion of the languages of the subfamily. Specific topics and emphasis may vary depending on the interest of the students.]

Southeast Asian

[LING 230 Introduction to Southeast Asian Languages and Linguistics @
Fall. 3–4 credits variable. For non-majors or majors. Not offered 1999–2000. A. Cohn, 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) sociolinguistic and ethnolinguistic issues of language and politics, language and culture, and language use; 2) language structures and typological patterns of the area's languages; 3) historical linguistics, genetic relations between languages, as well as the linguistic effects of language contact and linguistic evidence for prehistory.]

[LING 653–654 Seminar in Southeast Asian Linguistics
653, fall; 654, spring. 4 credits each term. Prerequisite: LING 303 or permission of instructor. LING 653 is not a prerequisite for 654. Not offered 1999–2000.
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 LING 655, LING 101 and permission of instructor; for LING 656, LING 655. J. Wolff.
Descriptive and comparative studies of Malayo-Polynesian languages.

[LING 657–658 Seminar in Austroasiatic Linguistics
657, fall; 658, spring. 4 credits each term. Prerequisite: LING 101 or permission of instructor. Not offered 1999–2000.
Descriptive and comparative studies of Austroasiatic languages.]

Spanish

[LING 366 Spanish in the United States (also SpanRom 366 and Latino Studies Program 366)
Fall. 4 credits. Prerequisite: some knowledge of Spanish. Not offered 1999–2000. M. Suñer.
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 407 Grammatical Structure of Spanish I (also SpanRom 407)
Spring. 4 credits. Prerequisite: proficiency in Spanish or permission of instructor. Not offered 1999–2000. M. Suñer.
This course seeks to equip the advanced student or the future language professional with practical insights into problem areas for foreign language learners with the aid of linguistic descriptions. The intent is to narrow the gap known to exist between the knowledge that a native speaker has and the incomplete one that a foreign language learner possesses.]

[LING 408 Grammatical Structure of Spanish II (also SpanRom 408)
Spring. 4 credits. Prerequisites: LING 101 and proficiency in Spanish or permission of instructor. Offered alternate years. Not offered 1999–2000. M. Suñer.
Survey of Spanish morpho-syntax using contemporary theoretical models to highlight hidden patterns and generalizations. Topics may vary according to students' interests, but may include major clause types, word order possibilities, negation, agreement, and null categories.]

MATHEMATICS

R. Connelly, chair; G. Bailey, D. Barbasch, Y. Berest, L. Billera, K. Brown, S. Chase, associate chair and director of undergraduate studies; M. Cohen, R. K. Dennis, P. Diaconis, R. Durrett, E. Dynkin, C. Earle, A. Epstein, J. Escobar, V. Gasharov, L. Gross, M. Gross, J. Guckenheimer, A. Hatcher, D. Henderson, J. Hubbard, J. Hwang, Y. Ilyashenko, A. Kable, P. Kahn, H. Kesten, V. Limic, M. Morley, A. Nerode, M. Nussbaum, I. Peeva, R. Platek, R. Ramakrishna, T. Rishel, O. Rothaus, L. Saloff-Coste, A. Schatz, S. Sen, R. Shore, R. Sjamaar, J. Smillie, A. Solomon, B. Speh, M. E. Stillman, R. Strichartz, M. Sweedler, M. Terrell, R. Terrell, P. Topping, K. Vogtmann, L. Wahlbin, B. H. West, J. West, D. Wise, (Emeritus: J. Bramble, R. Farrell, G. R. Livesay, P. Olum, L. E. Payne, A. Rosenberg)

Mathematics is the language of modern science; basic training in the discipline is essential for those who want to understand, as well as for those who want to take part in, the important scientific developments of our time. Acquaintance with mathematics is also extremely useful for students in the social sciences and valuable for anyone interested in the full range of human culture and the ways of knowing the universe in which we live.

The Department of Mathematics faculty has strong groups specializing in algebra, number theory, real and complex analysis, Lie groups, topology and geometry, logic, probability and statistics, mathematical physics, and applied mathematics. Related departments at Cornell have specialists in computer science, operations research, linear programming, and game theory, and courses in these topics can be integrated readily into the mathematics major.

The department offers a rich variety of undergraduate courses, and many of its beginning graduate courses are suitable for advanced undergraduates as well. Under some conditions, a student may carry out an independent reading and research project for college credit under the supervision of a faculty member.

Members of the department are available to discuss with students the appropriate course for their levels of ability and interest, and students are urged to avail themselves of this help.

Students who want to take any of the courses numbered 300 or above are invited to confer, before registering, with the instructor concerned. The level of a course is indicated by the first digit of the course number: roughly, 1, 2, indicate underclass courses; 3, 4, upperclass courses; 5, professional level and mathematics education courses; 6, 7, graduate courses. The subject matter of courses is often indicated by the second digit: 0, general; 1, 2, analysis; 3, 4, algebra; 5, 6, topology and geometry; 7, probability and statistics; 8, logic; 9, other.

Midterm grades, when required, will be S or U only, except in special circumstances. In courses with numbers below 700, 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, and can be broad or narrow. It can also be combined easily with serious study in another subject in the physical, biological or social sciences by means of a double major and/or concentration. For example, a double major with mathematics and computer science is facilitated by the concentration in computer science (4b) described below; this concentration permits a student to use certain computer science courses to satisfy the requirements of both majors. Questions concerning the major should be brought to a departmental representative.

Prerequisites: the traditional prerequisites are Mathematics 221–222, 223–224 or 293–294. A unit on infinite series is required. Such a unit is offered in Mathematics 112, 122, and 192. Normally students will be admitted to the major only when they have grades of B– or better in all sophomore-level mathematics courses they have taken. Alternative prerequisites are Mathematics 213, 231, normally with grades of B+ or better.

Requirements

There are five requirements for the major:

1) Computer Science 100. Students are urged to take this course before the end of the sophomore year.
2) Two courses in algebra. Eligible courses are Mathematics 431 or 433, 432 or 434 or 332, 336.
3) Two courses in analysis. Eligible courses are Mathematics 321, 411 or 413, 414, 418, 420, 422, 423, 427, 428.
4) Further high-level mathematical courses. Any one of the following are 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.

d) (Concentration in Economics) Five additional courses from v), vi), vii) below, as follows: 1 course from v), 3 courses from vi), and a 5th course from any of v), vi), vii). However, Mathematics 472 and Economics 319 cannot **both** be used to satisfy these requirements.

v) Mathematics courses numbered 300 or above

vi) Economics courses with significant mathematical content. Eligible courses are Economics 318, 319, 320, 416, 419, 450 (also ARME 450), 467, 609, 610, 613, 614, 619, 620, 717, 756

vii) Courses in Operations Research with significant mathematical content and dealing with material of interest in economics; e.g. OR&IE 320, 321, 432, 435, the 1-semester sequence 475–476. However, the student may, with the advisor's approval, select an OR&IE course that satisfies the basic intent of the requirement but is not in this list.

These four alternatives do not exhaust the possibilities. A mathematics major interested in a concentration in a subject different from those above may develop a suitable individual program in consultation with the major advisor.

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.

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 Agriculture, Mathematics and Science (TEAMS)

Students at Cornell may pursue teaching credentials in biology, chemistry, earth science, general science, mathematics, and physics. TEAMS is a university program jointly conducted by the Departments of Education and Mathematics. Although TEAMS 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 TEAMS Student Support Specialist at 255–9255 or the 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 Quantitative and Formal Reasoning part of the Distribution Requirements. Explicit exceptions are noted in the beginning of the Arts and Sciences section of the Courses of Study.

Basic Sequences

Precalculus

Description	*Course Numbers*
1) Algebra and trigonometry to prepare students for calculus	MATH 109* or EDUC 005*
2) Algebra, analytic geometry, elements of calculus	EDUC 115**

*MATH 109 and EDUC 005 do not carry credit for graduation.

**Students who want a second semester of mathematics after EDUC 115 may take MATH 105 or if they need more calculus, MATH 111.

Calculus

Description	*Mathematics Course Numbers*
1) Standard three-semester sequence for students who do not expect to take advanced courses in mathematics	111–112–213
2) Calculus for engineers (also taken by some physical science majors)	191(193)–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 121–122–223–224; or the engineering sequence 191(193)–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 or 193 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 excellent may switch to sequence 3 and take 221.

Special-Purpose Sequences

Description	*Mathematics Course Numbers*
1) Finite mathematics and calculus for biology majors	105–106
2) Other possible finite mathematics and calculus sequence	105–111

Students who want to take two semesters of calculus are advised to take the first two semesters of one of the three calculus sequences. It is also possible to follow Mathematics 106 with 112 or 122.

Switching between calculus sequences is often difficult, especially at the 200 level. Students should not attempt such a switch without consulting the associate chair.

Courses with Overlapping Content

Because the department offers many courses with overlapping content, students must choose their courses carefully to ensure that they will receive credit for each course they take. Listed below are groups of courses with similar content. Students will receive credit for only one of the courses in each group.

106, 111, 121, 191, 193
112, 122, 192
213, 222, 224, 293
221, 223, 231, 294
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.

Summer Courses

A list of mathematics courses usually offered every summer can be found in the School of Continuing Education and Summer Sessions section of this catalog. Students interested in taking summer courses in mathematics should consult the Mathematics Department (255–4013). A tentative summer listing may be available as early as October.

Undergraduate Course Offerings

Please visit the department web site (http://math.cornell.edu/) for further information and up-to-the-minute corrections.

Foundation courses: 105, 106, 109, 111, 112, 121, 122, 191, 192, 193, 213, 221, 222, 223, 224, 293, 294

Mathematics Education: 405, 408, 451

History of Mathematics: 403

General and Liberal Arts Courses: 103, 150, 171, 181, 401, 405, 408, 490

Analysis: 411, 413, 414, 418

Algebra and Number Theory: 231, 332, 336, 431, 432, 433, 434, 436

Combinatorics: 441, 442

Geometry and Topology: 150, 356, 451, 452, 453, 454, 455

Probability and Statistics: 171, 471, 472, 474

Mathematical Logic: 181, 281, 384, 481, 482, 483, 486

Applied Analysis and Differential Equations: 321, 420, 422, 423, 425, 427, 428

MATH 103 Mathematical Explorations
Fall, spring. 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. 3 credits. Prerequisite: three years of high school mathematics, including trigonometry and logarithms.
Mathematical modeling, sets, functions, and graphing (including use of log and semi-log paper). Probability (with some applications to genetics). Matrices, systems of linear equations, and Markov chains. Examples from biology are used.

MATH 106 Calculus for Biologists
Spring. 3 credits. Prerequisite: readiness for calculus, such as can be obtained from 3 years of high school mathematics (including trigonometry), or any one of the following Cornell courses: MATH 105, MATH 109, or EDUC 115. Mathematics 111, rather than 106, is recommended for those planning to take 112.*
Introduction to differential and integral calculus, partial derivatives, elementary differential equations. Examples from biology are used.

MATH 109 Precalculus Mathematics
Summer. 3 transcript credits only; cannot be used toward graduation.
This course is designed to prepare students for Mathematics 111. Algebra, trigonometry, logarithms, and exponentials are reviewed.

*See the list of courses with overlapping content at the end of the introduction.

MATH 111–112 Calculus
Calculus is the study of functions and processes from the point of view of how they are changing. What can we know of a function from the rate at which it changes? What is the cumulative effect of infinitely many infinitesimal changes?

Mathematics 111 and 112 aim to provide, to students with little or no prior exposure to calculus, the knowledge that calculus is *useful,* in that its applications to the physical, biological and social sciences have shaped our world, and *beautiful*, in that it represents a breathtaking attempt of the human mind to capture the infinitely large and the infinitely small.

These courses seek to provide basic understanding, technical skills and sample applications in various fields for the very broad range of students who take them. Topics are studied (as appropriate) by analytic, numerical and graphical methods. These courses usually have several sections with small-group projects. (See the Supplement to the Course and Room Roster.)

MATH 111 Calculus
Fall, spring. 4 credits. Prerequisites: Mathematics 109 or three years of high school mathematics, including trigonometry.*
Functions and graphs, limits and continuity, differentiation and integration of algebraic, trigonometric, inverse trig, logarithmic and exponential functions. Applications of differentiation, including graphing, max-min problems, tangent line approximation, implicit differentiation, applications to the sciences. The mean value theorem. Antiderivatives, definite and indefinite integrals, the fundamental theorem of calculus, substitution in integration, the area under a curve. Graphing calculators will be used, and their pitfalls will be discussed, as applicable to the above topics.

Mathematics 111 can serve as a one-semester introduction to calculus or as part of a 2-semester sequence in which it is followed by Mathematics 112 or 122.

MATH 112 Calculus
Fall, spring. 4 credits. Prerequisites: Mathematics 106 or 111 with a grade of C or better. Those who do well in Mathematics 111 and expect to major in mathematics or a strongly mathematics-related field should take 122 instead of 112.*
Integration: applications, including volumes and arc length; techniques of integration, approximate integration with error estimates, improper integrals, differential equations (separation of variables, initial conditions, systems, some applications). Infinite sequences and series: definition and tests for convergence, power series, Taylor series with remainder. Parametric equations.

MATH 121 Honors Calculus
Fall. 4 credits. Prerequisite: three years of high school mathematics with average grade of A- or better, or permission of the department.*
This is a first-semester course in calculus intended for students who have been quite successful in their previous mathematics courses. The syllabus for the course is quite similar to that of Mathematics 111; however, the approach is more theoretical and the material will be covered in greater depth.

*See the list of courses with overlapping content at the end of the introduction.

MATH 122 Honors Calculus
Fall, 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 150 From Space to Geometry
Fall. 3 credits. Not offered 1999–2000.
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.]

*See the list of courses with overlapping content at the end of the introduction.

MATH 171 Statistical Theory and Application in the Real World
Fall, spring. 4 credits. Prerequisites: high school mathematics.
This introductory statistics course will discuss techniques for analyzing data occurring in the real world and the mathematical and philosophical justification for these techniques. Topics include population and sample distributions, central limit theorem, and statistical theories of point estimation, confidence intervals, and testing hypotheses, the linear model, and the least squares estimator. The course concludes with a discussion of tests and estimates for regression and analysis of variance (if time permits). The computer will be used to demonstrate some aspects of the theory, such as sampling distributions and the Central Limit Theorem. In the lab portion of the course, students will learn and use computer-based methods for implementing the statistical methodology presented in the lectures. (No previous familiarity with the computer is presumed.)

[MATH 181 Elementary Logic and Formal Proof
Fall. 3 credits. Prerequisite: high school mathematics. Not offered 1999–2000.
The course will explore, from an elementary viewpoint, several topics selected by the instructor from the following list: sets and relations, mathematical induction, cardinal numbers and the notion of infinity, formal and informal proofs and their roles in mathematics and computer science, introduction to mathematical logic, applications of formal logic to world problems and puzzles. The course is designed for liberal arts students, including those who may be "math-averse." Rather than providing a systematic treatment of formal logic, it attempts to instill an appreciation for mathematics and its uses, as

*See the list of courses with overlapping content at the end of the introduction.

well as some understanding of the process by which intuitive notions are developed into precise mathematical statements.]

MATH 191 Calculus for Engineers
Fall. 4 credits. Prerequisite: three years of high school mathematics, including trigonometry.*
Plane analytic geometry, differential and integral calculus, and applications. This course is restricted to engineering students who have had no previous successful experience with calculus. Students who have had such experience but wish a first-semester calculus course should take MATH 193.

MATH 192 Calculus for Engineers
Fall, spring. 4 credits. Prerequisite: Mathematics 191 or 193.*
Methods of integration, polar coordinates, complex numbers, infinite series. Introduction to physical vectors and calculus of functions of several variables.

MATH 193 Calculus for Engineers
Fall, spring. 4 credits. Prerequisite: three years of high school mathematics including trigonometry, plus some knowledge of calculus.*
Plane analytic geometry, differential and integral calculus, and applications. Mathematics 193 covers essentially the same topics as 191, but is designed for students with some previous successful experience with calculus.

MATH 213 Calculus
Fall, spring. 4 credits. Prerequisite: Mathematics 112, 122, or 192.*
Vectors and vector-valued functions. Multivariable and vector calculus including multiple and line integrals. First- and second-order differential equations with applications; systems of differential equations. Elementary partial differential equations. This course is designed for students who wish to master the basic techniques of calculus, but whose major will not require a substantial amount of mathematics. The course may emphasize different topics in the syllabus in different semesters.

MATH 221 Linear Algebra and Calculus
Fall, spring. 4 credits. Prerequisite: two semesters of calculus with a grade of B or better, or permission of instructor.*
Linear algebra and differential equations. Topics include vector algebra, linear transformations, matrices, linear differential equations, as well as an introduction to proving theorems. This course is especially recommended for students who plan to major in mathematics or in a strongly mathematics-related field.

MATH 222 Calculus
Fall, spring. 4 credits. Prerequisite: Mathematics 221.*
Vector differential calculus, calculus of functions of several variables, multiple integrals. This course is especially recommended for students who plan to major in mathematics or in a strongly mathematics-related field.

MATH 223 Honors Linear Algebra and Calculus
Fall. 4 credits. Prerequisites: two semesters of calculus with a grade of A- or better, or permission of instructor.*
Vectors, matrices and linear transformations; differential calculus of functions of several variables; inverse and implicit function theorems; quadratic forms, extrema, and manifolds; multiple and iterated integrals. Mathematics 223–224 provides an integrated treatment of linear algebra and multivariable calculus designed for students who have been highly successful in their previous calculus courses.

MATH 224 Honors Linear Algebra and Calculus
Spring. 4 credits. Prerequisites: Mathematics 223.*
Vector fields; line integrals; differential forms and exterior derivative; work, flux, and density forms; integration of forms over parametrized domains; Green's, Stoke's, and divergence theorems.

MATH 231 Linear Algebra
Spring. 3 credits. Prerequisite: Mathematics 111 or equivalent.*
Vectors, matrices, and linear transformations, affine and Euclidean spaces, transformation of matrices, and eigenvalues.

MATH 281 Deductive Logic (also Philosophy 331)
Spring. 4 credits.
For description, see PHIL 331.

MATH 293 Engineering Mathematics
Fall, spring. 4 credits. Prerequisites: Mathematics 192 plus a knowledge of computer programming equivalent to that taught in Computer Science 100.*
Introduction to ordinary differential equations, systems of ordinary linear differential equations. Vector fields and vector calculus. May include computer use in problem solving.

MATH 294 Engineering Mathematics
Fall, spring. 4 credits. Prerequisite: Mathematics 293.*
Introduction to partial differential equations, Fourier series, and boundary value problems, with applications. Matrix theory and linear algebra, inner product spaces. May include computer use in solving problems.

MATH 321 Applicable Analysis
Fall. 4 credits. Prerequisites: 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 615–616. With less preparation they should take Mathematics 420 (or 321)–422–423.* (This course was formerly MATH 421 and has a substantial overlap with MATH 420.)
A survey of some of the mathematical techniques that are of primary use in applications to the physical sciences and engineering. The primary mathematical tool explored is harmonic analysis, including Fourier Series, Fourier Integral, and Laplace Transform. The applications will be principally to boundary value problems for ordinary and partial differential equations. Moderately advanced mathematics will be used but explained as the course progresses at an elementary level. Much of the formal mathematical material missing in applied courses (e.g., uniform convergence, dominated convergence, complete orthonormal sets) will be thoroughly explained in the course and at the working level.

MATH 332 Algebra and Number Theory
Fall. 4 credits. Prerequisites: Mathematics 221, 231, or 294.*
Various topics from number theory and modern algebra, usually including most of the following: Primes and factorization, Diophantine equations, congruences, quadratic reciprocity, continued fractions, rings and fields, finite groups, introduction to arithmetic of the Gaussian integers and quadratic fields. Motivation and examples for the concepts of abstract algebra are derived primarily from number theory and geometry.

MATH 336 Applicable Algebra
Spring. 4 credits. Prerequisites: Mathematics 221, 294, or 231.*
An introduction to concepts and methods of abstract algebra and number theory that are of importance in science and engineering. Applications of the theory to concrete problems will be stressed. The course treats mathematical topics usually selected from the following list: elementary number theory and congruences, groups, fields, partially ordered sets, lattices, graph theory, Boolean algebras, finite machines and languages. Applications discussed usually include at least some of the following: cryptography, primality testing, elementary coding theory, enumeration problems, fast Fourier transform, difference equations. Additional topics and applications may be chosen by the instructor.

MATH 356 Groups and Geometry
Spring. 4 credits. Prerequisites: Mathematics 221 or Mathematics 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 the geometry of the planes and of patterns in the plane in terms of the group of symmetries ("isometries") of the plane. 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 given to initiate the student into the writing of proofs and the language of mathematics. Symmetries. Groups of transformations. Subgroups and cosets. Homomorphisms and isomorphisms. Orbits and fixed points. Frieze groups, wallpaper groups ("2-dimensional crystallographic groups") and the associated tesselations of the Euclidean plane.

MATH 384 Foundations of Mathematics (also Philosophy 434)
Fall. 4 credits. Prerequisites: one course in logic or permission of instructor.
For description, see PHIL 434.

MATH 401 Honors Seminar: Topics in Modern Mathematics
Spring. 4 credits.
This course is a participatory seminar primarily aimed at introducing senior and junior mathematics majors to some of the challenging problems and areas of modern mathematics. The seminar will help students develop research and expository skills in

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mathematics, which is important for careers in any field that makes significant use of the mathematical sciences (i.e., pure or applied mathematics, physical or biological sciences, business and industry, medicine). The content will vary from year to year.

MATH 403 History of Mathematics #
Spring. 4 credits. Prerequisites: two courses in mathematics above 300, or permission of instructor.
Survey of the development of mathematics from antiquity to the present, with an emphasis on the achievements, problems, and mathematical viewpoints of each historical period and the evolution of such basic concepts as number, geometry, construction, and proof. Readings from original sources in translation. Students will be required to give oral and written reports.

[MATH 405 Mathematical Exposition
Fall. 3 credits. Not offered 1999–2000.
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 408 Mathematics in Perspective
Spring. 4 credits. Prerequisite: consent of instructor (intended for senior mathematics majors and other students with strong mathematics backgrounds). Not offered 1999–2000.
The purpose of this course is for students to step back and to form an overview of the mathematics they have learned.]

MATH 411 Introduction to Analysis
Fall. 4 credits. Prerequisite: Mathematics 222 or 293–294. Students who need measure theory and Lebesgue integration for advanced probability courses should take Mathematics 413–414 or audit the first few weeks of Mathematics 621. Undergraduates who plan to attend graduate school in mathematics should take 413–414.
An introduction to the theory of functions of real variables, stressing concepts and a logical development of the subject rather than applications. Topics include Euclidean spaces, the real number system, continuous and differentiable functions, uniform convergence and approximation theorems, and the Riemann integral. Students who wish to continue study of theoretical analysis upon completion of Mathematics 411 may take, for example, Mathematics 418.

MATH 413–414 Honors Introduction to Analysis
413, fall; 414, spring. 4 credits each. Prerequisite for 413: Mathematics 222 or 293–294. Prerequisite for Mathematics 414: Mathematics 413.
This sequence, designed for honors students, provides an introduction to the theory of functions of real variables, stressing a rigorous logical development of the subject rather than applications. Topics include metric spaces, the real number system, continuous and differentiable functions, uniform convergence and approximation theorems, Fourier series, Riemann and Lebesgue integrals, calculus in several variables, and differentiable forms.

MATH 418 Introduction to the Theory of Functions of One Complex Variable
Spring. 4 credits. Prerequisite: Mathematics 222 or 294 or 213. May be offered only in alternate years.
A rigorous introduction to complex variable theory. Complex numbers. Differential and integral calculus for functions of a complex variable, including Cauchy's theorem and the calculus of residues. Elements of conformal mapping.

MATH 420 Applicable Analysis
Fall, 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 615–616. 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 Laplacian. Vector calculus and Stokes Theorem, with 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 422 Applicable Analysis II
Fall, spring. 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 III
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 in mathematics, or permission of instructor. Not offered 1999–2000.
Methods and basic theory for the numerical solution of ordinary and partial differential equations. Linear multistep methods, Runge-Kutta methods, and the problem of stiffness for ordinary differential equations. Finite difference methods and Galerkin finite element methods for partial differential equations. Homework will involve use of a computer.]

MATH 427 Introduction to Ordinary Differential Equations
Fall. 4 credits. Prerequisite: Mathematics 222 or 294 or permission of instructor.
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
431, fall; 432, spring. 4 credits each. Prerequisite: Mathematics 221 or 231. Prerequisite for Mathematics 432: Mathematics 431 or 433, or permission of instructor. 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 Honors Introduction to Algebra
433, fall; 434, spring. 4 credits each. Prerequisite: Mathematics 221 or 231. Prerequisite for Mathematics 434: Mathematics 433 or permission of instructor.
Honors version of Mathematics 431–432. Mathematics 433–434 will be more theoretical and rigorous than 431–432 and will include additional material such as multilinear and exterior algebra.

[MATH 436 Applications of Abstract Algebra
Spring. 4 credits. Prerequisites: Linear algebra (MATH 231 or higher). Familiarity with elementary algebra or number theory such as MATH 332 would also be helpful.* Not offered 1999–2000.
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 typically includes items drawn from: elementary number theory, polynomials and ring theory, monoids and group 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

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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 441 Introduction to Combinatorics
Spring. 4 credits. Prerequisites: Mathematics 221, 231, or 294.
Enumerative combinatorics: permutation enumeration, stirling and bell numbers, generating functions, exponential formula, Lagrange inversion, recurrences, basic asymptotic methods, rational generating functions. Basic graph theory: trees and Cayley's theorem, chromatic polynomial, eigenvalues and their application. Matching theory: equivalences, marriage theorem, flow problems, totally unimodular matrices. Polya theory: action of a group on a set, Burnside lemma, DeBruijn's method, applications to graphical enumeration and algorithms.

[MATH 442 Introduction to Combinatorics
Spring. 4 credits. Prerequisites: Mathematics 221, 231, or 294. Not offered 1999–2000.
Sieves and Mobius Inversion: inclusion/exclusion and its application to enumeration and number theory. Partially ordered sets, abstract Mobius inversion, rudiments of lattice theory. Matroids and combinatorial geometry: Rank function, circuits, bases, application to graph theory and geometry. Combinatorial design: Fisher's inequality, Latin squares, Hadamard matrices, Wilson's theorem on t-designs, application to statistical design. Nonconstructive methods: Ramsey's theorem, Lovasz local lemma, random graphs, application to coding theory. Extremal set theory: Sperner's lemma, Kruskal-Katona and Erdös-Ko-Rado theorems.]

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 was better understood. For example, the historical problem of the independence of Euclid's fifth postulate is understood when the existence of the hyperbolic plane is realized. 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 material provides some background for the study of general relativity; connections with the latter will be indicated.

MATH 455 Applicable Geometry
Fall. 4 credits. Prerequisite: a good introduction to linear algebra (such as in Math 221 or 293) or permission of the instructor. It will not be assumed that you know what any of the words in the following paragraphs mean.
An introduction to the theory of n-dimensional convex polytopes and polyhedra and some of its applications, with an in-depth treatment of the case of 3-dimensions. We will discuss both combinatorial properties (such as face counts) as well as metric properties (such as rigidity).

Theorems of Euler, Cauchy, and Steinitz, Voronoi diagrams and triangulations, convex hulls, cyclic polytopes, shellability and the upper-bound theorem. We relate these ideas to applications in tiling, linear inequalities and linear programming, structural rigidity, computational geometry, hyperplane arrangements and zonotopes.

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 671.

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 474 Basic Stochastic Processes
Spring. 4 credits. Prerequisites: Mathematics 471 or equivalent and knowledge of linear algebra such as taught in Mathematics 221. Not offered 1999–2000.
This is a second-semester undergraduate course on probability. It covers topics from renewal theory, martingales, discrete and continuous time Markov chains, Brownian motion and related diffusion processes, and applications to queuing theory and finance. Theoretical as well as applied aspects of the subject will be emphasized.]

[MATH 481 Mathematical Logic (also Philosophy 431)
Spring. 4 credits. Not offered 1999–2000.
Propositional and predicate logic. Classical proof procedures. Completeness and compactness. Decidability and undecidability. The Godel incompleteness theorem. Elements of set theory.]

[MATH 482 Topics in Logic (also Philosophy 432)
Spring. 4 credits. Prerequisites: one logic course from the Mathematics Department at the 200 level or higher, one logic course from the Philosophy Department at the 300 level or higher, or permission of the instructor. Not offered 1999–2000.
For description, see PHIL 432.]

[MATH 483 Intensional Logic (also Philosophy 436)
Fall. 4 credits. Prerequisites: one logic course at the 200 level or higher from the Philosophy Department or the Mathematics Department, or permission of instructor. Not offered 1999–2000.
For description, see PHIL 436.]

MATH 486 Applied Logic (also Computer Science 486)
Spring. 4 credits. Prerequisites: Mathematics 222 or 294; Computer Science 280 or equivalent (such as Mathematics 332, 336, 432, 434, 436, or 481); and some additional course in mathematics or theoretical computer science.
Propositional and predicate logic; compactness and completeness by tableaux, natural deduction, and resolution. Equational logic. Herbrand Universes and unification. Rewrite rules and equational logic, Knuth-Bendix method and the congruence-closure algorithm and lambda-calculus reduction strategies. Topics in Prolog, LISP, ML, or Nuprl. Applications to expert systems and program verification.

MATH 490 Supervised Reading and Research
Fall, spring. 1–6 credits.
Supervised reading and research by arrangement with individual professors. Not applicable for material currently available in regularly scheduled courses.

Professional Level and Mathematics Education Courses

MATH 500 College Teaching
Fall, weeks 1–6. 1 credit.
Among the topics covered: basic topics about teaching, such as how to plan recitations, how to prepare lesson plans for lectures, exam design and grading, syllabus planning. Also discussed: the structure of colleges and universities, jobs and tenure, professionalism, alternative teaching strategies.

[MATH 503 History of Modern Mathematics
Spring. 4 credits. Prerequisites: undergraduate algebra and analysis. Not offered 1999–2000.

*See the list of courses with overlapping content at the end of the introduction.

Topics in the history of modern mathematics at the level of F. Klein's *Evolution of Mathematics in the 19th Century*, J. Dieudonne's *Abrege D'Histoire Des Mathematiques 1700–1900*, and G. Birkhoff's *Source Book of Classical Analysis*.]

MATH 505 Educational Issues in Undergraduate Mathematics
Fall. 4 credits. Prerequisite: graduate standing or permission of the instructor.
This course will examine various educational issues in undergraduate mathematics and the relationship of these issues to the mathematics itself. The precise choice of topics will vary, but the intent is that a balance of different views be presented and discussed. There will be extensive readings in the course and occasional guest lectures. Possible topics include: nature of proof and how and when to teach it, calculus "reform," teaching mathematics to school teachers, using writing, using history, alternative assessments, alternatives to lecturing, equity issues, effective uses of technology, what is mathematical understanding and how do we recognize it, what should every mathematics major know, research in undergraduate mathematics.

MATH 507 Teaching Secondary Mathematics: Theory and Practices
Spring. 4 credits.
This course will provide direct experience of new approaches, curricula and standards in mathematics education. Discussion of articles, activities for the secondary classroom and videotape of classroom teaching will be tied to in-class exploration of math problems. Experience in the computer lab, examining software environments and their use in the mathematics classroom will be included. Participants will be expected to write short papers, share ideas in class and present their opinions on issues.

MATH 508 Mathematics for Secondary School Teachers
Fall, spring. 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.

Graduate Courses

Graduate-level mathematics courses (formerly 500 and 600 level) have been renumbered to conform to university guidelines regarding course level numbers, p. 5. The level numbers (first digit of the course number) have been raised by one, effective in the fall of 1997. Course content and level of difficulty remain unchanged.

Students interested in taking graduate courses in mathematics should consult the department for further details, times, and possible changes in courses as described below.

MATH 611–612 Real and Complex Analysis
611, fall; 612, spring. 4 credits each.
611: measure and integration, functional analysis. 612: complex analysis, Fourier analysis, and distribution theory.

MATH 613–[614] Topics in Analysis
613, fall; 614, spring. 4 credits each. 614 not offered 1999–2000.

MATH 615–[616] Mathematical Methods in Physics
615, fall; 616, 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 420 (or 321)–422–423. Undergraduates will be admitted only with permission of instructor. Mathematics 615 is a prerequisite for 616. 616 not offered 1999–2000.
Topics designed to give a working knowledge of the principal mathematical methods used in advanced physics. A brief discussion of some basic notions: metric space, vector space, linearity, continuity, integration. Generalized functions (Schwartz distributions). Fourier series and Fourier integrals. Saddle point method. Linear operators. Differential operators and integral operators, the equations and eigenvalue problems connected with them and the special functions arising from them. Elements of group theory. The rotation group and its representations.

MATH 617 Dynamical Systems
Fall. 4 credits.
Topics: existence and uniqueness theorems for ODEs. Poincaré-Bendixon theorem and global properties of two dimensional flows. Limit sets, non-wandering sets, chain recurrence, pseudo-orbits and structural stability. Linearization at equilibrium points: stable manifold theorem and the Hartman-Grobman theorem. Generic properties: transversality theorem and the Kupka-Smale theorem. Examples: expanding maps and Anosov diffeomorphisms. Hyperbolicity: the horseshoe and the Birkhoff-Smale theorem on transversal homoclinic orbits. Rotation numbers: Herman's theorem. Characterization of structurally stable systems.

[MATH 618 Smooth Ergodic Theory
Spring. 4 credits. Not offered 1999–2000.
Topics: invariant measures. Entropy. Hausdorff dimension and related concepts. Hyperbolic invariant sets: stable manifolds, Markov partitions and symbolic dynamics. Equilibrium measures of hyperbolic attractors. Ergodic theorems. Pesin theory: stable manifolds of non-hyperbolic systems. Liapunov exponents: relations between entropy, exponents and dimensions.]

MATH 619–620 Partial Differential Equations
619, fall; 620, spring. 4 credits each.
Basic theory of partial differential equations.

MATH 621 Measure Theory and Lebesgue Integration
Fall. 4 credits.
Measure theory, integration, and Lp spaces.

MATH 622 Applied Functional Analysis
Spring. 4 credits.
Basic theory of Hilbert and Banach spaces and operations on them. Applications.

[MATH 628 Complex Dynamical Systems
Spring. 4 credits. Prerequisite: Mathematics 418. Not offered 1999–2000.
Various topics in the dynamics of analytic mappings in one complex variable, such as: Julia and Fatou sets, the Mandelbrot set, Mañe-Sad-Sullivan's theorem on structural stability. Local theory, including repulsive cycles and the Yoccoz inequality, parabolic points and Ecalle-Voronin invarients, Siegel disks and Yoccoz's proof of the Siegel Brjuno theorem. Quasi-conformal mappings and surgery: Sullivan's theorem on non-wandering domains, polynomial-like mappings and renormalization, Shishikura's constructin of Hermann rings. Puzzles, tableaux and local connectivity problems. Thurston's topological characterization of rational functions, the spider algorithm, and mating of polynomials.]

MATH 631–[632]–634 Algebra
631, fall; 632, spring; 634, spring. 4 credits each. 632 not offered 1999–2000.
631: finite groups, field extensions, Galois theory, rings and algebras, tensor and exterior algebra. 632: Wedderburn structure theorem, Brauer group, group cohomology. 634: Dedekind domains, primary decomposition, Hilbert basis theorem, local rings.

[MATH 637 Analytic Number Theory
Fall. 4 credits. Prerequisites: Mathematics 431, 611, 621. Not offered 1999–2000.
Topics: the Prime Number Theorem. Primes in Arithmetic Progressions. The Large Sieve and Some of its Applications.]

[MATH 649 Lie Algebras
Fall. 4 credits. Not offered 1999–2000.
Nilpotent, solvable and reductive Lie algebras. Enveloping algebras. Root systems, Coxeter groups. Classification of simple algebras.]

MATH 650 Lie Groups
Spring. 4 credits.
Topological groups, Lie groups. Relation between Lie groups and Lie algebras. Exponential map, homogeneous manifolds. Invariant differential operators.

MATH 651 Introductory Algebraic Topology
Spring. 4 credits.
Fundamental group and covering spaces. Homology theories for complexes and spaces.

MATH 652–[653] Differentiable Manifolds
652, fall; 653, spring. 4 credits each. Prerequisites: advanced calculus, linear algebra (Mathematics 431), point set topology (Mathematics 453). This is an introduction to differential geometry and differential topology at the level of the beginning graduate student. 653 not offered 1999–2000.
Topological manifolds. Smooth manifolds, immersions and embeddings, tangent bundles, fiber bundles, vector fields and dynamical systems, Froebenius' theorem. Lie groups. Integration on manifolds, differential forms. Stokes theorem. Connections, Riemannian manifolds, geodesics, curvature, Gauss-Bonnet theorem. Tubular neighborhoods, transversality and cobordism.

MATH 661 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 662 Riemannian Geometry
Spring. 4 credits.
Linear connections, Riemannian metrics and parallel translation. Covariant differentiation and curvature tensors. The exponential map, the Gauss Lemma and completeness of the metric. Isometries and space forms, Jacobi fields and the theorem of Cartan-Hadamard. The first and second variation formulas. The index form of Morse and the theorem of Bonnet-Myers. The Rauch, Hessian, and Laplacian comparison theorems. The Morse index theorem. The conjugate and cut loci. Submanifolds and the Second Fundamental form.

MATH 671–672 Probability Theory
671, fall; 672, spring. 4 credits each. Prerequisite: a knowledge of Lebesgue integration theory, at least on the real line. Students can learn this material by taking parts of Mathematics 413–414 or 621. Prerequisite for Mathematics 672: Mathematics 671.
Properties and examples of probability spaces. Sample space, random variables, and distribution functions. Expectation and moments. Independence, Borel-Cantelli lemma, zero-one law. Convergence of random variables, probability measures, and characteristic functions. Law of large numbers. Selected limit theorems for sums of independent random variables. Markov chains, recurrent events. Ergodic and renewal theorems. Martingale theory. Brownian motion and processes with independent increments.

MATH 674 Introduction to Mathematical Statistics
Spring. 4 credits. Prerequisites: Mathematics 671 or permission of instructor.
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.

MATH 681 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 [711]–712 Seminar in Analysis
711, fall; 712, spring. 4 credits each. 711 not offered 1999–2000.

MATH 713 Functional Analysis
Spring. 4 credits.
Topological vector spaces. Banach and Hilbert spaces, Banach algebras. Additional topics to be selected by instructor.

MATH 715 Fourier Analysis
Fall. 4 credits.

MATH 717 Applied Dynamical Systems (also T&AM 776)
Spring. 4 credits. Suggested prerequisite: T&AM 675, Mathematics 617, or equivalent.
Review of planar (single-degree-of-freedom) systems. Local and global analysis. Structural stability and bifurcations in planar systems. Center manifolds and normal forms. The averaging theorem and perturbation methods. Melnikov's method. Discrete dynamical systems, maps and difference equations, homoclinic and heteroclinic motions, the Smale Horseshoe and other complex invariant sets. Global bifurcations, strange attractors, and chaos in free and forced oscillator equations. Applications to problems in solid and fluid mechanics.

MATH 722 Topics in Complex Analysis
Spring. 4 credits.
Selections of advanced topics from complex analysis, such as Riemann surfaces, complex dynamics, conformal and quasiconformal mapping. Course content varies.

MATH 728 Seminar in Partial Differential Equations
Fall. 4 credits.

MATH 731–732 Seminar in Algebra
731, fall; 732, spring. 4 credits each.

MATH 735 Topics in Algebra
Spring. 4 credits.
Selection of advanced topics from algebra, algebraic number theory, and algebraic geometry. Course content varies.

MATH 737 Algebraic Number Theory
Fall. 4 credits.

MATH 739 Topics in Algebra
Fall. 4 credits.
Selection of advanced topics from algebra, algebraic number theory, and algebraic geometry. Course content varies.

[MATH 740 Homological Algebra
Spring. 4 credits. Not offered 1999–2000.]

MATH 751–752 Seminar in Topology
751, fall; 752, spring. 4 credits each.

MATH 753–[754] Algebraic Topology
753, fall; 754, spring. 4 credits. 754 not offered 1999–2000.
The continuation of 651. Cohomology, cup products, Poincare duality, higher homotopy groups, fiber bundles, fibrations, vector bundles, characteristic classes, K-theory, spectral sequences, cohomology operations.

MATH 757–758 Topics in Topology
757, fall; 758, spring. 4 credits each.
Selection of advanced topics from modern algebraic, differential, and geometric topology. Course content varies.

MATH [761]–762 Seminar in Geometry
761, fall; 762, spring. 4 credits each. 761 Not offered 1999–2000.

MATH 767 Algebraic Geometry
Fall. 4 credits.

MATH 771–772 Seminar in Probability and Statistics
771, fall; 772, spring. 4 credits each.

MATH 777–778 Stochastic Processes
777, fall; 778, spring. 4 credits each.

MATH 781–782 Seminar in Logic
781, fall; 782, spring. 4 credits each.

MATH 783 Model Theory
Spring. 4 credits.

MATH 784 Recursion Theory
Fall. 4 credits.
Theory of effectively computable functions. Classification of recursively enumerable sets. Degrees of recursive unsolvability. Applications to logic. Hierarchies. Recursive functions of ordinals and higher type objects. Generalized recursion theory.

[MATH 785 Automata Theory
Fall. 4 credits. Prerequisite: Mathematics 481 or similar mathematical logic course at 400-level or higher. Not offered 1999–2000.
Basic results in finite and tree automata, including the algebraic approach to these topics. Buchi automata, with applications to computability theory and decidability problems. Rabin automata and their applications to decidability problems, boolean algebras, linear orderings, topology. Applications of automata theory to theoretical computer science in modal and temporal logic and concurrency.]

[MATH 786 Proof Theory
Fall. 4 credits. Not offered 1999–2000.
This course will cover basic ideas and methods of proof theory along with major recent developments motivated by computer science and knowledge presentation theory.

The topics will include Gentzen style and "natural" derivations, normalization theorems for classical and constructive logics, connections with the typed lambda calculus, Curry-Howard isomorphism, arithmetization of proof theory, incompleteness theorems, Loeb's theorem, modal logic of formal provability, models of arithmetic, consistency proofs and normalization theorems in typed lambda calculus.]

[MATH 787 Set Theory
Fall. 4 credits. Not offered 1999–2000.
Models of set theory. Theorems of Gödel and Cohen, recent independence results.]

MATH 788 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 790 Supervised Reading and Research
Fall, spring. 1–6 credits.

MATH 901–902 Oliver Club Seminar

MATH 903–904 Olivetti Club Seminar

MATH 905–906 Occasional Seminar on Undergraduate Education

MATH 907–908 Educational Issues in Undergraduate Mathematics

MATH 911–912 Seminar in Analysis

MATH 913–914 Seminar in Dynamics and Geometry

MATH 949–950 Seminar in Lie Groups

MATH 951–952 Topics in Topology and Geometry

MATH 967–968 Seminar in Combinatorial and Algebraic Geometry

MUSIC

M. Scatterday, chair (on leave, fall 1999); M. Hatch, acting chair, fall 1999; S. Tucker, director of undergraduate studies (301 White Hall, 255–3423); R. Harris-Warrick, director of graduate studies (216 White Hall, 255–7141); M. Bilson, X. Bjerken, D. Borden, L. Case, D. Conn, L. Coral, M. Hatch, K. Hester, H. Hoffman, J. Hsu, J. Kellock, E. Murray, J. Peraino, S. Pond, D. Randel, A. Richards, R. Riley, D. Rosen, R. Sierra, S. Stucky, J. Webster, D. Yearsley, N. Zaslaw

Emeritus: W. Austin, K. Husa, S. Monosoff, R. Palmer, T. Sokol, M. Stith.

Department office: 255–4097.

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:

Vocal ensembles
- Cornell Chamber Singers
- Cornell Chorale
- Cornell University Chorus
- Cornell University Glee Club
- Sage Chapel Choir

Instrumental ensembles
- Chamber Music Ensembles
- Cornell Chamber Orchestra
- Cornell Experimental Lab Ensemble
- Cornell Gamelan
- Cornell Jazz Ensembles
- Cornell Symphony Orchestra
- Cornell University Chamber Winds
- Cornell University Symphonic Band
- Cornell University Wind Ensemble
- Cornell University Wind Symphony

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, too, is available through the Department of Music office, 129 White Hall 1999–2000 (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 great majority of concerts are free and open to the public. Lectures and concerts are listed on the World Wide Web (http://www.arts.cornell.edu./music/). Additional information is available through the events office (255–4760).

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 consult the department office, 129 White Hall 1999–2000 (255-4097), or the director of undergraduate studies (255–3423).

The Major

Two options are available for 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. 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 overall grade of B- or better in each course. For further information, contact the director of undergraduate studies.

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, 455, 456.
2) in music history: sixteen credits in courses numbered 381 or above listed under Music History Courses for Majors. 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 (Music 331 through 346 and 421 through 448).

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, in part by a successful solo recital before the end of the sophomore year.

The requirements for the Bachelor of Arts degree with a major in music under Option II are:

1) completion of all the requirements for Option I, except as noted below, and
2) in addition:
   a) in performance:
      (1) the requirement for four semesters of participation in a musical organization or ensemble is waived (but such majors are expected to participate actively in chamber and other ensembles sponsored by the department);
      (2) sixteen credits in individual instruction in the student's major instrument, or voice, earned by taking Music 323–324 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. Qualified students are invited to become candidates by the faculty early in the second semester of their junior year. As soon as possible thereafter, the student forms a committee of three or more faculty members to guide and evaluate the honors work. Senior year candidates 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 candidate's committee is held not later than May 1. The level of honors conferred is 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, 323–324) or in organizations and ensembles (Music 331 through 346 and 421 through 448).

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 comprise **either** up to 4 credits earned in performance (Music 321–322, 323–324) **or** up to 4 credits earned in organizations and ensembles (Music 331 through 346 and 421 through 448), but not both.

Facilities

Music Library. The Music Library, in Lincoln Hall (White Hall 1999–2000), has an excellent collection of standard research tools. Its holdings consist of approximately one hundred-twenty thousand books, periodicals, and scores and forty-five 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 Statler Auditorium (about 900), Sage Chapel (about 800) and Barnes Hall Auditorium (about 280).

Rehearsal Spaces. The orchestras and bands rehearse in Bailey Hall, Barnes Hall, and Barton Hall; the Jazz Ensembles, Gamelan, and Chamber Ensembles rehearse in Lincoln Hall; and the choral ensembles are quartered in Sage Chapel. Practice studios in Lincoln Hall (White Hall 1999–2000) are available for individual practice by pianists, vocalists, and instumentalists.

Twenty-two grand pianos and eight upright or studio pianos are housed in Cornell's offices, classrooms, and rehearsal spaces. In addition, our Center for Keyboard Studies includes two concert grand pianos (Steinway and Mason & Hamlin), two eighteenth-century fortepiano replicas (copies of Johann Andreas Stein and Anton Walter), an original Broadwood grand piano from 1827, an 1824 Conrad Graf fortepiano replica, one Dowd and one Hubbard harpsichord, and a Challis clavichord.

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 KX88 MIDI Controller keyboard, a Yamaha TX802 FM synthesizer, an E-Mu Proteus XR, a Casio FZ 10M sampler and various other synthesizers. In addition, there are two MIDI work stations with additional instruments, including a Korg M1 synthesizer and an Akai S900 sampler.

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 100 Elements of Musical Notation
Fall or spring, weeks 2–5. 1 credit. Prerequisite: concurrent enrollment in any three-credit course in music and permission of instructor. D. Conn.
This four-week course, given at the beginning of each term, will fulfill the requirement of basic pitch and rhythm and reading skills needed for introductory courses (except 101 and 103) and 200-level courses with prerequisites. The material covered in this course is no longer part of Music 105.

MUSIC 101 Popular Music in America: 1850–1985 (also AM ST 105) #
Fall. 3 credits. 1-hour disc to be arranged. M. Hatch.
A survey of the history and diverse streams of popular music in America. Elementary vocabulary and techniques for describing, analyzing, and evaluating music. Relationships between mainstream musics, tributaries, and side-streams, and between folk, art, and popular music.

MUSIC 103 Introduction to the Musics of the World @
Spring. 3 credits. 1-hour disc to be arranged. No previous training in music required. S. Pond.
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 are major components of the course.

MUSIC 105 Introduction to Music Theory
Fall, spring, or summer. 3 credits. Plus two hours to be arranged. Experience in reading music is recommended. Fall, S. Tucker; spring, D. Conn.
An elementary, self-contained introduction to music theory emphasizing fundamental musical techniques, theoretical concepts, and their application. Intervals, scales, triads; basic concepts of tonality; extensive listening to music in various styles; analysis of representative works of Bach, Mozart, Haydn and Beethoven.

MUSIC 107 Hildegard to Handel
Fall. 3 credits. Prerequisite: ability to read music or concurrent enrollment in Music 100. R. Harris-Warrick.
The music of Western Europe from the Middle Ages through the Baroque period. Starting from Gregorian chant and the monophonic works of Hildegard von Bingen, this course will survey composers and repertoires such as the troubadors, the Notre Dame School, Renaissance sacred polyphony, madrigals, the dance suite, concertos, cantatas, and will end in the early 18th century with works by Vivaldi, Bach, and Handel.

MUSIC 108 Mozart to Minimalism
Spring. 3 credits. Prerequisite: ability to read music or concurrent enrollment in Music 100. N. Zaslaw.
A survey of Western art music in many genres from the second half of the 18th century to the present. Composers whose music will be studied include Haydn, Mozart, Beethoven, Schumann, Mendelssohn, Berlioz, Chopin, Wagner, Verdi, Liszt, Brahms, Mahler, Debussy, Strauss, Stravinsky, Bartók, Ives, Webern, Messiaen, Copland, Bernstein, Carter, Stucky, and Sierra.

MUSIC 201 Diction for Oral Presentation
Fall or spring. 1 credit. Prerequisite: permission of instructor. J. Kellock.
Introduction to the uses of the International Phonetic Alphabet for pronunciation of English, French, German, and Italian. Open to singers and non-singers. Assignments will vary according to musical experience. Singing students will be expected to perform their assignments. Students taking voice lessons for credit (321a–322a) must take Music 201 by the end of the third semester of lessons.

Music Theory

Students contemplating the music major are strongly advised to take Music 151, 152, 153, and 154 in the freshman year; in any case Music 152 and 154 must be completed 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. E. Murray.
Detailed study of the fundamental elements of tonal music: rhythm, scales, intervals, 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 154. 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. E. Murray.
Continued study of voice leading and harmonic progression, 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. E. Murray.
Sight singing: diatonic melodies in treble, alto, and bass clefs. Keyboard: scales, triads, seventh chords, short diatonic chord progressions. Dictation: intervals, rhythms; short diatonic melodies; short diatonic chorale phrases. Score reading: 2 parts using treble, alto, and bass clefs. Musical terms: tempo markings and rhythmic terminology.

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. E. Murray.
Sight singing: longer melodies in 3 clefs, including diatonic modulation. Keyboard: diatonic chord progressions and sequences. Dictation: intervals, rhythms; longer melodies; chorale phrases with diatonic modulation. Score reading: 3 parts using treble, alto, and bass clefs. Musical terms: nuance and expression marks.

[MUSIC 239 Introduction to Improvisational Theory
Spring. 2 credits. Prerequisite: permission of instructor. Intended for performers in "jazz" and related styles. Not offered 1999–2000. Staff.
Tonal, modal, and blues harmonic resources, and the formal structures in which they are

embodied. Development of improvisational skills and creation of spontaneous compositions.]

MUSIC 251 Tonal Theory III
Fall. 3 credits. Prerequisites: Music 152 and 154 or equivalent, and concurrent enrollment in Music 253. D. Yearsley.
Continuation of diatonic and introduction to chromatic harmony; species counterpoint; composition in small forms.

MUSIC 252 Tonal Theory IV
Spring. 3 credits. Prerequisites: Music 251 and 253 or equivalent, and concurrent enrollment in Music 254. R. Sierra.
Study of and composition in larger forms, including sonata form; systematic study of chromatic harmony, voice-leading, and modulation; composition in chromatic style.

MUSIC 253 Musicianship III
Fall. 2 credits. Prerequisite: concurrent enrollment in or previous credit for Music 251. 2 hours TBA. D. Yearsley.
Sight singing: melodies with chromaticism in treble, alto, tenor, and bass clefs. Keyboard: diatonic modulation, chromatic chords. Dictation: melodies with modulation; chorale phrases with secondary dominants and other chromatic chords. Score reading: 4 parts using treble, alto, tenor, and bass clefs. Musical terms: orchestral ranges, terms, clefs, and transpositions.

MUSIC 254 Musicianship IV
Spring. 2 credits. Prerequisite: concurrent enrollment in or previous credit for Music 252. 2 hours TBA. R. Sierra.
Sight singing: melodies in 4 clefs, including modality and chromatic modulation. Keyboard: chromatic sequences, chromatic modulations, improvised modulations employing diatonic pivot chords. Dictation: intervals, rhythms, short melodies and short, diatonic chorale phrases. Score reading: 4 parts, including transposing instruments. Musical terms: other terms in French, German, and Italian.

MUSIC 351 Materials of Twentieth-Century Music
Fall. 3 credits. Prerequisite: Music 252 and 254 or equivalent, and concurrent enrollment in Music 353. S. Stucky.
Introduction to some techniques of twentieth-century music including extended tonality, modes, twelve-tone technique, set theory and new approaches to form and rhythm. Analysis of representative works by Debussy, Bartók, Webern, Hindemith, Schoenberg, Stravinsky, and others.

MUSIC 353 Musicianship V
Fall. 2 credits. Prerequisite: concurrent enrollment in or previous credit for Music 351. 2 hours TBA. S. Stucky.
Sight singing: advanced chromatic, twelve-tone, and atonal melodies in 4 clefs. Keyboard: continued chromatic harmony; improvised chromatic modulations. Dictation: continued chromatic harmony; atonal sets and melodies; 2-part counterpoint. Score reading: 4 clefs, transpositions. Music terms: twentieth-century terms.

MUSIC 451 Counterpoint
Spring. 4 credits. Prerequisite: Music 251 or permission of instructor. S. Stucky.
Composition in the polyphonic vocal style of the late Renaissance.

[MUSIC 452 Topics in Music Analysis
Spring. 4 credits. Prerequisite: Music 251 or permission of instructor. Not offered 1999–2000. J. Webster.
A survey of important analytical approaches to tonal music, including thematic-motivic relations, phrase-rhythm, large-scale paragraph construction, structural-tonal voice-leading, and relations among the movements in a multimovement work.]

[MUSIC 453 Introduction to Improvisational Theory
Spring. 4 credits. Prerequisite: Music 251 or permission of instructor. Not offered 1999–2000. Staff.
Study and performance of tonal, modal, and blues harmonic resources; introduction to the formal structures in which these resources are embodied. Includes ear training, work at the keyboard, composing short pieces, and analyzing selected representative works of popular music and African-American art music from 1940 to 1970.]

MUSIC 454 Composition
Fall. 4 credits. Prerequisite: Music 251 or permission of instructor. R. Sierra.

MUSIC 455 Conducting
Spring. 4 credits. Prerequisite: Music 251 or permission of instructor. S. Tucker.
Fundamentals of score reading, score analysis, rehearsal procedures and conducting technique; instrumental and choral contexts.

[MUSIC 456 Orchestration
Spring. 4 credits. Prerequisite: Music 251 or permission of instructor. Not offered 1999–2000.
Orchestration based on nineteenth- and twentieth-century models.]

Music in History and Culture

MUSIC 221 History of Rock Music (also AM ST 223)
Spring. 3 credits. No previous training in music required. J. Peraino.
This course examines the development and cultural significance of rock music from its origins in blues, gospel, and Tin Pan Alley up to present-day genres of alternative rock and hip hop.

MUSIC 222 A Survey of Jazz (also AMST 222)
Fall. 3 credits. Enrollment limited. S. Pond.
This course will trace historical developments in jazz from its African roots to the current diverse spectrum of improvisational styles that form popular, neoclassic, and innovative contemporary jazz music.

MUSIC 245 Gamelan in Indonesian History and Cultures @
Fall or spring. 3 credits. Permission of instructor. No previous knowledge of musical notation or performance experience necessary. M. Hatch.
An introduction to Indonesia through its art. Elementary techniques of performance on the Javanese *gamelan*; a general introduction to Indonesian history and cultures, and the socio-cultural contexts for the arts there. Several short papers and one longer research report are required.

[MUSIC 261 Bach and Handel #
Fall. 3 credits. Prerequisite: any 3-credit course in music or permission of instructor. Not offered 1999–2000. D. Yearsley.]

[MUSIC 262 Haydn and Mozart #
Fall. 3 credits. Prerequisite: any 3-credit course in music or permission of instructor. Not offered 1999–2000. N. Zaslaw.
Music for courts, theaters, churches, concerts, dancing, marching, public and private ceremonies, and domestic use by two extraordinarily different musical personalities who were friends, explored in its historical and socio-cultural contexts.]

[MUSIC 263 Beethoven #
Spring. 3 credits. Prerequisite: any 3-credit course in music or permission of instructor. Not offered 1999–2000. J. Webster.
A survey of Beethoven's life, works, and influence. While the primary focus will be his musical style and its development, the course will also cover social-cultural factors and the psychology and reception of genius.]

[MUSIC 264 Musical Romantics #
Spring. 3 credits. Prerequisite: any 3-credit course in music or permission of instructor. Not offered 1999–2000. D. Rosen.
This survey of music from 1815 to 1900 will be divided into five segments focusing on five composers (Schubert, Berlioz, Verdi, Wagner, and Mahler) and two or three segments on broader topics, such as musical nationalism in Russia, fin de siècle Vienna, the art song, and the history of the piano and its music.]

MUSIC 274 Opera #
Fall. 3 credits. R. Harris-Warrick.
An introduction to major works of the operatic repertory, with discussion of texts and theatrical performances as well as music. Video recordings will be an integral part of the course; trips to live performances will be scheduled where possible.

MUSIC 275 Choral Sounds #
Spring. 3 credits. Prerequisite: ability to read music or concurrent enrollment in Music 100. R. Harris-Warrick.
This course examines representative works composed for group singing, primarily from the Western choral tradition, but also including folk and popular styles, from the Middle Ages to the 20th century. Class will include discussion of performance practices as well as historical and stylistic issues, and will be integrated with local concert offerings.

MUSIC 276 The Orchestra and Its Music #
Fall. 3 credits. Prerequisite: any three credit music course or permission of instructor. N. Zaslaw.
The music of, and the social structures supporting, large instrumental ensembles in the Western world, including Italian court festivals of the 16th century, string bands of the 17th century, Lully's ascendency at Paris and Versailles, and music of Purcell, Corelli, Vivaldi, Bach, Handel, Haydn, Mozart, Beethoven, Schubert, Schumann, Mendelssohn, Berlioz, Liszt, Wagner, Brahms, Tchaikovsky, Bruckner, Mahler, Strauss, Stravinsky, Schoenberg, Webern, Bartók, Shostakovich, Messiaen, Copland, Carter, Tower, Stucky, Sierra, and others.

MUSIC 372 Mind and Memory (also ENGL 301, S HUM 301, and THETR 301)
Spring. 4 credits. D. Ackerman.
See S HUM 301 for description.

Music History Courses for Majors and Qualified Non-Majors

Prerequisite: Music 152 or permission of instructor. Intended primarily for music majors, these courses investigate selected topics and repertories from each period in some detail. Each course includes listenings, readings, oral and written papers, and analyses.

[MUSIC 374 Opera and Culture (also Gerst 374 and Itala 374)
Spring. 4 credits. Prerequisite: any three-credit music course or proficiency in German or Italian. Not offered 1999–2000. A. Groos.]

MUSIC 381 Music in Western Europe to 1700 #
Fall. 4 credits. J. Peraino.
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. A. Richards.
Music in Western and Central Europe and North America from Bach, Handel 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 1999–2000. D. Rosen.
A chronological survey of nineteenth-century music from Beethoven through Puccini including reference to its cultural and historical context.]

[MUSIC 384 Music of the Twentieth Century
Spring. 4 credits. Not offered 1999–2000. S. Stucky.
Movements, schools, and styles in "classical" music from the turn of the century to the present. Extensive listening and reading assignments for historical breadth; detailed attention to representative works for analytical depth.]

[MUSIC 388 Historical Performance Practicum #
Spring. 4 credits. Not offered 1999–2000. M. Bilson.
The study of 18th- and 19th-century instrumental performance practices, with special emphasis on the string quartets of Haydn and the piano trios of Schubert. Open to qualified performers.]

MUSIC 390 Culture of Renaissance II (also COMP LIT 362, ENG 325, HIST 364 ART H 351)
Spring. 4 credits. Plus discussion section. W. Kennedy and C. Kaske.
See Comparative Lit. 362 for description.

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 405 Operatic Contacts (also S HUM 405)
Fall. 4 credits. Limited to 15 students. Permission of instructor. A. Groos.
See S HUM 405 for description.

MUSIC 418 Exploring the Israeli Folksong (also S HUM 418)
Spring. 4 credits. Limited to 15 students. Permission of instructor. S. Burstyn.
See S HUM 418 for description.

MUSIC 474 Opera, History, Politics, Gender (also HIST 456, WOMNS 454, COML 459, S HUM 459, ITALA 456)
Spring. 4 credits. M. Steinberg and S. Stewart.
See HIST 456 for description.

[MUSIC 489 African American Music Innovators (also AS&RC 489)
Fall. 4 credits. Permission of instructor. Not offered 1999–2000.]

[MUSIC 490 American Musical Theatre (also English 454)
Spring. 4 credits. Not offered 1999–2000. To be offered 2000–01. S. McMillin.
See English 454 for description.]

MUSIC 491 American Popular Song
Fall. 4 credits. E. Murray and C. Greenspan.
A historical and analytical study of American popular song (primarily from the 1920s and 1950s), emphasizing Kern, Berlin, Rodgers and Hart, Porter, Gershwin and Harold Arlen, and including others such as Ellington. The interaction of music, lyrics, and performance will be among the topics considered. Live as well as recorded performances will be featured.

[MUSIC 492 Music and Queer Identity
Spring. 4 credits. Prerequisite: Music 152 or permission of instructor. Not offered 1999–2000. J. Peraino.
Throughout history music has been associated with "otherness" in Western cultures. Appropriately, lesbian and gay individuals and communities have turned to music as a means of expressing and negotiating their "queer" identity within status-quo culture. This course examines how and why music encodes "queerness" by focusing on various musical genres (such as opera, disco, women's music, country) and composer/musicians (such as Franz Schubert, Judy Garland, David Bowie) that have become significant for various lesbian and gay communities. The course will also examine the reasons behind the general popularity of queer-coded but "straight-identified" performers such as Elvis Presley, Prince, and Michael Jackson.]

[MUSIC 493 Women and Music (also WOMNS 496)
Spring. 4 credits. Prerequisite: Music 152 or permission of instructor. Not offered 1999–2000. J. Peraino.
This course introduces the students to a critical examination of women's participation in Western European and American musical traditions. The course will focus on the various subject positions and critical perspectives that women hold in examples of music and writings about music. Of primary importance will be the concepts of "objective" vs. "subjective" approaches to the topic of the week. Topics will include approaches to history and criticism, women composers, women performers, women as objects, women's music, drag and androgyny, and women as listeners. Students will be asked to keep a journal of their reactions to the readings, listenin]g assignments, and class discussions, and to write "objective" and "subjective" formal papers.]

MUSIC 494 Love, Sex, and Song in Medieval France (also WOMNS 403)
Spring. 4 credits. J. Peraino.
This course explores the cult of courtly love and its inextricable relationship with singing. We will focus on secular music and poetry and relevant narratives of Southern and Northern France from the twelfth and thirteenth centuries, and consider issues such as constructions of gender and gender relations, music and sexuality in the Middle Ages, medieval misogyny, women's voices in courtly love lyric, the relationship of words and music, performance context and reconstruction.

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.

Digital Music and New Media

MUSIC 120 Learning Music through Digital Technology
Fall or spring. 3 credits. Enrollment limited. Prerequisite: permission of instructor. D. Borden.
This course uses selected commercially available technological resources to produce live music. The student is expected to master the Macintosh computer, several music software programs, and several synthesizers using MIDI. 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 220 Learning Counterpoint through Digital Technology
Spring. 3 credits. Enrollment limited. Prerequisite: 152 and permission of instructor. D. Borden.
This course is a study of traditional contrapuntal techniques from the fourteenth century to the present, with emphasis on invention and fugue. Synthesizers, samplers, MIDI, and music software will be covered. There are

three classroom concerts, some analysis and a final public concert.

MUSIC 391 Media Arts Studio I (also THETR 391, ART 391, ARCH 391)
Fall. 3 credits. Permission of instructor. See THETR 391 for description.

MUSIC 392 Media Arts Studio II (also THETR 392, ART 392, ARCH 392)
Spring. 3 credits. Permission of instructor. See THETR 392 for description.

MUSIC 420 Introduction to MIDI Techniques
Spring. 4 credits. Permission of instructor. D. Borden.
This course is an introduction to MIDI for students who are already at an advanced level in music composition. Three composition projects will be completed in collaboration with film, dance, and computer animation students.

[MUSIC 620 Introduction to MIDI Techniques
Spring. 4 credits. Permission of instructor. Not offered 1999–2000. D. Borden.]

Musical Performance

Cornell faculty members offer individual instruction in voice, organ, harpsichord, piano and fortepiano, violin, viola, cello, and some brass and woodwind 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 also by audition only (see Music 321h–322h).

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 $150 per term. For a one-hour lesson (or two half-hour lessons) weekly, *without credit*, the fee is $300. The fee in Music 321–322 for a one-hour lesson (or two half-hour lessons) *for credit* is $225 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 department-sponsored organizations and ensembles may, with the permission of the director of the organization, receive a scholarship of up to $150 of 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 $50 per term and for six hours weekly are $40 per term for a room **with a piano**. Practice-room fees for twelve hours weekly are $25 per term and for six hours weekly are $15 per term for a room **without a piano**. The fee for the use of the **pipe organ** is $50 for twelve hours weekly and $40 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, 323–324, 331–343, 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. Transfer credit for appropriate music courses already taken elsewhere may be used to satisfy this requirement with the approval of the department chair.

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, and will receive credit only as described under "Earning credit," above. 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. Music 201 must be taken by the end of the third semester of lessons. Limited enrollment. Attendance at weekly studio class required for *all* credit students. J. Kellock.
The Vocal Coaching Program offers noncredit 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. D. Yearsley.

MUSIC 321c–322c Individual Instruction in Piano
321c fall; 322c, spring. 2 credits each term. Prerequisite: successful audition. M. Bilson, X. Bjerken and staff.

MUSIC 321d–322d Individual Instruction in Harpsichord
321d, fall; 322d, spring. 2 credits each term. Prerequisite: successful audition. D. Yearsley.

MUSIC 321e–322e Individual Instruction in Violin or Viola
321e, fall; 322e, spring. 2 credits each term. Prerequisite: successful audition. L. Case.

MUSIC 321f–322f Individual Instruction in Cello
321f, fall; 322f, spring. 2 credits each term. Prerequisite: successful audition. H. Hoffman.

[MUSIC 321g–322g Individual Instruction in Brass
321g, fall; 322g, spring. 2 credits each term. Prerequisite: successful audition. Not offered 1999–2000. M. Scatterday.]

MUSIC 321h–322h Individual Instruction Outside Cornell
321h, fall; 322h, spring. 2 credits each term. Prerequisite: successful audition. Coordinator: D. Conn.
All the standard orchestral and band instruments, keyboard instruments, guitar and voice may, under certain conditions, be studied for credit with outside teachers. This course is available primarily for the study of instruments not taught at Cornell and when there is limited enrollment in Music 321–322. Prior approval and audition by a member of the faculty in the department is required, and credit may be earned only as described under "Earning credit," above. Additionally, a departmental petition must be completed by the end of the third week of classes. For information and a list of approved teachers, consult the department office, 104 Lincoln Hall/129 White Hall (1999–2000).

MUSIC 321i–322i Individual Instruction in Woodwinds
321i, fall; 322i, spring. 2 credits each term. Prerequisite: successful audition. D. Conn.

MUSIC 323–324 Advanced Individual Instruction
323, fall; 324, 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; $225 per semester will normally be awarded to such students.

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 (usually at the beginning of each semester), 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 8 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. R. Riley.
Open to all students and members of the University. Varied and demanding repertoire. The Sage Chapel Choir sings regularly in the Sunday Service of Worship which is broadcast on 870 WHCU-AM radio, and on special occasions throughout the year.

MUSIC 333–334 Cornell Chorus
333, fall; 334, spring. 1 credit. Prerequisite: permission of instructor. W 5:15–7:15 p.m. plus 2 hours to be arranged. S. Tucker.

MUSIC 335–336 Cornell University Glee Club
335, fall; 336, spring. 1 credit. Prerequisite: permission of instructor. W 7:30–9:30 p.m., plus 2 hours to be arranged. S. Tucker.

MUSIC 337 Wind Symphony
Fall. 1 credit. Prerequisite: permission of instructor. M W 4:45–6:30. D. Conn.

MUSIC 338 Symphonic Band
Spring. 1 credit. Prerequisite: permission of instructor. M W 4:45–6:30. D. Conn.

MUSIC 339–340 Cornell Jazz Ensembles
339, fall; 340 spring. 1 credit. Prerequisite: permission of instructor. W 6–8 p.m. K. Hester.

MUSIC 342 Wind Ensemble
Spring. 1 credit. Prerequisite: permission of instructor. M 7:30–9:30 and R 4:45–6:30. M. Scatterday.

MUSIC 343–344 Cornell Symphony Orchestra
343, fall; 344, spring. 1 credit. Prerequisite: permission of instructor. W 7:30–10:00 p.m. E. Murray.

[MUSIC 345–346 Introduction to the Gamelan @
345 fall; 346 spring. 1 credit. Enrollment limited. Prerequisite: permission of instructor. M W 2:30–3:20. Not offered 1999–2000.
Concentrated instruction for beginning students in elementary techniques of performance on the Indonesian *gamelan*. Music 245 is a 3-credit course that complements the instruction in *gamelan* by an introduction to Indonesian history and cultures.]

MUSIC 421–422 Cornell Chamber Orchestra
421, fall; 422 spring. 1 credit. Prerequisite: permission of instructor. T 5–6:30 p.m. J. Hsu.
Study and performance of the chamber symphonies of Haydn, Mozart, and their contemporaries. For strings, woodwinds, and horns. More recent music may also be included in the spring.

MUSIC 437–438 Chamber Winds
437, fall; 438, spring. 1 credit each term. Prerequisites: enrollment in Symphonic Band, Wind Symphony or Wind Ensemble in the same semester as this course AND permission of instructor only. Fall, T R 4:45–6:30 p.m., D. Conn. Spring, T F 4:45–6:30 p.m., M. Scatterday.
A flexible instrumentation ensemble performing original woodwind, brass, and percussion music from Gabrieli brass choirs and Mozart serenades through more contemporary works such as Stravinsky's Octet and new music premiers. The ensemble will perform on wind symphony, symphonic band and wind ensemble concerts in addition to several chamber concerts throughout the year.

MUSIC 439–440 Experimental Lab Ensemble
439, fall; 440, spring. 1 credit each term. Permission of instructor. W 8:30–10:30 p.m. K. Hester.

MUSIC 441–442 Chamber Music Ensemble
441, fall; 442, spring. 1 credit. Prerequisite: permission of instructor. J. Hsu.
Study and perform chamber music works from duos to octets for pianists, string and wind players.

MUSIC 443–444 Chorale
443, fall; 444, spring. 1 credit each term. Prerequisite: permission of instructor. F 4:30–6:15 p.m. Staff.
Study and performance of selected choral music for mixed voices.

MUSIC 445–446 Cornell Gamelan Ensemble
445, fall; 446, spring. 1 credit each term. Enrollment limited. Prerequisite: permission of instructor. R 7:30–10:00 p.m. M. Hatch.
Advanced performance on the Javanese *gamelan*. Tape recordings of *gamelan* and elementary number notation are provided. Some instruction by Indonesian musicians is offered in most years.

MUSIC 447–448 Chamber Singers
447, fall; 448, spring. 1 credit each term. Prerequisite: permission of instructor. Plus 2 hours to be arranged. Shapovalov.

Graduate Courses

Open to qualified undergraduates with permission of instructor.

MUSIC 601 Introduction to Bibliography and Research
Fall. 4 credits. M 1:25–4. L. Coral.
This course explores the nature of the discipline and introduces the many types of bibliographic tools, both printed and electronic, needed to pursue research in music.

[MUSIC 602 Analytical Technique
Spring. 4 credits. Not offered 1999–2000. J. Webster.
A critical survey of various analyical methods in current use. Frequent analytical assignments and class presentations.]

[MUSIC 603 Editorial Practice
Spring. 4 credits. Not offered 1999–2000.]

[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 1999–2000. M. Hatch.
Major aspects of research into musical cultures of the world. Problems, theories, and methods, especially those affecting analytical terminology, transcription and analysis of sound events, and fieldwork.]

MUSIC 622 Historical Performance Practicum
Fall. 4 credits. M. Bilson.
The study of 18th- and 19th-century instrumental performance practices, with special emphasis on the string quartets of Haydn and the piano trios of Schubert. Open to qualified performers.

[MUSIC 653 Topics in Tonal Theory and Analysis
Spring. 4 credits. Not offered 1999–2000. J. Webster.]

[MUSIC 654 Topics in Post-tonal Theory and Analysis
Spring. 4 credits. Not offered 1999–2000.]

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. R. Sierra, S. Stucky.

[MUSIC 674 German Opera (also German Studies 672)
Spring. 4 credits. Not offered 1999–2000. A. Groos.
See German Studies for description.]

MUSIC 677 Mozart: His Life, Works, and Times (also German Studies 757)
Spring. 4 credits. N. Zaslaw.

[MUSIC 680 Topics in Ethnomusicology
Spring. 4 credits. Not offered 1999–2000.]

[MUSIC 681 Seminar in Medieval Music
Fall. 4 credits. Not offered 1999–2000. J. Peraino.
Topic: Medieval Music and Intellectual History.]

MUSIC 683 Music and Postmodern Critical Theory
Fall. 4 credits. J. Peraino.
This course surveys the many critical theories that have been included under the umbrella of "postmodernism," and that have fueled the debate between "old" and "new" styles of musicology. Readings will focus on structuralism and post-structuralism, feminist literary criticism, queer theory, and postmodern and post-colonialism, and their application in musicology and ethnomusicology. A broad spectrum of music will be examined along with the readings.

[MUSIC 684 Seminar in Renaissance Music
Fall. 4 credits. Not offered 1999–2000.]

MUSIC 686 Seminar in Baroque Music
Fall. 4 credits. N. Zaslaw.
Topic: Handel. Recent controversies over Handel's career and music.

[MUSIC 688 Seminar in Classical Music
Fall. 4 credits. Not offered 1999–2000. J. Webster.]

[MUSIC 689 Seminar in Music of the Romantic Era
Spring. 4 credits. Not offered 1999–2000. D. Rosen.]

MUSIC 690 Seminar in Music of the Twentieth Century
Spring. 4 credits. D. Rosen.
Topic: Britten.

MUSIC 691–692 Historical Performance
691, fall; 692, spring. 4 credits each term. Prerequisite: permission of instructor. Hours to be arranged. M. Bilson.
Lessons on the major instrument with supplementary study and research on related subjects.

[MUSIC 693 Seminar in Performance Practice
Fall or spring. 4 credits. Not offered 1999–2000.]

MUSIC 697–698 Independent Study and Research
697, fall; 698, spring. Credit to be arranged. Staff.

[MUSIC 785–786 History of Music Theory
785, fall; 786, spring. 4 credits each term. Not offered 1999–2000.]

[NES 434 Introductory Sumerian II (Also NES 632) @ #
Spring. 4 credits each semester. Prerequisite: NES 433/631. Not offered 1999–2000. D. Owen.
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 435–436 Aramaic I-II (also JWST 435–436) @ #
435, fall; 436, spring. 4 credits each term. Prerequisite: knowledge of Hebrew. Enrollment limited to 15 students. Not offered 1999–2000. G. Rendsburg.]

[NES 631 Introductory Sumerian I (also NES 433)
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. D. Owen.
For description, see NES 433 under Near Eastern Languages.]

[NES 632 Introductory Sumerian II (also NES 434)
Spring. 4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. D. 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 permission of instructor. D. I. Owen.
An introduction to the Semitic language of the Akkadians and Babylonians of ancient Mesopotamia. Utilizing the inductive method, students are rapidly introduced to the grammar and the cuneiform writing system of Akkadian through selected readings in the Code of Hammurapi, the Descent of Ishtar, and the Annals of Sennacherib. Secondary readings in comparative Semitic linguistics, the position of Akkadian in the family of Semitic languages and on the history and culture of Mesopotamia provide the background for the study of the language. Knowledge of another Semitic language helpful but not essential.

NES 637–638 Ugaritic I & II (also NES 337–338) @ #
637, fall; 638, spring. 4 credits. Prerequisite: knowledge of another Semitic language (preferably Hebrew). G. Rendsburg.
Study of the language and literature of ancient Ugarit, an important site in northern Canaan. Special attention is paid to the relationships between Ugaritic and Hebrew and between Canaanite literature and the Bible.

Archaeology

[NES 261 Ancient Seafaring (also ARKEO 275, JWST 261) @ #
Fall. 3 credits. Enrollment limited to 80 Students. Not offered 1999–2000. D. Owen.
A survey of the history and development of archaeology under the sea. The role of nautical technology and seafaring among the maritime peoples of the ancient Mediterranean world—Canaanites, Minoans, Mycenaeans, Phoenicians, Hebrews, Greeks, and Romans—as well as the riverine cultures of Mesopotamia and Egypt. Evidence for maritime trade, economics, exploration and colonization, and the role of the sea in religion and mythology.]

NES 263 Introduction to Biblical History and Archaeology (also ARKEO 263, JWST 263, and RELST 264) @ #
Spring. 3 credits. Enrollment limited to 50 students. J. Zorn.
A survey of the principal archaeological developments in Canaan/Israel from the Neolithic period (ca 9000 B.C.E.) to the Babylonian Exile (586 B.C.E.). Includes an introduction to archaeological methodology utilized in the reconstruction of ancient cultures, as well as the basic bibliography of the field. Emphasis will be placed on the use of archaeological data for understanding major problems in Israelite history and archaeology: such as the dating of the cultural milieu of the patriarchs, the dating and geographical setting of the Exodus and the Israelite conquest, and the origin and history of the Philistines. Special lectures will be devoted to topics such as: warfare, cult, food production and storage, writing and water systems. Recommended for students planning to participate in excavations in Israel.

NES 366 The History and Archaeology of the Ancient Near East (also ARKEO 366, JWST 366) @ #
Fall. 4 credits. Prerequisite: Archaeology 100 or permission of instructor. D. I. Owen.
A survey of the history and archaeology of the major civilizations of the Near East from the Persian Gulf to Syria and Anatolia. The course will cover the time span from the prehistoric period to the Persian conquest. Sumerian, Babylonian, Eblaite, Elamite, West Semitic, Assyrian and Persian cultures will be discussed with particular emphasis on indigenous development and cross-cultural contacts.

Civilization

[NES 197 Introduction to Near Eastern Civilization (also JWST 197 and RELST 197) @ #
Fall. 3 credits each term. Not offered 1999–2000. D. Owen.]

[NES 234 Arabs and Jews: Cultures in Confluence and Conflict (also JWST 234, RELST 234, and COM L 234) @ #
Fall. 3 credits. Not offered 1999–2000. R. Brann.]

[NES 244 Introduction to Ancient Judaism (also JWST 244 and RELST 244) @ #
Spring. 3 credits. Enrollment limited to 140 students. Not offered 1999–2000. G. Rendsburg.
This course focuses on the development of Judaism as a religion and as a civilization in antiquity. Particular emphasis is placed on theological development culminating in monotheism, the role of the covenant, law and society, sacrifice and prayer as modes of worship, and similar topics. Jewish civilization is placed within the context of ancient civilizations (Canaan, Egypt, Babylon, Persia, Greece, Rome). Texts to be studied include selections from the Bible, the Apocrypha, the Dead Sea Scrolls, Josephus, and the Mishnah. All readings in English translation.]

[NES 251 Introduction to Islam: Religion, Politics, and Society (also RELST 252) @ #
Spring. 3 credits. Not offered 1999–2000.]

NES 255 Introduction to Islamic Civilization (also HIST 253, RELST 255) @ #
Spring. 3 credits. D. Powers.
The seventh-century Arab conquests resulted in the creation of a vibrant new civilization that stretched from the Iberian Peninsula in the West to Central Asia and the borders of India in the East. We will follow the course of Islamic history from the birth of Muhammad until the Mongol sack of Baghdad in 1258, with special attention to the religion of Islam and to the achievements of Muslims in the fields of law, theology, literature, science, philosophy, art and architecture. Friday sections will be devoted to the reading and analysis of primary sources in English translation.

NES 265 From Empire To Empire: Palestine Under Late Ottoman and British Rule, 1799–1948 (also JWST 265, HIST 206) @ #
Fall. 4 credits. M. LeVine.
This course examines the social history of Palestine during the late Ottoman and Mandate periods from a variety of disciplinary perspectives with the goal of helping students better understand the continuities of changes that occurred in the transition from Ottoman to British rule.

[NES 291 Arab Society and Culture
Fall. 3 credits. Enrollment limited to 25 students. Not offered 1999–2000. M. Younes.
The focus of this course is Arab society in the 20th century. We will start with a definition of the term "Arab" and address the issue of whether there is one or several Arab nations. This will be followed by a detailed examination of the following topics: the role of religion, history, and language in shaping modern Arab society; Arab identity and the development of Arab nationalism; the Arab-Israeli conflict; the conflict between secular and religious movements; the political systems of the different Arab countries; ethnic and religious groups; the distribution of resources (the super-rich and the destitute) and resulting conflicts; education; and finally the family and the status of women. No prior knowledge of Arabic is required.]

NES 298 Issues in 20th Century Catholic Thought (also RELST 201)
Fall. 3 credits. D. McKenzie.
This course is designed to introduce the student to important themes in twentieth century Catholicism including ideas of the church, religious freedom, human dignity and human rights, the Eucharist, hierarchy within the church, the communion of saints, discernment, spirituality, options for and obligations to the poor, solidarity, and peacemaking. This exploration is rooted in historical studies as well as theological and ethical approaches. No previous study of Catholicism is presupposed. Consideration will be given to the study of the Second Vatican Council and the ways in which this council inspired changes in the Catholic Church with which the church continues to grapple. Particular attention will be given to understanding Catholicism in the United States and the tensions that exist between United States Catholics and the institutional church.

We will assess the significance of the globalization of the church for theology and ethical decision making.

NES 339 Islamic Spain: Culture and Society (also JWST 339, COM L 334, RELST 334, SPAN L 339/699, NES 639) @ #

Fall. 4 credits. R. Brann.
This course examines the culture and society of al-Andalus (Islamic Spain) from 711, when Islam arrived in Iberia, until 1492 and the demise of Nasrid Granada. Through extensive discussion and analysis of Arabic, Latin, and Hebrew primary documents and literary texts of various genres (in translation), the course challenges ideological bases of conventional thinking regarding the social, political and cultural identity of medieval "Spain". Among other things, the class investigates the origins of lyric poetry, the relationships among the various confessional and ethnic communities in al-Andalus and the problems involved in Mozarabic Christian and Andalusi Jewish subcultural adaptations of Andalusi Arabo-Islamic culture.

[NES 351 Introduction to Islamic Law (also NES 651, RELST 350, HIST 372/652) @ #

Fall. 4 credits. Enrollment limited to 25 students. Not offered 1999–2000. D. Powers.]

[NES 352 Palaces and Court Culture in the Islamic World

Fall. 4 credits. Not offered 1999–2000. D. F. Ruggles.
While much of Christian Europe slumbered, Islamic cities of the Mediterranean and Asia shone with the brilliance of their many royal courts, patronized by rulers determined to outdo each other in the display of wealth and achievement. In centers such as Cairo, Kairouan, Baghdad, Cordoba, Granada, Isfahan, Herat, Agra, Lahore, and Istanbul, luxurious palaces were built to express not only power of sovereignty but intellectual prowess as well, for it was a sign of prestige for a prince to attract the greatest artists, poets, scientists, and scholars to his court. The focus of this course will be the architectural and artistic setting of court life and the display of power in outward signs such as festivals, coinage, and public acts that confirmed and symbolized royal power and authority.]

NES 357 Islamic Law and Society (also RELST 356) @ #

Spring. 4 credits. D. Powers.
The *Shari'ah*, or sacred law of Islam, embodies the totality of God's commands that regulate the life of every Muslim in all its aspects. The *Shari'ah* comprises on an equal basis ordinances regarding worship and ritual as well as political and, in Western terms, strictly legal rules. This course examines the relationship between the *Shari'ah* and the major social, economic, and political institutions of Islamic society. Topics to be discussed will include the status of women, slaves, and non-Muslims; attitudes toward the economy and the arts; the significance of *jihad* (holy war); the nature of the Muslim city; and the relationship between the religious establishment and the government. Attention will be given to the function of the *Shari'ah* in the modern world, with special reference to the problems and challenges of legal reform.

NES 363 Society and Law in the Ancient Near East (also JWST 363) @ #

Fall. 4 credits. T. Sharlach.
This course will study early Near Eastern law codes from Mesopotamia, the Hittite world and Israel. We will consider what legal and ethical norms can be derived from these laws, as well as exploring the issue of the social realities the laws addressed. Our main sources will be the ancient law codes themselves, but we will also read contemporaneous judicial proceedings, contracts and narratives that shed light on the actual practice of law.

NES 464 The Herodotean Moment (also GOVT 454, HIST 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.

NES 494 Modern Medicine and the Catholic Church (also RELST 494)

Spring. 3 credits. D. McKenzie.
This course is designed to help students develop an understanding of ethical approaches to contemporary health care which are based on the Catholic tradition in all of its breadth and diversity. Catholic tradition and medicine through critical analysis of relevant teachings and church statements are explored. Principle based approaches are considered as a conversation partner to examine the significance of a faith based approach. The goal of this course is to help students think analytically and passionately about health care ethics. The ability to appreciate complexity and tolerate legitimate differences in moral methods and choices is an important framework for this class, as well as an interest in Catholic tradition. Consideration of what constitutes just health care and the Church's longstanding commitment to medicine will provide a lens to examine critical issues such as: allocation of healthcare resources, the healing relationship and structure of medical care, autonomy and relationships in decision making, life and death treatment decisions, organ donation, abortion, new reproductive technologies, genetics and euthanasia. Attention will also be given to contemporary Roman Catholic scholars who offer feminist and liberation perspectives.

NES 497 Thomas Merton: Monk and Author (also RELST 497)

Fall. 4 credits. D. McKenzie.
Thomas Merton (1915–1968), a major Catholic figure of the twentieth century, enjoys a wide popularity based on his books, letters, journals, and poetry. In his writings he grappled with a wide variety of social problems and developed a contemporary spirituality. From the hermitage where he lived as a Trappist monk at the Abbey of Gethsemane near Bardstown, Kentucky, he contributed significantly to International discourse and social movements on pacifism, social justice, a Buddhist-Christian dialogue, and issues relating to religion and the environment. His life as a contemplative informed his writings on spirituality. Major themes include his conversion as recounted in *The Seven Story Mountain*, his spirituality (*Bread in the Wilderness, Contemplation in a World of Action*), his commitment to pacifism (*Conjectures of a Guilty Bystander, Faith and Violence: Christian Teaching and Christian Practice, Passion for Peace: The Social Essays*), his contributions to social justice (selections from letters, as well as *At Home in the World*, his correspondence with feminist theologian Rosemary Radford Reuther), his poetry (selections from *Collected Poems*), his concern for the environment (selections from letters and journals), and his participation in the Buddhist-Christian dialogue (*Zen and the Birds of Appetite*). Guest faculty from the Asian Studies Department and English Department will explore Merton's contributions from their respective disciplines.

NES 639 Islamic Spain: Culture and Society (also NES 339, JWST 339, COM L 334, RELST 334, SPAN L 339/699) @ #

Fall. 4 credits. R. Brann.
This course examines the culture and society of al-Andalus (Islamic Spain) from 711, when Islam arrived in Iberia, until 1492 and the demise of Nasrid Granada. Through extensive discussion and analysis of Arabic, Latin, and Hebrew primary documents and literary texts of various genres (in translation), the course challenges ideological bases of conventional thinking regarding the social, political and cultural identity of medieval "Spain". Among other things, the class investigates the origins of lyric poetry, the relationships among the various confessional and ethnic communities in al-Andalus and the problems involved in Mozarabic Christian and Andalusi Jewish subcultural adaptations of Andalusi Arabo-Islamic culture.

[NES 651 Introduction to Islamic Law (also NES 351, RELST 350, HIST 372/652)

Fall. 4 credits. Limited to 25 students. Not offered 1999–2000. D. Powers.]

NES 696 Conceptualizing Cultural Contact (also GERST 696, COM L 696)

Spring. 4 credits. L. Adelson.
Since the West German and Turkish governments signed a labor recruitment agreement in 1961, the Turkish population in the Federal Republic has become the largest group of "foreigners" to reside permanently in Germany. While Turks have borne the brunt of xenophobic hostility in a country that may soon grant them citizenship, a lesser known fact is that Turkish-German authors of several generations have been producing German literature for over two decades. Departing from the sociological model that usually interprets this minority literature as a plea for German compassion or intercultural dialogue, this course juxtaposes prose fiction about Turkish-German contact and critical theories of difference with two primary goals in mind: 1) Students will be introduced to representative examples of Turkish-German literature, a cultural phenomenon whose scope and significance have grown, not lessened, over time. 2) Various modes of conceptualizing cultural contact within a given country will be explored and compared, methodologically in relation to each other and analytically with regard to the Turkish-German field.

History

[NES 239 Cultural History of the Jews of Spain (also JWST 239, COMP LIT 239, RELST 239, SPAN LIT 239) @ #
Fall. 3 credits. Not offered 1999–2000. R. Brann.]

[NES 245 From Medievalism to Modernity: The History of Jews in Early Modern Europe, 1492–1789 (also JWST 253, HIST 285)
Fall. 4 credits. Not offered 1999–2000. V. Caron.
This course will examine the history of European Jewry during the centuries of transition from the Middle Ages to the Modern Era. It examines the extent to which traditional Jewish life began to break down during this period and thus paved the way for the emergence of modern Jewry. Topics will include: the impact of the Spanish Expulsion of 1492; religious, intellectual, and socioeconomic dimensions of the Marrano dispersion, including Lurianic Kabbalah and the messianic movement of Shabbetai Zevi; the reestablishment of Jewish communities in the West; the end of the "Golden Age" of Polish Jewry and the rise of Hasidism; the changing economic and political role of the Jews in the 17th and 18th centuries; and the impact of Enlightenment.]

[NES 248 Introduction to Classical Jewish History (also RELST 248 and JWST 248) @ #
Fall. 3 credits. Not offered 1999–2000.]

NES 255 Introduction to Islamic Civilization I (also RELST 255, HIST 253) @ #
Spring. 3 credits. D. Powers.
For description see Near Eastern Civilization.

[NES 261 Ancient Seafaring (also JWST 261, ARKEO 275) @ #
Fall. 3 credits. Not offered 1999–2000. D. Owen.]

NES 263 Introduction to Biblical History and Archaeology (also ARKEO 263, JWST 263, RELST 264) @ #
Spring. 3 credits. Enrollment limited to 50 students. J. Zorn.
For description, see NES 263 under Near Eastern Archaeology.

[NES 266 Jerusalem Through the Ages (also JWST 266, ARKEO 266, RELST 266)
Fall. 3 credits. J. Zorn. Not offered 1999–2000.
This class will explore the history, archaeology and natural topography of Jerusalem throughout its long life, from its earliest remains in the Chalcolithic period (ca 4000 B.C.E.) to the present day, including Jebusite Jerusalem, Jerusalem as the capital of the Davidic dynasty, the Roman era city of Herod and Jesus, the Crusaders and medieval Jerusalem, and Ottoman Jerusalem as the city entered the modern era. Students will examine the original historical sources (e.g. the Bible, Josephus, and the Madeba map) which pertain to Jerusalem. Slides and videos will be used to illustrate the natural features, man-made monuments, and artifacts which flesh out the textual material providing a fuller image of the world's most prominent spiritual and secular capital.]

[NES 290 History of Zionism and the Birth of Israel (also JWST 290, HIST 267)
Spring. 3 credits. Not offered 1999–2000. V. Caron.
This course will examine the history of Zionism as an ideology and political movement from its origins in the 19th century to the present. Attention will be paid to situating Zionism within the context of modern Jewish, European, and Middle Eastern History. Topics will include: the ideological foundations of Zionism; the role of Theodor Herzl and the rise of political Zionism; the Balfour Declaration; the development of the Yishuv; Zionism as a cultural identity for Diaspora Jewry; the British Mandate; the Arab-Zionist encounter; Zionist responses to the Holocaust; and Zionism and contemporary Israeli society.]

NES 294 Modern History of the Near East: Changing Politics, Society and Ideas (also JWST 294, GOVT 358) @
Spring. 4 credits. Fulfills the college distribution requirement in history or the social sciences. M. Bloom.
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 295 Introduction to Christian History (also JWST 295, RELST 295, HIST 299) #
Spring. 3 credits. K. Haines-Eitzen.
This course offers an introduction of Christianity from the apostle Paul through the 17th century, with an emphasis on the diversity of Christian traditions, beliefs, and practices. We will explore the origins of Christianity within the eastern Mediterranean world, the spread of Christianity, the development of ecclesiastical institutions, the rise and establishment of monasticism, and the vairous controversies that occupied the church throughout its history. The course will draw upon primary literary sources (from biblical literature to council proceedings, monastic rules, sermons, theological treatises, and biographies) as well as Christian art, inscriptions, music, and manuscripts.

NES 321 Heresy and Orthodoxy in Early Christianity (also RELST 321) @ #
Fall. 4 credits. K. Haines-Eitzen.
In this course we will explore the varieties of Christian thought and practice from the first through the fourth centuries. In its earliest centuries, Christianity consisted of a diverse range of movements, each of which was considered "heretical" by its opponents, one of which came to dominate all the others and so earned for itself the designation "orthodoxy". The "heresies" we study will include Adoptionism, Marcionism, Gnosticism, Montanism, Arianism, and Donatism. Consideration will also be given to the ways in which charges of "heresy" intersected with competing views about women in the early Church, the relationship between Judaism and Christianity, the construction of authority, and the content, function, and sacredness of early Christian books.

[NES 350 Women and Patronage in Islam (also WOMNS 350)
Spring. 4 credits. Not offered 1999–2000. D. F. Ruggles.
The active patronization of art, architecture, literature, and charitable works by Muslim women from the 12th century to the present was a sign of their public and personal power. This course will examine the means of female empowerment, ascribing it to family ties, the birth of male heirs, education, financial independence, etc., as well as its limitations in a world where the public institutions were run by men. It will particularly examine periods of change and the rise of self-conscious feminism in the modern age.]

[NES 351 Introduction to Islamic Law (also NES 651, RELST 350, HIST 372/652) @ #
Fall. 4 credits. Enrollment limited to 25 students. Not offered 1999–2000. D. Powers.]

[NES 356 Islamic History: The Age of Ibn Khaldun (also HIST 317)
Spring. 4 credits. Enrollment limited to 15 students. Prerequisite: NES 257 or equivalent. Not offered 1999–2000. D. Powers.
An examination of the Islamic world in the age of the great fourteenth-century historian Ibn Khaldun, with special attention to the political, social, and economic history of the Maghrib, or Muslim West.]

[NES 358 Ottoman History: 1300–1600 (also HIST 446/646 and NES 658) @ #
Fall. 4 credits. Not offered 1999–2000.]

[NES 359 Ottoman History: 1600–1923 (also HIST 441/641 and NES 659) @ #
Spring. 4 credits. Not offered 1999–2000.]

NES 366 The History and Archaeology of the Ancient Near East (also ARKEO 366, JWST 366) @ #
Fall. 4 credits. Prerequisite: Archaeology 100 or permission of instructor. D. I. Owen.
For description, see Near Eastern Archaeology.

[NES 368–369 State, Society and Language in Ancient Egypt (also GOVT 343/345)
368, fall; 369, spring. 4 credits. Not offered 1999–2000. M. Bernal.
This course is concerned with state and society in Pharaonic Egypt 3400–300 BCE. This will be combined with an introduction to Middle Egyptian, the official language of the Middle Kingdom 2000–1750 BCE and accepted as the "classical" language thereafter. This is a two-semester sequence course. In the fall we shall study the Egyptian state and society through secondary materials; in the spring we shall be reading primary sources concerned with everyday life, official reports and adventures abroad.]

[NES 393 Religion and Politics in the Middle East (also RELST 393)
Fall. 4 credits. Enrollment limited to 25 students. Not offered 1999–2000.]

[NES 395 International Relations of the Middle East (also GOVT 392) @
Fall. 4 credits. Not offered 1999–2000.]

NES 399 Age of Empires: Architecture of the Ottoman, Safavid, and Mughal Dynasties @ #
Fall. 4 credits. D. F. Ruggles.
The Ottomans, Safavids, and Mughals were the three great empires that coexisted in the Islamic world in the 16th, 17th and 18th centuries. The three architectures are all expressions of Islamic culture and stem from common sources, and yet the regional differences are marked. The Ottomans built monochromatic stone mosques with cascading low domes; the Safavids built tall domes sheathed in brilliantly colored tile; and the Mughals realized their architecture in the indigenous red sandstone and white marble of India. The themes addressed in class are the competition, imitation, and defiant rejection among the three empires; trade and communication with Europe; ethnicity and non-Islamic traditions; and regional versus pan-Islamic interests, and the symbolic construction of sovereign legitimacy with respect to both political dynasty and Islam. We will study the structure and engineering of great domes, the social use of space in mosque and palace planning, the expression of individual identity in tomb patronage, and competing political interests among contemporary and modern users of the building.

[NES 451 Seminar in Islamic History: 600–750 (also HIST 461/671, NES 650, and RELST 451) @ #
Spring. 4 credit. Enrollment limited to 25 students. Prerequisite: NES 257 or 258, or permission of instructor. Not offered 1999–2000. D. Powers.]

[NES 453 Islam in China and Southeast Asia (also ASIAN 422)
Fall. 4 credits. Not offered 1999–2000. J. Armijo-Hussein.]

[NES 457 The Role of Women in Muslim Societies: Past, Present and Future (also Asian 423)
Spring. 4 credits. Not offered 1999–2000. J. Armijo-Hussein.]

[NES 459 Women, Men and the Law in Muslim Court (also WOMNS 458, RELST 459, HIST 457/657 and NES 655) @ #
Fall. 4 credits. Prerequisites: previous course in Islamic Studies helpful but not essential. Enrollment limited to 20 students. Not offered 1999–2000.]

NES 466 The Mythology and Religion of Ancient Mesopotamia and Canaan (also JWST 466, RELST 466) @ #
Spring. 4 credits. T. Sharlach.
This course will introduce the religion of ancient Mesopotamia and of the Levant prior to the arrival of the Israelites. We will use translations of ancient Mesopotamian and Canaanite myths and hymns as the main area of investigation, but we also will look at archaeological and art historical evidence to explore the ancient Near Eastern perception of the cosmos.

[NES 650 Seminar in Islamic History: 600–750 (also HIST 461/671, NES 451, and RELST 451)
Spring. 4 credits. Not offered 1999–2000. D. Powers.]

[NES 651 Introduction to Islamic Law (also NES 351, RELST 350, HIST 372/652)
Fall. 4 credits. Enrollment limited to 25 students. Not offered 1999–2000. D. Powers.]

[NES 655 Women, Men and the Law in Muslim Court (also WOMNS 458, RELST 459, HIST 457/657 and NES 459)
Fall. 3 credits. Prerequisites: previous course in Islamic Studies helpful but not essential. Enrollment limited to 20 students. Not offered 1999–2000.]

[NES 658 Ottoman History: 1300–1600 (also HIST 446/646 and NES 358)
Fall. 4 credits. Not offered 1999–2000.]

[NES 659 Ottoman History: 1600–1923 (also HIST 441/641 and NES 359)
Spring. 4 credits. Not offered 1999–2000.]

Literature

[NES 213 Introduction to the Qur'an (also RELST 213) # @
Spring. 3 credits. Not offered 1999–2000.]

NES 223 Introduction to the Bible I (also JWST 223, RELST 223) @ #
Fall. 3 credits. G. Rendsburg.
This is the first course of a two-semester sequence. The main goal is to introduce students to the literature of the Hebrew Bible, which is accomplished by concentrating on the Torah and the historical material in Joshua through Samuel, that is, the material which covers the period from Israel's origins through King David. 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, and law.

[NES 224 Introduction to the Bible II (also JWST 224, RELST 224) @ #
Spring. 3 credits. Not offered 1999–2000. G. Rendsburg.
This is the second of a two-semester sequence, but one does not need to take NES 223 in order to take this course. The main goal is to introduce students to the literature of the Hebrew Bible. This is accomplished by concentrating on the historical material in Kings, the books of the Prophets, and the book of Job, that is, the material which covers the period from King Solomon through the end of the biblical era. 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, and mythology. (Note: students who have taken NES 227 Introduction to the Prophets are ineligible to take this course; NES 224 is intended to replace NES 227).]

NES 229 Introduction to the New Testament (also RELST 229 and JWST 229) @ #
Fall. 3 credits. K. Haines-Eitzen.
This course provides a literary and historical introduction to the earliest Christian writings, most of which eventually come to be included in the New Testament. Through the lens of the gospel narratives and earliest Christian letters, especially those of Paul, the course will explore the rich diversity of the early Christian movement, from its Jewish roots in first century Palestine through its development and spread to Asia Minor and beyond. Careful consideration will be given to the political, economic, social, cultural, and religious circumstances that gave rise to the Jesus movement, as well as those that facilitated the emergence of various manifestations of early Christian beliefs and practices.

[NES 230 The Quest for the Historical Jesus (also RELST 231)
Spring. 3 credits. Not offered 1999–2000.]

NES 236 Israel: Literature and Society (also JWST 236, COM L 246) @
Fall. 3 credits. Y. Halevi-Wise.
A series of Israeli literary narratives in English translation will be read closely: *The Lover* by Yehoshua, *A Voyage in the Land of Israel* by Oz, and selected short stories by contemporary authors of various ethnic backgrounds. We will analyze these texts both as literary artifacts and as attempts to represent a panorama of Israeli society.

[NES 239 Cultural History of the Jews of Spain (also JWST 239, COM L 239, RELST 239, SPAN L 239) @ #
Fall. 3 credits. Not offered 1999–2000. R. Brann.]

NES 299 Hebrew Bible and Arabic Qur'an in Comparative Perspective (also RELST 299, COM L 299, JWST 299) @ #
Spring. 3 credits. R. Brann.
This course examines (in translation) the Hebrew Bible and Arabic Qur'an as foundational documents of their respective religious traditions and as the texts by which their corresponding religious communities came to constitute and define themselves. The approach in this course will be comparative, analyzing literary aspects of the parallel narrative traditions on Creation, the Noah story, Abraham/Ibrahim and his sons, the Joseph/Yusuf cycle, as well as postbiblical and Islamic elaborations of the Solomon/Sheba material. The class will also discuss the concepts of revelation, prophethood, community, and notions of history, eschatology, and apocalypse set forth in the Hebrew Bible and Arabic Qur'an. The problematic nature of revealed scripture in monotheistic religion and the limited relevance of the idea of "influence" in the Near Eastern context will also be studied.

[NES 313 Classical Arabic Texts (also RELST 313)
Fall. 4 credits. Prerequisite: NES 311 or equivalent. Not offered 1999–2000. D. Powers.
This course will be an advanced study of classical Arabic through a close reading of selected chapters of the Qur'an, together with the Qur'anic commentary (tafsir) and other relevant literature. Special attention will be given to grammar, syntax, and lexicography.]

NES 320 Women in the Hebrew Bible (also JWST 320, WOMNS 322) @ #
Spring. 3 credits. G. Rendsburg.
This course features stories about women in the Hebrew Bible. Through literary readings of these texts we attempt to understand the portrayal of women (characteristics and roles assigned by male writers); the social reality represented; and the role of narrative in the promotion of ideologies. All texts in English translation. Hebrew texts optional.
There is a one-credit option for students who wish to meet 1 hour/week to read the texts in the Hebrew original (NES 326).

[MUSIC 787 History and Criticism
Spring. 4 credits. Not offered 1999–2000. A. Richards.]

[MUSIC 789 Liturgical Chant in the West
Spring. 4 credits. Not offered 1999–2000.]

MUSIC 901–902 Thesis Research
901, fall; 902, spring. Up to 6 credits each term, to be arranged. Offered for S-U only.
Limited to doctoral students in music who have passed the Admission-to-Candidacy Exam.

NEAR EASTERN STUDIES

R. Brann, chair; K. Haines-Eitzen, Y. Halevi-Wise, D. McKenzie, R. Morrison, D. I. Owen, (director of the Program of Jewish Studies); D. Powers (director of Undergraduate Studies), G. Rendsburg (director of Graduate Studies), D. F. Ruggles, N. Scharf, T. Sharlach, S. Shoer, H. Ünlü, L. White, M. Younes, J. Zorn
Joint faculty: M. Bernal

The Department

The Department of Near Eastern Studies (360 Rockefeller Hall, 255–6275) offers courses in the civilizations of the Near East including archaeology, history, religions, languages, and literatures. Students are encouraged to take an interdisciplinary approach to the religions and cultures of the region which has had an important impact on the development of antique, medieval, and modern civilization. The department's course offerings treat the Near East from the dawn of history to the present 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 social sciences/history. Any two Near Eastern Studies civilization or literature courses at the 200, 300, or 400 level that form a reasonable sequence or combination satisfy the distribution requirement in the humanities. NES 197, 198 or a 200-level survey course 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 197, 198 (or a 200-level survey course). 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 student's 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 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 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 the present. The following are 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 255, Introduction to Islamic Civilization

   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 (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 during 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 credit. Archaeological field work on Cornell-sponsored projects in the Near East 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
Fall and spring. 3 credits. Enrollment limited to 15. Not offered 1999–2000. C. Smith.
We will read selections from the Hebrew Bible (in translation) and examine the portrayal of courtship and marriage in its laws, poetry, and narratives.]

[NES 150 Discovering Islam
Spring. 3 credits. Enrollment limited to 15 students. Not offered 1999–2000. D. Powers.
Against the backdrop of Western stereotypes, we will explore Islamic society and culture from within, with special attention to prophecy and revelation, ritual practice, criminal law, the status of women, and the Islamic understanding of death and resurrection.]

NES 163 Things The Prophets Never Told You: Archaeology and the Religion of Ancient Israel (also JWST 163)
Fall. 3 credits. Enrollment limited to 15 students. J. Zorn.
A casual reading of the Hebrew Scriptures might lead one to believe that the normative religion of the Israelites was that spelled out in the Torah and Prophets. However, a more critical appraisal of the Biblical texts, along with an analysis of extra-Biblical texts and archaeological materials, demonstrates that the Israelites were often closer to their pagan neighbors than to modern Judaism or Christianity. Students will explore in their essays these similarities and differences. Topics may include: cult prostitution, magic, funerary rites, temple ritual, Hebrew mythology, etc. Readings will be from the Hebrew Bible, translations of extra-biblical texts, articles on archaeology and modern synthetic treatments of Israelite cult.

NES 190 Catholic Social Action (also RELST 190)
Spring. 3 credits. Enrollment limited to 15 students. D. McKenzie.
This course will focus on the history and development of Catholic Social Teaching, which calls on Catholics to work to eliminate injustice and build a compassionate world. Attention will be given to several themes including the economy (the rights of workers and owners, the rights to private property and its limitations, economic rights and initiative, debt and development), peace-making, capital punishment, option for the poor, and global solidarity. The class will analyze critically major encyclicals, papal letters, and bishops' statements, as well as attend to selected grassroots movements that inspired this teaching. The course is designed as a comprehensive introduction to the study of Catholicism and its social mission in the twentieth century. Participants will assess the strengths and weaknesses of Catholic Social Teaching and evaluate its contributions to human rights discourse.

Language Courses

NES 101–102 Elementary Modern Hebrew I and II (also JWST 105–106)
101, fall; 102, spring. 6 credits each term. Prerequisite for NES 102: 101 or permission of instructor. Satisfactory completion of NES 102 fulfills the qualification portion of the language requirement. Enrollment limited to 17 students in each section. S. Shoer.
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 17 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: 1) understand and actively participate in simple conversations involving basic practical and social situations (introductions, greetings, school, home and family, work, simple instructions, etc.); 2) read Arabic material of limited complexity and variety (simple narrative and descriptive texts, directions, etc.); 3) write notes and short letters describing an event or a personal experience. An important objective of the course is to familiarize students with basic facts about the geography, history, and culture of the Arab world.

NES 117–118 Elementary Turkish I & II
117, fall; 118, spring. 4 credits each term. Prerequisite for NES 118 is NES 117 or permission of instructor. Enrollment limited to 17 students. H. Ünlü.
Intended for beginners. This course is designed to develop students' proficiency and communication in modern Turkish in the four basic language skills: speaking, listening, reading, and writing. Facts about the geography, history, and culture of Turkey are built into the course. The teaching/learning process emphasizes the functional use of the language and contextual communication in the four skills. In the spring term, the course will continue to help students acquire the basic vocabulary and fundamental structures of Turkish. Students will proceed to use the major points of Turkish grammar, conduct oral (informal conversation and structured situations) and written practice, and advance their reading skills. The course will place increased emphasis on the development of conversational, reading, and writing skills while focusing on communicative drills and activities that involve student interaction.

NES 123–124 Elementary Biblical Hebrew I & II (also JWST 123–124, RELST 123–124)
123, fall; 124, spring. 3 credits each term. Enrollment limited to 17 students. Y. Chen.
The course is intended to develop basic proficiency in reading the Hebrew Bible. The first semester will emphasize introductory grammar and vocabulary. The second semester will focus on reading selected passages in the Hebrew Bible, with further development of vocabulary and grammar.

NES 133–134 Qur'anic and Classical Arabic
133, fall; 134, spring. 4 credits each semester. M. Younes.
This course is designed for students who are interested in reading the language of the Qur'an and *Hadiths* (Sayings of the Prophet) with accuracy and understanding. Authentic texts in the form of chapters from the Qur'an and *Hadiths* will be presented and analyzed, and basic grammatical structures will be discussed, explained, and practiced systematically. Interested students will be encouraged to memorize excerpts from the texts. At the end of the two-semester sequence, the successful student will have mastered a working vocabulary of over 1000 words, correct pronunciation, and the most commonly used grammatical structures. In addition, the course will provide the student with a firm foundation on which to build an advanced study of Classical Arabic.

NES 201–202 Intermediate Modern Hebrew I and II (also JWST 201–202) @
201, fall; 202, spring. Enrollment limited to 15 students in each section. 4 credits each term. Prerequisites for NES 201, 102 or permission of instructor; for NES 202, 201 or permission of instructor. N. Scharf.
A sequel to NES 101–102. Continued development of reading, writing, grammar, oral comprehension, and speaking skills. The course introduces Hebrew literature and Israeli culture through the use of texts and audio-visual materials.

NES 211–212 Intermediate Arabic I and II @
211, fall; 212, spring. Enrollment limited to 15 students in each section. 4 credits each term. Prerequisites: for NES 211, one year of Arabic or permission of instructor; for NES 212, 211 or permission of instructor. Staff.
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 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 situations 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 301–302 Advanced Modern Hebrew I and II (also JWST 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 literary 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 311 Advanced Arabic I @
Fall. 4 credits. Prerequisite: NES 212 or permission of instructor. Limited to 15 students. Staff.
Students will be introduced to authentic, unedited Arabic language materials ranging from poems, short stories, and plays to newspaper articles dealing with social, political, and cultural issues. Emphasis will be on developing fluency in oral expression through discussions of issues presented in the reading selections. A primary objective of the course is the development of writing skills through free composition exercises in topics of interest to individual students.

NES 312 Advanced Arabic II @
Spring. 4 credits. Limited to 15 students. Prerequisite: NES 311, or permission of instructor. Staff.
This course is a continuation of NES 311 using similar but more challenging materials. There will be more focus on the writing skills, the development of native-like pronunciation, and accurate use of grammatical structures than in NES 311. Each student will be required to make an oral presentation in Arabic on a topic of his/her choice and submit a written version of the presentation.

NES 333–334 Elementary Akkadian I & II (also NES 633–634) @ #
333, fall; 334, spring. 4 credits each term. Prerequisite for NES 334: 333 or permission of instructor. Prerequisite for NES 634: 633 or permission of instuctor. D. I. Owen.
An introduction to the Semitic language of the Akkadians and Babylonians of ancient Mesopotamia. Utilizing the inductive method, students are rapidly introduced to the grammar and the cuneiform writing system of Akkadian through selected readings in the Code of Hammurapi, the Descent of Ishtar, and the Annals of Sennacherib. Secondary readings in comparative Semitic linguistics, the position of Akkadian in the family of Semitic languages and on the history and culture of Mesopotamia provide a background for study of the language. Knowledge of another Semitic language is helpful but not essential.

NES 337–338 Ugaritic I & II (also NES 637–638) @ #
337, fall; 338, spring. 4 credits. Prerequisite: knowledge of another Semitic language (preferably Hebrew). G. Rendsburg.
Study of the language and literature of ancient Ugarit, an important site in northern Canaan. Special attention is paid to the relationships between Ugaritic and Hebrew and between Canaanite literature and the Bible.

[NES 416 Structure of the Arabic Language (also LING 416) @
Spring. 4 credits. Prerequisite: NES 112 or one year of Arabic. Not offered 1999–2000. M. Younes.]

[NES 420 Readings in Biblical Hebrew Prose (also JWST 420, RELST 420) @ #
Spring. 4 credits. Prerequisite: one year of Hebrew, Biblical or modern. Course may be repeated for credit. Not offered 1999–2000. 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 comparative concerns.]

[NES 433 Introductory Sumerian I (also NES 631) @ #
Fall. 4 credits each semester. Prerequisite: permission of instructor. Not offered 1999–2000. D. Owen.
This course will consist of an introduction to the Sumerian cuneiform script and grammar of the third millennium B.C.E. Readings in selected Sumerian economic, legal, and historical inscriptions, a basic introduction to Sumerian grammar and script, linguistic connections, and a survey and discussion of Sumerian civilization and culture. Students who have taken or plan to take Akkadian, Hebrew, or Hittite linguistics or are otherwise interested in the history of language should consider this course.]

NES 326 Women in the Hebrew Bible—seminar (also JWST 326, WOMNS 326)
Spring. 1 credit. G. Rendsburg.
This is a one-credit option for students who wish to meet one hour each week to read the texts in the Hebrew original. Must be concurrently enrolled in NES 320.

NES 328 Gnosticism and Early Christianity (also JWST 328, RELST 330) @ #
Spring. 4 credits. K. Haines-Eitzen.
An in-depth exploration of early Christian Gnosticism—its literatures, beliefs, and practices. Early Christian Gnosticism came to be considered heretical by early proto-orthodox Church Fathers. In this course, however, we will not simply read the condemnations written by the opponents of gnostic thought; rather, we will focus our attention on reading (in English translation) substantial portions of the texts written by the Gnostics themselves and found at Nag Hammadi, Egypt, in 1945. We will explore gnostic ideas about the world, creation, salvation, God, humanity, and the human body, while also attending to issues of gender, asceticism, and scriptural interpretation as they intersect with gnostic thought. To set gnostic literature within a socio-historical context, we will discuss other relevant ancient texts and scholarly theories about the Jewish and Hellenistic roots of early Christian Gnosticism.

NES 329 Intro to the New Testament—Seminar (also JWST 329, RELST 329)
Fall. 1 credit. Prerequisite: concurrent enrollment (or past enrollment) in NES 229 and one year of ancient Greek.
K. Haines-Eitzen.
A weekly seminar that may be taken in addition to NES 229. The seminar will provide an opportunity to read portions of the New Testament and other early Christian writings in Greek. We will work on grammatical and textual issues as well as other problems related to translations.

NES 339 Islamic Spain: Culture and Society (also JWST 339, COM L 334, RELST 334, SPAN L 339/699) @ #
Fall. 4 credits. R. Brann.
For description, see NES Civilization.

NES 354 The Islamic Book @ #
Spring. 4 credits. D. F. Ruggles.
Books both as material objects and texts will be the subject of this course, and for both we will study first-hand the Arabic and Persian works in the rare book and manuscript collections of the Kroch Library and the Johnson Museum. In the first half of the course we will begin looking at the materials and techniques of manuscript making (parchment, ink, paper, and bindings) and the visual organization of the page. We will proceed to the non-figural decoration of Qur'ans, prayerbooks, and secular texts with calligraphy, painted frontispieces and gold illumination. We will then study the various extant illustrated manuscripts of major works of literature and history, such as the *Maqamat*, *Bayad wa Riyad*, the world history of Rashid al-Din, *Baburnama*, *Süleymanname* and the Mongol, Timurid and Safavid versions of the *Shahnameh*. Projects will consist of creating an exhibition (either in electronic form or for glass display cases) with an accompanying explanatory catalogue.

[NES 394 Gender, Sexuality, and the Body in Early Christianity (also RELST 394, WOMNS 394)
Spring. 4 credits. Not offered 1999–2000.
K. Haines-Eitzen.
Beliefs about gender, sexuality, and the human body were remarkably interwoven with political, religious, and cultural disputes in early Christianity. In this course we will explore the construction and representation of gender, sexuality, and the body in various forms of Christianity from the first century through the fourth. Asceticism and celibacy, veiling and unveiling, cross-dressing and Gnostic androgyny, marriage and childbirth, and homosexuality will be among the topics considered, and our sources will range from the New Testament, early Christian apocrypha, martyrologies, and patristic writings to Greek medical texts, Jewish midrash, Roman inscriptions, and Egyptian erotic and magical spells. Current interdisciplinary and theoretical studies on gender, ideology, sexuality, and power will aid us in developing our analytical approaches to the ancient materials.]

NES 400 Seminar in Advanced Hebrew (also JWST 400) @
Fall. 4 credits. Prerequisite: NES 302/JWST 302 or permission of instructor. Enrollment limited to 15 students.
N. Scharf.
Continuation of work done in NES/JWST 302, with less emphasis on the study of grammar. We will read and discuss texts of cultural relevance, using articles published in Israeli newspapers and works by authors in each of the three principal genres: poetry, theater and novels. The course may be repeated for credit with permission of instructor.

[NES 420 Readings in Biblical Hebrew Prose (also JWST 420 and RELST 420)
Spring. 4 credits. Prerequisite: one year of biblical or modern Hebrew. Course may be repeated for credit. Not offered 1999–2000. 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 comparative concerns.]

NES 421 Readings in Biblical Hebrew Poetry (also JWST 421, RELST 421) @ #
Fall. 4 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 630 Readings in Judeo-Arabic: Medieval Judeo-Arabic and Hebrew Poetics
Fall and spring. 4 credits. Not offered 1999–2000. R. Brann.]

NES 639 Islamic Spain: Culture and Society (also NES 339, JWST 339, COM L 334, RELST 334, SPAN L 339/699) @ #
Fall. 4 credits. R. Brann.
This course examines the culture and society of al-Andalus (Islamic Spain) from 711, when Islam arrived in Iberia, until 1492 and the demise of Nasrid Granada. Through extensive discussion and analysis of Arabic, Latin, and Hebrew primary documents and literary texts of various genres (in translation), the course challenges ideological bases of conventional thinking regarding the social, political and cultural identity of medieval "Spain." Among other things, the class investigates the origins of lyric poetry, the relationships among the various confessional and ethnic communities in al-Andalus and the problems involved in Mozarabic Christian and Andalusi Jewish subcultural adaptations of Andalusi Arabo-Islamic culture.

NES 491–492 Independent Study, Undergraduate Level
Fall and spring. Variable credit. Prerequisite: permission of instructor. Staff.

NES 499 Independent Study, Honors
Fall and spring. Variable credit. Prerequisite: permission of instructor. Staff.

NES 691–692 Independent Study: Graduate Level
Fall and spring. Variable credit. Prerequisite: permission of instructor. Staff.

The Program of Jewish Studies

The Program of Jewish Studies encompasses a broad spectrum of disciplines that includes civilization, history, language, literature, philology, archaeology 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 I. Owen, 360 Rockefeller Hall. For complete listings and descriptions, see Program of Jewish Studies under "Special Programs and Interdisciplinary Studies."

JWST 105–106 Elementary Modern Hebrew I and II (also NES 101–102)
105, fall; 106, spring. 6 credits each term. Enrollment limited to 15 students.
S. Shoer.

JWST 123–124 Elementary Biblical Hebrew I and II (also NES 123–124, RELST 123–124)
123; fall, 124; spring. 3 credits each term.
Y. Chen.
For description, see NES 123–124.

JWST 163 Things the Prophets Never Told You (also NES 163)
Fall. 3 credits. Freshman Writing Seminar.
J. Zorn.
For description, see NES 163.

JWST 201–202 Intermediate Modern Hebrew I and II (also NES 201–202) @
201, fall; 202, spring. 4 credits. Enrollment limited to 15 students. N. Scharf.

JWST 223 Introduction to the Bible I (also NES 223, RELST 223) @ #
Fall. 3 credits. G. Rendsburg.
For description, see NES 223.

JWST 229 Introduction to the New Testament (also RELST 229, NES 229) @ #
Fall. 3 credits. See JWST 329 for additional credit offering. K. Haines–Eitzen.
For description, see NES 229.

JWST 236 Israel: Literature and Society (also NES 236) @
Fall. 3 credits. Y. Halevi-Wise.
For description, see NES 326.

JWST 252 Modern European Jewish History, 1789–1948 (also HIST 291)
Fall. 4 credits. V. Caron.
For description, see HIST 291.

JWST 255 Women and The Holocaust (also ENGL 252, WOMNS 252)
Fall. 4 credits. M. Jacobus.
For description, see ENGL 252.

JWST 263 Introduction to Biblical History and Archaeology (also NES 263, ARKEO 263, RELST 264) @ #
Spring. 3 credits. J. Zorn.
For description, see NES 263.

JWST 265 From Empire to Empire: Palestine Under Late Ottoman and British Rule, 1799–1948 (also NES 265, HIST 206) @ #
Fall. 4 credits. M. LeVine.
For description, see HIST 206.

JWST 271 Yiddish Linguistics (also LING 241)
Fall. 4 credits. M. Diesing.
For description, see LING 241.

JWST 294 Modern History of the Near East: Changing Politics, Society and Ideas (also NES 294, GOVT 358) @
Spring. 4 credits. M. Bloom.
For description, see GOVT 358.

JWST 295 Introduction to Christian History (also NES 295, RELST 295) #
Spring. 3 credits. K. Haines-Eitzen.
For description, see NES 295.

JWST 299 The Hebrew Bible and The Arabic Qur'an in Comparative Perspective (also NES 299, RELST 299, COM L 299) @ #
Spring. 3 credits. R. Brann.
For description, see NES 299.

JWST 301–302 Advanced Modern Hebrew I and II (also NES 301–302) @
301; fall, 302, spring. 4 credits. N. Scharf.
For description, see NES 301–302.

JWST 320 Women in the Hebrew Bible (also NES 320, WOMNS 322) @ #
Spring. 3 credits. G. Rendsburg.
For description, see NES 320.

JWST 323 Encounters With The Dead (also JWST 623, ITALL 323/623, COM L 323/623)
Fall. 4 credits. M. Migiel.
For description, see ITALL 323

JWST 326 Women in the Hebrew Bible—seminar (also NES 326, WOMNS 326)
Spring. 1 credit. G. Rendsburg.
For description, see NES 326.

JWST 328 Gnosticism and Early Christianity (also NES 328, RELST 330) @ #
Spring. 4 credits. K. Haines-Eitzen.
For description, see NES 328.

JWST 329 Intro to the New Testament—Seminar (also NES 329, RELST 329)
Fall. 1 credit. K. Haines-Eitzen.
For description, see NES 329.

JWST 339 Islamic Spain: Culture and Society (also NES 339/639, RELST 334, SPANL 339/699, COM L 334) @ #
Fall. 4 credits. R. Brann.
For description, see NES 339.

JWST 363 Society and the Law in the Ancient Near East (also NES 363)
Fall. 4 credits. T. Sharlach.
For description, see NES 363.

JWST 366 The History and Archaeology of the Ancient Near East (also NES 366, ARKEO 366) @ #
Fall. 4 credits. D. I. Owen.
For description, see NES 366.

JWST 400 Seminar in Advanced Hebrew (also NES 400) @
Fall. 4 credits. N. Scharf.
For description, see NES 400.

JWST 414 History into Fiction: Nazis and the Literary Imagination (also ENGL 404, COM L 404, GERST 414)
Fall. 4 credits. E. Rosenberg.
For description, see ENGL 404.

JWST 418 Exploring the Israeli Folksong (also S HUM 418, MUSIC 418)
Spring. 4 credits. S. Burstyn.
For description, see MUSIC 418.

JWST 421 Readings in Biblical Hebrew Poetry (also NES 421, RELST 421) @ #
Fall. 4 credits. G. Rendsburg.
For description, see NES 421.

JWST 458 Imagining the Holocaust (also JWST 658, ENGL 458/658, GERST 457/657)
Spring. 4 credits. D. Schwarz.
For description, see ENGL 458.

JWST 466 The Mythology and Religion of Ancient Mesopotamia and Canaan (also NES 466, RELST 466) @ #
Spring. 4 credits. T. Sharlach.
For description, see NES 466.

JWST 474 Topics in Modern European Intellectual and Cultural History (also HIST 474)
Fall. 4 credits. D. La Capra.
For description, see HIST 474.

JWST 478 Jewish-American Writing (also ENGL 479, AM ST 479)
Fall. 4 credits. J. Porte.
For description, see ENGL 479.

JWST 491–492 Independent Study–Undergraduate
Fall and spring. Variable to 6 credits.
Staff.

JWST 499 Independent Study—Honors
Fall and spring. Variable to 4 credits.
Staff.

JWST 623 Encounters With The Dead (also JWST 323, ITALL 323/623, COM L 323/623)
Fall. 4 credits. M. Migiel.
For description, see ITALL 323/623.

JWST 639 Islamic Spain: Culture and Society (also NES 339/639, JWST 339, RELST 334, SPAN L 339/699, COM L 334) @ #
Fall. 4 credits. R. Brann.
For description, see NES 339/639.

JWST 658 Imagining the Holocaust (also JWST 458, ENGL 458/658)
Spring. 4 credits. D. Schwarz.
For description, see ENGL 458/658.

Related Courses in Other Departments

Africana Studies
Archaeology
Asian Studies
Classics
Comparative Literature
Economics
English
German Studies
Government
English
History
History of Art
Linguistics
Medieval Studies
Music
Philosophy
Religious Studies
Romance Studies
Russian Literature
Society for the Humanities
Sociology
Women's Studies

NEPALI

See Department of Asian Studies.

PALI

See Department of Asian Studies.

PHILOSOPHY

T. Irwin (chair), T. Berry, R. N. Boyd (on leave fall 1999), W. Bracken, G. Fine, H. Hodes, T. Irwin, K. Jones (on leave 1999–2000), S. MacDonald, R. W. Miller (on leave spring 2000), F. Neuhouser (Society for the Humanities 1999–2000), N. Sethi, S. Shoemaker, J. Stanley, N. Sturgeon, Z. Szabó and J. Whiting.

Emeritus: C. A. Ginet.

The study of philosophy provides students with an opportunity to become familiar with some of the ideas and texts in the history of thought while developing analytical skills that are valuable in practical as well as academic affairs. It affords the excitement and satisfaction that come from understanding and working toward solutions of intellectual problems. The curriculum includes offerings in the history of philosophy, logic, philosophy of science, ethics, social and political philosophy, metaphysics, and theory of knowledge. Any philosophy course numbered in the 100s or 200s is suitable for beginning study in the field. Sections of Philosophy 100 are part of the freshman writing seminar program; they are taught by various members of the staff on a variety of philosophical topics, and because of their small size (seventeen students at most) they provide ample opportunity for discussion. Students who want a broad introduction to philosophy may take Philosophy 101, but many students with special interests may find that the best introduction to philosophy is a 200-level course in some particular area of philosophy; such courses have no prerequisites and are usually open to freshmen.

The Major

Students expecting to major in philosophy should begin their study of it in their freshman

or sophomore year. Admission to the major is granted by the director of undergraduate studies of the department on the basis of a student's work during the first two years. Normally the student must have completed two philosophy courses with grades of B or better. Eight philosophy courses are required for the major. They must include at least one course in ancient philosophy (Philosophy 210 or 211, or a course with a large component on Plato or Aristotle), at least one course in classical modern metaphysics and epistemology (Philosophy 212 or a course on the empiricists, the rationalists, or Kant), and a minimum of three courses numbered above 300. Students admitted to the major after fall 1996 will be required to take a minimum of six philosophy courses numbered above 200, and may not count more than one section of Philosophy 100 toward the major. A course in formal logic (e.g., Philosophy 231), while not required, is especially recommended for majors or prospective majors. Courses numbered 191–199 do not count toward the major.

Philosophy majors must also complete at least 8 credits of course work in related subjects approved by their major advisers. Occasionally majors may serve as teaching or research aides, working with faculty members familiar with their work.

Honors. A candidate for honors in philosophy must be a philosophy major with an average of B- or better for all work in the College of Arts and Sciences and an average of B+ or better for all work in philosophy. In either or both terms of the senior year a candidate for honors enrolls in Philosophy 490 and undertakes research leading to the writing of an honors essay by the end of the final term. *Honors students normally need to take Philosophy 490 both terms of their senior year in order to write a satisfactory honors essay.* Philosophy 490 does *not* count toward the eight philosophy courses required for the major. Prospective candidates should apply at the philosophy department office, 218 Goldwin Smith Hall.

Fees

In some courses there may be a small fee for photocopying materials to be handed out to students.

Introductory Courses

These courses have no prerequisites; all are open to freshmen.

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.

PHIL 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
3 credits. Fall, M W F 11:15–12:05, C. Williams; spring, M W F 11:15–12:05, J. Stanley.

Fall: This course will deal with selected central problems of philosophy, such as: the grounds and extent of our knowledge, responsibility and human freedom, personal identity and the relationships of persons to each other and to the world around them, the foundations of morality, the existence of God and of evil. Readings will be from both historical and contemporary authors.

Spring: As the title suggests, this is an introductory course. We will discuss four principle areas of philosophy: epistemology, philosophy of mind, ethics, and metaphysics; if you don't know what some of these terms mean, you can be sure that you will learn something here. We will begin with a close reading of Descartes's classic *Meditations on First Philosophy*. We will continue with Cartesian themes through the first two-thirds of the course, with discussions of the nature of the mental, personal identity, and free will. The last part of the course will be devoted to a survey of ethical theories.

PHIL 131 Logic, Evidence and Argument
Fall. 3 credits. M W F 10:10–11:00. S. MacDonald.

An introduction to the concepts and skills central to critical reading and thinking. The course aims to provide a general understanding of the principles of reasoning and to develop skills for identifying, analyzing, and evaluating the sorts of reasoning we encounter everyday in ordinary discourse. Students will be expected to attain facility with two different formal systems for representing and evaluating arguments—propositional logic and traditional syllogistic logic—and to acquire the ability to apply these systems in the analysis and evaluation of various kinds of ordinary reasoning.

PHIL 142 Appropriation and Alienation
Spring. 3 credits. This course is intended for freshmen. T R 2:55–4:10. T. Berry.

This course will investigate an important issue in political philosophy: the justification of property rights. We will start the course by watching a film, *The Field*, in which two different conceptions of what justifies ownership come into conflict. Should things belong to those who make them? Or shouldn't labor be the primary justification of property rights? We will spend the first half of the course investigating how the philosopher John Locke handles this issue in his classic defense of private property. In the second half, we will consider Karl Marx's classic objections to Locke's defense of private property.

[PHIL 145 Contemporary Moral Issues
3 credits. Not offered 1999–2000.]

PHIL 181 Introduction to the Philosophy of Science
Spring. 3 credits. T R 1:25–2:40. N. Sethi.

In this course we will attempt to answer such central questions as: What reasons do scientists have for accepting current scientific theories? Is science a search for truth? How can scientists test theories about unobservable entities? Do scientists discover or construct facts about nature? Are scientific claims immune to cultural, social and subjective influences?

PHIL 191 Introduction to Cognitive Science (See Cognitive Studies 101)
Fall. 3 credits. T R 11:40–12:55. M. Spivey-Knowlton.

This course surveys the study of how the mind/brain works. We will examine how intelligent information processing can arise from biological and artificial systems. The course draws primarily from five disciplines that make major contributions to cognitive science: philosophy, psychology, neuroscience, linguistics, and computer science. The first part of the course will introduce the roles played by these disciplines in cognitive science. The second part of the course will focus on how each of these disciplines contributes to the study of five topics in cognitive science: language, vision, learning and memory, action, and artificial intelligence.

PHIL 193 Inequality, Diversity and Justice (also City and Regional Planning 293, Government 293, Sociology 293)
Fall. 4 credits. M W F 2:30–3:20. The class will meet as a whole, for a lecture, F, 8/27; thereafter, lectures will be given M W, disc secs will be F. No prerequisites. Intended for freshmen and sophomores. R. Miller.

An interdisciplinary discussion of the nature and moral significance of social inequality, diversity and poverty and of the search for just responses to them. How unequal are economic opportunities? What are the causes of poverty? To what extent is greater equality a demand of justice? Are traditional welfare programs an appropriate response to poverty? What special significance have race and gender as sources of inequality? Do they merit special remedies such as affirmative action? How should governments deal with religious diversity and other differences in ultimate values? For example, should abortion statutes be neutral toward rival views of the importance of potential human life? What are the causes of worldwide inequality? To what extent do people in per-capita rich countries have a duty to help the foreign poor? Moral argument, investigations of social causes and legal reasoning interact in the search for answers to these questions. To provide these resources, the course will be taught by leading faculty researchers in philosophy, political theory, the social sciences and law.

PHIL 194 Global Thinking (also Government 294)
Spring. 4 credits. Satisfies geographical distribution requirement. No prerequisites. Intended for freshmen and sophomores. T R 10:10–11:25, 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 questions raised by one of the most important and most difficult issues facing international society: when, if ever, should other nations unilaterally or multilaterally intervene militarily into ethnic conflicts like those in Kosovo and Rwanda in this decade? Both of these recent cases, one in Europe and one in Africa, raise fundamental questions about the kind of world we are constructing for the 21st century. To what extent is the system of nation-states we now have either desirable or unavoidable? Does every ethnic group have a right to a self-determining and sovereign state? When is the use of military force morally justified? Should trials for war crimes or crimes against humanity be routinely held after military conflicts? These and other ethical questions need to be answered in light of the best available knowledge about the political dynamics of foreign intervention and the changing international legal regime, bringing together political science, law, and ethics. The course is team-taught by leading faculty researchers from the three fields involved.

[PHIL 210 Ancient Thought #
4 credits. Not offered 1999–2000.]

PHIL 211 Ancient Philosophy (also Classics 231)
Fall. 4 credits. This course has no prerequisites. It is open to freshmen. T R 1:25–2:40. G. Fine.
This course examines the origin and development of Western philosophy in Ancient Greece and Rome. We will study some of the central ideas of the Pre-Socratics, Socrates, Plato, Aristotle, and the Hellenistic philosophers (Epicureans, Stoics, and Sceptics). Questions to be considered include: What are the nature and limits of knowledge? Is knowledge even possible? How reliable is perception? What are the basic entities in the universe: atoms, Platonic Forms or Aristotelian substances? Is moral knowledge possible? What is the nature of happiness and what sort of life will make people happy? Do human beings have free will? Ought we to fear death? One of the fundamental works we will read is Plato's *Republic*.

PHIL 212 Modern Philosophy
Spring. 4 credits. No prerequisites. M W F 1:25–2:15. Z. Szabó.
This course is about the rise of modern philosophical thought in the 17th and 18th centuries in Europe. We will be focusing on four philosophers: Descartes, Berkeley, Leibniz and Hume. Our main interest will be the theory of ideas and the way this theory underlies metaphysics. What are ideas and how do we come to have them? Why are ideas necessary for knowledge about the external world? What is the connection between the structure of ideas and the structure of reality? This course emphasizes close reading of original texts (or translations of original texts) and critical assessment of philosophical arguments.

PHIL 213 Existentialism
Spring. 4 credits. M W F 2:30–3:20. W. Bracken.
This course will provide an introduction to the central themes and methods of existentialism as exemplified in the writings of Kierkegaard, Nietzsche, Heidegger, and Sartre. Topics will include: the nature of consciousness; the idea that human existence is a task; the anxieties of freedom; nihilism and despair; relationships between self and others; the possibility of an ethics of authenticity. Readings will be drawn from the aforementioned philosophers and will include one or two plays as well as one or two short stories. Time permitting, one or two films will also be screened and discussed over the course of the semester.

[PHIL 214 Philosophical Issues in Christian Thought #
4 credits. Not offered 1999–2000.]

PHIL 231 Introduction to Deductive Logic
Fall. 4 credits. M W F 1:25–2:15. H. Hodes.
The logic of truth-functional connectives and the universal and existential quantifiers: analysis of English-statements in terms of a formal language; evaluation of deductive reasoning in terms of such an analysis.

PHIL 241 Ethics (by petition for breadth requirement)
Fall. 4 credits. M W F 9:05–9:55. N. Sturgeon.
An introduction to the philosophical study of moral theories and moral arguments. Ethical relativism, ethical egoism, ethical skepticism, utilitarianism and deontological theories; some application to controversial contemporary issues.

[PHIL 242 Social and Political Philosophy (also Government 260)
Fall. 4 credits. Not offered 1999–2000.]

[PHIL 243 Aesthetics
4 credits. Not offered 1999–2000.]

[PHIL 244 Philosophy and Literature
4 credits. Not offered 1999–2000.]

PHIL 245 Ethics and Health Care
Fall. 4 credits. T R 10:10–11:25. C. Williams.
This course is an introduction to the ethical issues surrounding health care. Topics include: the professional-patient relationship; personhood, quality of life, and death, and their relations to issues such as abortion and euthanasia; justice and access to health care.

PHIL 246 Ethics and the World Environment
Spring. 4 credits. T R 11:40–12:55. H. Shue.
Critical philosophical analysis of the conceptual frameworks in which policies affecting the environment are formulated and judged. The course is an extended case-study of the global environmental issue of rapid climate change, focusing upon the ethical issues at the heart of the debates about the Kyoto Protocol to the Framework Convention on Climate Change. The key issues include alternative grounds for assigning responsibility for making necessary sacrifices between industrialized and developing nations, alternative principles for handling risks to future generations when outcomes are uncertain, and conflicting views about alleged over-consumption in wealthy nations and alleged over-population in poor nations.

[PHIL 247 Ethics and Public Life
4 credits. Not offered 1999–2000.]

PHIL 249 Feminism and Philosophy (also Women's Studies 249)
Fall. 4 credits. M W F 11:15–12:05. J. Whiting.
An historical introduction, using literary as well as philosophical texts, to views about the nature of women and their position in society—from the ancient debate (between Plato and Aristotle) about whether men and women are by nature suited to different activities, to contemporary debates between "sameness" and "difference" feminists. Texts will include Aeschylus, Plato, Aristotle, Rousseau, Wollstonecraft, Engels, and various twentieth century authors (such as Virginia Woolf, Carol Gilligan, Catherine MacKinnon, and Sarah Hoagland).

PHIL 261 Knowledge and Reality
Fall. 4 credits. T R 11:40–12:55. J. Stanley.
There are many propositions you take yourself now to know. For example, you take yourself now to know that there is a course-description of a philosophy class in front of you. You take yourself to know that a human has been on the moon before. You take yourself to know that two plus two is four. And so on. In taking ourselves to know such propositions, we are assuming that we can come to know facts about the world on the basis of such methods as perception, testimony, and memory. In this course, we will investigate, on an introductory level, different theories of what it is to know something on the basis of perception, reasoning, memory, or testimony. Issues we will discuss include skepticisms, i.e. positions which challenge our right to take these methods as sources of knowledge. We will read classical and contemporary sources.

[PHIL 262 Philosophy of Mind
4 credits. Not offered 1999–2000.]

PHIL 263 Religion and Reason
Spring. 4 credits. M W F 9:05–9:55. S. MacDonald.
What must (or could) God be like, and what reasons do we have for thinking that a being of that sort actually exists? What difference would (or could) the existence of God make to our lives? Religion and Reason examines the idea, common to several major world religions, that God must be an absolutely perfect being. What attributes must a perfect being have? Must it have a mind, be a person, care for human beings? Is the concept of a perfect being coherent? Is the existence of a perfect being compatible with the presence of evil in the world and the existence of human freedom? Does human morality depend in any important way on the nature or will of a perfect being? Is a perfect being among the things that actually inhabit our universe? The course approaches these questions with the tools and methods of philosophical reason and through readings drawn from both classic texts and contemporary philosophical discussion.

[PHIL 270 Truth and Interpretation (also Linguistics 270/Cognitive Studies 270)
4 credits. Not offered 1999–2000.]

PHIL 286 Science and Human Nature (also Science and Technology Studies 286)
Spring. 4 credits. M W F 10:10–11:00. R. Boyd.
Topic for 1999–2000: Darwin, Social Darwinism, and Human Sociobiology. An examination of attempts in the biological and social sciences to offer scientific theories of human nature and human potential and to apply such theories to explain important social and psychological phenomena.

Intermediate or Advanced Courses

Some of these courses have prerequisites.

PHIL 309 Plato
Fall. 4 credits. Prerequisites: at least one previous course in philosophy. M W 2:55–4:10. G. Fine.
A systematic survey of many of Plato's dialogues, including the *Republic*. We will consider Plato's views on knowledge and reality, as well as his ethical and political theories. Topics to be covered include the theory of forms; the nature and limits of knowledge and sense perception; the ideally just state; human happiness; why be moral?; the nature of the soul and immortality.

PHIL 310 Aristotle
Spring. 4 credits. T R 10:10–11:25. J. Whiting.
A general introduction to Aristotle's works—from the logical and biological through the ethical and political—organized around the differences, and relations, between his theoretical or scientific works and his practical or ethical works. Topics will include: the

extent to which his ethical and political views are based on his metaphysical and psychological views; and the contrast between the universality and exactness of mathematics and other sciences and the alleged particularity and inexactness of ethics.

PHIL 311 The Rationalists
4 credits. Spring. Prerequisites: at least one previous course in philosophy. T R 1:25–2:40. G. Fine.
We will consider the metaphysics and epistemology of Descartes, Spinoza, and Leibniz. Topics to be considered include: the nature of substance; proofs for the existence of God; free will, determinism, and causation; scepticism; the nature and limits of knowledge; the nature and value of sense perception; mind and body.

PHIL 312 Modern Empiricism
Spring. 4 credits. M W F 11:15–12:05. C. Williams.
A systematic survey of important themes in Hume. We will read extensively in each of the three major divisions of *A Treatise of Human Nature*, with occasional glances at Hume's later writings. Topics will include associationism in philosophical psychology, causal inference and belief in unperceived objects, communication of mental states via sympathy, the alleged "combat" of reason and passion, the moral sense and its evolution.

PHIL 313 Twentieth-Century Continental Philosophy
Spring. 4 credits. M 7:30–10:00 p.m. W. Bracken.
An investigation of leading figures in French and German speaking philosophy in the Twentieth-century, including such movements as existentialism, phenomenology, structuralism, post-structuralism, and the Frankfurt school of Critical Theory. Particular attention will be paid to the ways in which these figures can be understood as continuing "the critique of the subject" that Nineteenth-century German philosophers such as Hegel and Marx derived from Kant. Topics will include many of the following: existential phenomenology's critique of consciousness; the central role given to (differing interpretations of) Hegel's master-slave dialectic; the "decentering" of the subject; Lacan's theory of the mirror stage; structuralist conceptions of the unconscious; humanism and anti-humanism; ideology critique and psychoanalysis as methods of self-overcoming; the relationship between reason and desire; the possibility of an ethics (and a politics) of desire. We will focus on selected readings from Kojève, Sartre, Beauvoir, Lacan, Kristeva, Althusser, Marcuse, Adorno, and possibly one or two others, along with supplementary texts from Hegel, Marx, Freud and Nietzsche.

[PHIL 314 Ancient Philosophy: The World of Theory and the World of Ordinary Life #
4 credits. Not offered 1999–2000.]

PHIL 315 Medieval Philosophy
Fall. 4 credits. T R 11:40–12:55. S. MacDonald.
A survey of some main themes and major figures in medieval philosophy. Emphasis will be on the close reading and analysis of representative texts, but some attention will be given to the general historical development of philosophical themes and traditions during the thousand years separating late antiquity and the Renaissance. Readings (in English translation) may include Augustine, Boethius, Anselm, Abelard, Aquinas, Scotus, and Ockham and address topics in metaphysics, epistemology, ethics, and philosophical theology.

PHIL 316 Kant
Fall. 4 credits. M W F 1:25–2:15. T. Irwin.
An introduction to Kant's main metaphysical and epistemological doctrines as presented in the *Critique of Pure Reason*, including: the nature of space and time, the justification of scientific knowledge, the nature of human reason and self-consciousness. Special attention will be paid to Kant's critique of traditional metaphysics and his attempt to establish a new metaphysics, grounded in practical reason, that establishes the existence of God, human freedom, and morality.

[PHIL 317 Hegel #
4 credits. Not offered 1999–2000.]

PHIL 318 Twentieth-Century Philosophy
Spring. 4 credits. Recommended background: Philosophy 231 or the equivalent. M W 2:55–4:10. J. Stanley.
A survey of philosophical writings from the late 19th to early 20th century including G. Frege, B. Russell, L. Wittgenstein, on language, foundations of mathematics, topics in metaphysics (and perhaps epistemology).

[PHIL 319 Philosophy of Marx #
4 credits. Not offered 1999–2000.]

PHIL 331 Deductive Logic (also Mathematics 281)
Spring. 4 credits. M W F 2:30–3:20. H. Hodes.
Review of derivations and truth-in-a-model; function- constants and identity; truth in non-fully-distinguished models; very basic set-theory; sets as the only mathematical objects; mathematical induction; soundness; completeness. Recommended previous course: Philosophy 231 or equivalent.

PHIL 332 Philosophy of Language
Fall. 4 credits. T R 1:25–2:40. Z. Szabó.
This course is an introduction to contemporary philosophy of language. It does not, however, aim at covering all the ground; instead, we will focus almost exclusively on questions of quantification. Problems surrounding the use of quantifiers in natural languages play an important role in philosophical reflection, so working through this course will help you to orient yourself in contemporary analytic philosophy. In relation to quantification, we will touch on a number of important issues including problems surrounding the logical consequence relation, the status of modalities, the nature of intentionality, and the interpretation of propositional attitudes.

PHIL 341 Ethical Theory
Spring. 4 credits. M W F 10:10–11:00. N. Sturgeon.
Topic for 2000: Consequentialism and Its Critics. A historical and systematic investigation of one of the deepest divides in philosophical debate about ethics, between those who think the moral evaluation of acts, character traits and social institutions depends solely on their good or bad consequences, and critics who find this approach fundamentally misguided.

[PHIL 342 Law, Society, and Morality (also Law 666)
4 credits. Not offered 1999–2000.]

[PHIL 343 Resistance and Responsibility (also Law 676)
4 credits. Not offered 1999–2000.]

[PHIL 344 History of Ethics: Ancient and Medieval #
4 credits. Not offered 1999–2000.]

[PHIL 345 History of Ethics: Modern #
4 credits. Not offered 1999–2000.]

[PHIL 346 Modern Political Philosophy (also Government 462)
4 credits. Not offered 1999–2000.]

[PHIL 361 Metaphysics and Epistemology
Not offered 1999–2000.]

PHIL 362 Philosophy of Mind
Spring. 4 credits. T R 2:55–4:10. S. Shoemaker.
The nature of consciousness. Topics will include: the nature of introspective awareness of one's mental states, the nature of "phenomenal consciousness" and the question of whether this involves "qualia," the function of consciousness, the "explanatory gap" between neural states and conscious states, and the issue of whether the existence of consciousness is compatible with physicalism about the mind and functionalist views about the mind.

[PHIL 363 Topics in the Philosophy of Religion
4 credits. Not offered 1999–2000.]

[PHIL 368 Global Climate and Global Justice (also Government 368)
4 credits. Not offered 1999–2000.]

[PHIL 369 Limiting War (also Government 469)
4 credits. Not offered 1999–2000.]

[PHIL 381 Philosophy of Science: Knowledge and Objectivity (also Science and Technology Studies 381)
4 credits. Not offered 1999–2000.]

[PHIL 382 Philosophy and Psychology
4 credits. Not offered 1999–2000.]

[PHIL 383 Choice, Chance and Reason
4 credits. Not offered 1999–2000.]

[PHIL 384 Philosophy of Physics
4 credits. Not offered 1999–2000.]

[PHIL 387 Philosophy of Mathematics
4 credits. Not offered 1999–2000.]

[PHIL 389 Philosophy of Science: Evidence and Explanation
4 credits. Not offered 1999–2000.]

PHIL 390 Informal Study
Fall or spring. Credit to be arranged.
To be taken only in exceptional circumstances. Must be arranged by the student with his or her adviser and the faculty member who has agreed to direct the study.

Advanced Courses and Seminars

These courses are offered primarily for majors and graduate students.

[PHIL 395 Majors Seminar
4 credits. Not offered 1999–2000.]

[PHIL 409 German Philosophical Texts
Not offered 1999–2000.]

PHIL 410 Latin Philosophical Texts #
Fall and spring. Variable credit. Prerequisites: knowledge of Latin and permission of instructor. Hours to be arranged. S. MacDonald.
Reading of philosophical texts in the original Latin.

PHIL 411 Greek Philosophical Texts (also Classics 311) #
Fall and spring. Variable credit. Prerequisites: knowledge of Greek and permission of instructor. Hours to be arranged. T. Irwin, C. Brittain.
Reading of philosophical texts in the original Greek.

[PHIL 412 Medieval Philosophy #
Not offered 1999–2000.]

PHIL 413 Topics in Ancient Philosophy (also Society for the Humanities 402 and 403)
Fall and spring. 4 credits. T 2:30–4:25. C. Brittain.
Fall: Topic: Augustine's Confessions: Memory and the Self. Augustine's *Confessions* record the strange story of his conversion to or rediscovery of God under the stimulus of the letters of Paul and the pagan philosophy of Plotinus. The *Confessions* interpret his conversion as an act of memory or self-investigation which culminates in a Platonist philosophical vision of the divine at the limits of the self; the work itself is written as a self-conscious act of memory (or self-investigation); it also contains a theoretical analysis of memory (Book X). This course will study Augustine's conception of memory as the source of the self and the bridge from the self to the divine, and its origins in Greek philosophy, Latin rhetorical theory, and individual experience.

Spring: Topic: Augustine's Dialogues on the Soul. Augustine's first works after his conversion were a series of Christian philosophical dialogues, modeled on the exemplary works of Cicero. The dialogues exploit the Platonist conception of the soul Augustine found in the works of Plotinus: its immateriality *(On the quantity of the Soul)*, its intellectual capacities (*Against the Academics*), its immortality *(On the immortality of the Soul)*, and its relation to God (*The Soliloquies*). But theses texts are not simple translations of Greek philosophy into the pre-existing mold of the Latin dialogue; they represent Augustine's appropriation of the 'pagan' cultures of Greece and Rome for a new intellectual vision of Christianity. This course will examine Augustine's fusion and transformation of both the philosophical sources and the literary forms which provoked these powerful and conceptually rich dialogues.

[PHIL 414 German Philosophy after Kant #
Not offered 1999–2000.]

PHIL 415 Special Topics in the History of Philosophy (also Society for the Humanities 406 and 416)
Fall and spring. 4 credits. Fall, M 12:20–2:15; spring, M 12:20–2:15. F. Neuhouser.
Fall: Topic: Subjectivity and the Other I. This seminar examines various forms of the idea that interactions with "the other" (i.e., with other subjects) are essentially involved in the constitution of subjectivity. It will focus on the ways in which contact with the other is essential to reason, morality, freedom, and personal identity, as well as to alienation and self-tyranny. Readings will include: Rousseau on self-love and its connection to autonomy; Hegel's account of the master-slave relation and the unhappy consciousness; Sartre's view of the other as a threat to subjectivity; and de Beauvoir's portrayal of woman as the other and her attempt to unite autonomous subjectivity with being an object for others.

Spring: Topic: Subjectivity and the Other II. This seminar continues and expands the themes of its predecessor with special attention to the role played by the other in certain (loosely speaking) psychological theories of selfhood. Topics will include: G. H. Mead on the importance of social roles to selfhood; Nietzsche on guilt, enslavement, and resentment; Freud's theory of neuroses, narcissism, and the therapeutic relation between analyst and analysand; and Kristeva's view of the other as internal to each of us.

[PHIL 416 Modern Philosophy #
Not offered 1999–2000.]

[PHIL 431 Mathematical Logic (also Mathematics 481)
4 credits. Not offered 1999–2000.]

[PHIL 432 Topics in Logic (also Math 482)
4 credits. Not offered 1999–2000.]

[PHIL 433 Philosophy of Logic
4 credits. Not offered 1999–2000.]

PHIL 434 The Foundations of Mathematics (also Math 384)
Fall. 4 credits. M W F 2:30–3:20. H. Hodes.
Topic for 1999: set-theoretic foundations: formalizing logic (with attention to classical vs intuitionistic reasoning); formalizing arithmetic; set theory and its ZF- (and IZF) formalization; ordinal and cardinal numbers; the axiom of choice; number-systems within set-theory; truth and consistency in set-theory; alternatives to the ZF-formalization. Time permitting we'll constrast the set-theoretic approach with approaches based on untyped Lambda-calculi or type-theories.

[PHIL 436 Intensional Logic (also Math 486)
4 credits. Not offered 1999–2000.]

[PHIL 437 Topics in the Philosophy of Language
4 credits. Not offered 1999–2000.]

[PHIL 441 Contemporary Ethical Theory
4 credits. Not offered 1999–2000.]

PHIL 442 Ethics and the Philosophy of Mind (also Society for the Humanities 409)
Fall. 4 credits T 12:20–2:15. J. Hill.
Topic: "Cosmopolitanism and The Self". This seminar philosophically examines the racial and ethnic tribal identities on which contemporary selves are predicated. As a plausible antidote to problems spawned by tribalism, we will examine the possibility of a moral cosmopolitan identity. Readings will be drawn from the Ancient and Enlightenment cosmopolitans as well as contemporary texts which aim to deconstruct the concept of race.

PHIL 443 Aesthetic Theory
Spring. 4 credits. T R 11:40–12:55. C. Williams.
An examination of issues that commonly arise from our experience of the arts: the character and appropriateness of aesthetic judgments; the content of artworks, and the extent to which contents can be reproduced, stated, or paraphrased; the relevance of moral considerations; aesthetic desiderata (e.g., uniqueness, expressiveness) and aesthetic defectiveness (e.g., sentimentality, bad taste, insincerity). Although these issues can be formulated in a way that is neutral between the various arts, they can seem more pressing (or intractable) for specific arts; and we will give some attention to the more specialized contexts.

[PHIL 444 Contemporary Legal Theory (also Law 710)
4 credits. Not offered 1999–2000.]

[PHIL 446 Topics in Social and Political Philosophy (also Government 474)
4 credits. Not offered 1999–2000.]

PHIL 447 Contemporary Political Philosophy [also GOVT 465]
Fall. 4 credits. T R 2:55–4:10. R. Miller.
Topic for 1999: Reconceiving Liberalism. While traditional liberal goals of civil liberty, political equality and fair economic opportunity retain a central place in current political philosophy, liberalism has recently been subject to a variety of sharply contrasting interpretations, e.g., as based on political values shared by all reasonable moral doctrines (Rawls); as sustained by a general account of moral obligation, centered on mutual justifiability (Scanlon); or as expressing a distinctive view of the good life, in which autonomy plays a fundamental role (Raz). Others (e.g., Sandel) have argued that central liberal goals require, for their achievement, an ethic of solidarity and the collective development of shared values. Our discussion of these outlooks and their critics will include Rawls, *Political Liberalism*; Scanlon, *What We Owe to Each Other*; Raz, *The Morality of Freedom*; Sandel, *Democracy's Discontent*; and relevant disputes over the liberty and equality protected by the U.S. Constitution.

[PHIL 460 Metaphysics and Epistemology (also Society for the Humanities 444)
4 credits. Not offered 1999–2000.]

[Philosophy 461 Feminist Epistemology (also Women's Studies 461)
4 credits. Not offered 1999–2000.]

[PHIL 462 Philosophy of Mind
4 credits. Not offered 1999–2000.]

PHIL 481 Problems in the Philosophy of Science
Spring. 4 credits. W 7:30–10:00. R. Boyd.
Topic for 1999–2000: objectivity in science: alternative approaches from philosophy, science studies, feminist theory and radical critiques of science.

PHIL 490 Special Studies in Philosophy
Fall and spring. 4 credits. Open only to honors students in their senior year. See Honors description at front of Philosophy section.

PHIL 611 Ancient Philosophy
Spring. 4 credits. M 4:30–6:30. T. Irwin.
Topic for 1999–2000: nature, natural law, naturalism: historical questions in meta-ethics.

[PHIL 612 Medieval Philosophy
Not offered 1999–2000.]

[PHIL 613 Modern Philosophers
4 credits. Not offered 1999–2000.]

[PHIL 619 History of Philosophy
4 credits. Not offered 1999–2000.]

PHIL 633 Philosophy of Language
Fall and spring. 4 credits. Fall, W 4:30–6:30, J. Stanley; spring, R 4:30–6:30, Z. Szabo.
Fall: special topics in the philosophy of language. **Spring**: topics in semantics and pragmatics. We will survey current work in linguistics and in the philosophical literature with special focus on anaphora and quantification.

PHIL 641 Ethics and Value Theory
Fall. 4 credits. M 4:30–6:30. N. Sturgeon. Topic for fall: moral relativism, moral realism and moral nihilism

PHIL 642 Morality, Self, and Psychopathology
Spring. 4 credits. T 4:30–6:30. J. Whiting. Philosophical accounts of personal identity typically aspire to a kind of universality; each account tends to represent itself as *the* (presumably uniquely) correct account implying the falsity of its various rivals (e.g., psychological continuity theories implying the falsity of bodily continuity theories and vice versa). But to the extent that we are dealing with *selves*—i.e., partially reflexive entities—it seems possible that different self-*conceptions* might yield different sorts of *selves*, some, for example, more, and some less, bodily (or psychological) than others. We will examine this sort of "contingency of selfhood" both cross-culturally (looking, e.g., at non-Western conceptions of self and at the Buddhist ideal of self-dissolution) and psychopathologically (looking, e.g., at pathological configurations of self such as those involved in autism, schizophrenia, multiple-personality-disorder, and eating disorders), treating the study of psychopathology as akin (for our purposes) to ethnography. The idea is to see whether forms of selfhood (or subjectivity) that we take for granted and perhaps even view as inescapable are in fact contingent and optional. We can then ask what sorts of selfhood (or subjectivity) it is *valuable* (morally, aesthetically, or otherwise) to cultivate. This raises the difficult question of the point(s) of view from which we are to make such assessments.

[PHIL 661 Theory of Knowledge
4 credits. Not offered 1999–2000.]

PHIL 662 Philosophy of Mind
Fall. 4 credits. T 4:30–6:30. S. Shoemaker. The Mind-Body Problem: mental causation, the physical realization of mental states, and emergence.

[PHIL 663 Philosophy of Religion
4 credits. Not offered 1999–2000.]

[PHIL 664 Metaphysics
4 credits. Not offered 1999–2000.]

[PHIL 665 Metaphysics
4 credits. Not offered 1999–2000.]

[PHIL 681 Philosophy of Science
4 credits. Not offered 1999–2000.]

[PHIL 682 Philosophy of Social Science
4 credits. Not offered 1999–2000.]

PHIL 700 Informal Study
Fall or spring. Credit to be arranged. To be taken by graduate students only in exceptional circumstances and by arrangement made by the student with his or her Special Committee and the faculty member who has agreed to direct the study.

PHIL 773 Proseminar in Cognitive Studies (also Cognitive Studies 773, Linguistics 773, and Computer Science 773)
Fall. 2 credits. Fall: R grade.
For description, see COGST 773.

PHIL 774 Proseminar in Cognitive Studies (also Linguistics 774)
For description, see COGST 774.

Related course in other department

German Studies 378. German Aesthetic Theory from Kant to Hegel. P. Gilgen.

PHYSICS

G. P. Lepage, chair (109 Clark Hall, 255–6016); J. T. Rogers, director of undergraduate studies (101 Clark Hall, 255–8158); J. P. Alexander, V. Ambegaokar, P. C. Argyres, T. A. Arias, N. W. Ashcroft, K. Berkelman, E. Bodenschatz, P. Brouwer, D. G. Cassel, B. Cooper, P. Drell, G. F. Dugan, V. Elser, D. B. Fitchen, E. E. Flanagan, C. P. Franck, R. S. Galik, L. K. Gibbons, B. Gittelman, B. Greene, S. M. Gruner, L. N. Hand, D. L. Hartill, C. L. Henley, W. Ho, A. LeClair, D. M. Lee, N. D. Mermin, N. Mistry, M. Neubert, H. Padamsee, J. M. Parpia, J. R. Patterson, R. O. Pohl, D. C. Ralph, J. D. Reppy, R. C. Richardson, D. L. Rubin, J. P. Sethna, A. J. Sievers, E. Siggia, P. C. Stein, R. M. Talman, M. P. Teter, S. A. Teukolsky, R. Thorne, H. Tye, M. D. Wang, T-M. Yan

The Department of Physics offers a full range of university-level work in physics, from general education courses for nonscientists to doctoral-level independent research. Major research facilities are operated by two component organizations, the Laboratory of Atomic and Solid State Physics (LASSP) and the Laboratory of Nuclear Studies (LNS). LASSP carries out extensive research efforts in condensed-matter physics and in low-temperature physics. LNS operates a major high-energy particle physics research facility at Wilson Laboratory, the Cornell electron-positron storage ring (CESR). Theoretical work is carried out in many fields of physics, including astrophysics. There is a full schedule of weekly research-oriented seminars and colloquia. Junior and senior students will find many opportunities for research participation and summer employment.

Introductory physics sequences are: 101–102, 207–208, and 112–213–214, or its honors version 116–217–218. In addition, there is a group of general-education courses, Physics 200 through 206, 209, 210. Physics 101–102, a self-paced autotutorial course, is designed for students who do not intend to take further physics courses and who do not have preparation in calculus. Physics 112 and 207 both require calculus (Mathematics 191 or 111), and additional mathematics is required for subsequent courses in the sequence. Physics 101–102 or 207–208 may be taken as terminal physics courses. The three-term sequence 112–213–214 or its honors version, 116–217–218, is recommended for engineers and physics majors. Physics 214 and 218 are placing an increasing emphasis on use of the computer for homework, laboratory exercises, and projects; some knowledge about computing, perhaps at the level of Computer Science 99 or 100, is desirable.

Courses beyond the introductory level that might be of interest to nonmajors include. Physics 316 (Modern Physics I); Physics 330 (Modern Experimental Optics); and Physics 360 (Electronic Circuits).

Advanced placement and credit are offered as outlined in "Advanced Placement of Freshmen," or students may consult Professor Rogers, the director of undergraduate studies, as should students requesting transfer credit for physics courses taken at another college.

The Major

The major program is constructed to accommodate students who wish to prepare for professional or graduate work in physics as well as those who wish to complete their major program in the field of physics but have other post-graduation goals.

Students who wish to major in physics are advised to start the physics sequence in the first term of their freshman year. (Note that students who have had contact with introductory calculus may take Physics 112 with co-registration in Mathematics 191.) The major program can still be completed with a second-term start, but flexibility in future course scheduling is reduced.

Prospective majors are urged to make an early appointment at the physics office for advice in program planning. Acceptance into the major program is normally granted upon completion of a year of physics and mathematics courses at Cornell with all course grades at the B-level or 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 mathematics through at least Mathematics 222 or 294. 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 321/420–422).

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.

Typical Physics Course Sequences (other sequences are also possible)

Semester	No AP math or physics	1 year AP calculus and good HS physics	Outside concentrators	Outside concentrators (alternate)
1st – Fall	112	116	112	
2nd – Spring	213	217	213	112
3rd – Fall	214	218	214	213
4th – Spring	316, 3x0	316, 3x0	3x0	214
5th – Fall	317, 327, 3x0	317, 327, 3x0	316	3x0, 316
6th – Spring	314/318, 443	318, 443	314	314, 3x0
7th – Fall	341, 410	341, 410	317, 323	317, 323
8th – Spring	Elective(s)	Elective(s)		

•For majors with concentrations outside physics, there will be wide variation in individual programs, arranged to best match the field of concentration.

•Crossovers between the two sequences 112–113–214 and 116–217–218 are possible, although the combinations 112–217–218 and 112–213–218, are difficult. Physics 207 may be substituted for Physics 112. Students taking 217 after 112 must coregister for 216.

•Students taking the honors sequence 116–217–218 are strongly encouraged to start with Physics 116. 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, 480, 525, 553, 561, 572, the senior seminars 481–483, Astronomy 332 or 431–432, and A&EP 434.

•One semester of intermediate laboratory, listed here as 3x0, is required.

•Well-prepared sophomores wishing to take Physics 318 should consult the instructor before registering.

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. Students are strongly encouraged to start the sequence with Physics 116, even if they qualify for advanced placement credit for Physics 112. 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 credit 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. Of the required 15 hours credit beyond the core, at least 8 credits must be in courses numbered above 300. Students have chosen to concentrate in such topics as chemical physics, astrophysics, natural sciences, history and philosophy of science, computer science, meteorology, or econometrics. A combined biology-chemistry concentration is appropriate for pre-medical students or those who wish to prepare for work in biophysics. Students interested in a career in the teaching of science should consider the Teacher Education in Science and Mathematics (TESM) Program, which is administered by the Departments of Education and Mathematics and is described in detail in the College of Arts and Sciences section of this catalog. A concentration in "science education" would then typically include Education 402 and 403, both part of TESM, and two or more courses designed to broaden the student's background in general science and mathematics.

For students with concentrations outside physics, the core requirements in mechanics and electromagnetism can be appropriately 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 are encouraged to 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, 112, 116, 207
Physics 102, 208, 213, 217
Physics 214, 218
Physics 314, 318
Physics 323, 327

Course Prerequisites

Prerequisites are specified in physics course descriptions to illustrate the materials that students should have mastered. Students who wish to plan programs different from those suggested by the prerequisite ordering are urged to discuss their preparation and background with a physics adviser or with the instructor in the course. In many cases an appropriate individual program can be worked out without exact adherence to the stated prerequisites.

Courses

Listed days and times are not definite but are unlikely to change. Days and times will not be listed for 600-level courses.

PHYS 101 General Physics I
Fall, summer 4-week or 8-week session. 4 credits. General introductory physics for non-physics for non-physics majors. Prerequisites: three years of high school mathematics, including some trigonometry. A student without high school physics should allow extra time for Physics 101. Includes less mathematical analysis than Physics 207, but more than Physics 200–206, 209, 210. Enrollment may be limited. Fall introductory lec. R Aug. 26 or M Aug. 30, 7:30 p.m. J. Parpia.
Physics 101 emphasizes quantitative and conceptual understanding of the topics of introductory physics developed without use of calculus. The course is mostly self-paced in a mastery-oriented format including eight subject units and a final retention (review) unit. Most instruction occurs in the learning center utilizing video-taped lectures, personal tutoring by staff, assigned laboratory exercises, and solutions of sample test questions at our web site. Unit testing is designed to measure mastery with a limit of three test tries taken at the time of the student's choice. Major topics for 101: kinematics, forces and dynamics, momentum, energy, fluid mechanics, waves and sound, thermal physics, kinetic theory, and thermodynamics. At the level of *Physics* by Cutnell and Johnson.

PHYS 102 General Physics II
Spring, summer 4-week or 8-week session. 4 credits. Prerequisite for Physics 102: Physics 101 or 112 or 207. Includes less mathematical analysis than Physics 208, but more than Physics 200–206, 209, 210. Enrollment may be limited. Spring introductory lec, M Jan. 24, 7:30 p.m. Staff.
Physics 101–102 emphasizes quantitative and conceptual understanding of the topics of introductory physics developed without use of calculus. The course is mostly self-paced in a mastery-oriented format including eight subject units and a final retention (review) unit each term. Most instruction occurs in the learning center utilizing video-taped lectures, personal tutoring by staff, assigned laboratory exercises, and solutions of sample test questions at our web site. Unit testing is designed to measure mastery with a limit of three test tries taken at the time of the student's choice. Major topics for 102: electricity and magnetism, optics, relativity, atomic, quantum, and nuclear physics. At the level of *Physics* by Cutnell and Johnson.

PHYS 103 General Physics
Summer. 4 credits. Prerequisite: three years of high school mathematics, including some trigonometry. A student without high school physics should allow extra time for Physics 103. Physics 103 is a more traditional version of Physics 101. Physics 103 is not appropriate for students majoring in physics or engineering. 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*, 4th 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 111 or 191. Lec, M W F 10:10–11:00 or 12:20–1:10. Two rec. and one lab/cooperative learning session each week. Evening exams. Fall, P. Krasicky; spring, R. Galik.
Mechanics of particles: kinematics, dynamics, conservation laws, central force fields, periodic motion. Mechanics of many-particle systems: center of mass, rotational mechanics of a rigid body, static equilibrium. At the level of *University Physics, Vol. 1*, by Young and Freedman.

PHYS 116 Physics I: Mechanics and Special Relativity
Fall, spring. 4 credits. More analytic than Physics 112, intended for students who will be comfortable with a deeper, somewhat more abstract approach. Intended mainly but not exclusively for prospective physics majors. Prerequisites: a good secondary school physics course and familiarity with basic calculus. Corrective transfers between Physics 116 and Physics 112 (in either direction) are encouraged during the first few weeks of instruction. Lec, M W F 10:10–11:00. Fall, H. Tye; spring, R. Patterson.
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. 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. Students 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 Geology 200, Engineering 185, MS&E 285, Archaeology 285, and Art 372)
For description, see GEOL 200.

PHYS 201 Why the Sky Is Blue: Aspects of the Physical World
Fall. 3 credits. Lec, T R 2:55–4:10, rec, W 2:30–3:20 or W 3:35–4:25. A. Sadoff.
This is a descriptive physics course aimed specifically at the non–science student. There is an emphasis on the ideas of modern physics where the approach is both historical and thematic. The methodology of science and the nature of evidence is emphasized. An overriding theme is the character of physical laws as shown through the great principles of symmetry and conservation. While there are a few computational problems assigned, the purpose is to help students to understand the concepts rather than to master problem-solving techniques. At the level of *Physics for Poets* by March.

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 203 Physics of the Heavens and the Earth—A Synthesis
Spring. 3 credits. Prerequisite: none; uses high school algebra and geometry. For nonscience majors. Lec T R 2:55–4:10; sec W 2:30–3:20 or 3:35–4:25. H. Padamsee.
This course shows how the unification of apparently distinct areas of physics leads to an explosion in the growth of our knowledge and understanding. The material is divided into three parts: the physics of motion on earth and motion in the heavens, showing how the two evolved separately, from the ideas of the ancient Greeks to the dynamics and telescopic discoveries of Galileo; the final melding of these two topics with Newton's Universal Gravitation; an exploration of this "new" physics and its impact. There is an emphasis throughout on "how do we know the laws?" These are the stories of breakthrough discoveries and brilliant insights made by fascinating people, offering at the same time a humanistic perspective.

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 9:05–9:55; sec R or F 3:35–4:25. E. Cassel.
Many features of the production, propagation, and perception of musical sound may be understood in terms of important concepts in physics. Topics covered will include the mechanism of tone production in musical instruments, distinctions in tone quality, musical scales and tuning, some basic principles of room acoustics, and aspects of the mechanism of hearing. In addition to homework assignments and exams, students will write a research paper investigating a topic in the physics of sound that interests them. At the level of *The Acoustical Foundations of Music*, by J. Backus.

[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 2:30–4:00; rec, T 2:30–3:20. Not offered 1999–2000.
An attempt to explain how natural scientists can cope rationally with randomness. The first part of the course deals with the basic ideas of probability theory and explains why it is that in large systems likely events can become overwhelmingly likely. If we apply these ideas to gases consisting of very large numbers of molecules, an explanation of the true nature of heat follows. In this way, students are given a deep understanding of the second law of thermodynamics.

Probability enters into quantum mechanics in a more basic and somewhat mysterious way. We will spend the latter part of the course giving simple examples of the difference between classical and quantum probability. In particular, we discuss what is meant by an "entangled state" and how we know there are no hidden variables. At the level of *Reasoning About Luck: Probability and Its Uses in Physics* by Ambegaokar.]

PHYS 207 Fundamentals of Physics I
Fall. 4 credits. 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. Lec, M W F 9:05–9:55 or 11:15–12:05; two rec. and one lab each week. Evening exams. R. Thorne.
Physics 207–208 is a two-semester introduction to physics with emphasis on tools generally applicable in the sciences, intended for students majoring in a physical science, mathematics, or an analytically oriented biological science.

Mechanics, conservation laws, waves, and topics from thermal physics, fluids, acoustics and properties of matter. At the level of *Fundamentals of Physics*, Vol. I, 5th edition, by Halliday, Resnick, and Walker.

PHYS 208 Fundamentals of Physics II
Spring. 4 credits. Prerequisites for Physics 208: Physics 207 or 112 or 101 and at least coregistration in Mathematics 112 or 192. Physics 207–208 is a two-semester introduction to physics with emphasis on tools generally applicable in the sciences, intended for students majoring in a physical science, mathematics, or an analytically oriented biological science. Lec, M W F 9:05–9:55 or 11:15–12:05; two rec. and one lab each week. Evening exams. Staff.
Electricity and magnetism, and topics from physical and geometrical optics, quantum and nuclear physics. At the level of *Fundamentals of Physics*, Vol II, 5th edition, by Halliday, Resnick, and Walker.

PHYS 209 Relativity and Chaos
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, T R 1:25–2:40; rec, M 2:30–3:20 or M 3:35–4:25. N. D. Mermin.
We will examine two revolutionary fields of classical physics, one venerable and one relatively recent: the special theory of relativity will be developed, with a view to understanding how certain simple but apparently contradictory facts about light lead to extraordinary insights into the nature of time; and the newer subject of "chaos" will be explored, with a view to seeing how extremely simple rules can lead to behavior of breathtaking complexity.

PHYS 210 Randomness in Classical and Quantum Physics
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, T R 1:25–2:40; rec, M 2:30–3:20 or M 3:35–4:25. N. D. Mermin.
We will examine two areas of physics where randomness plays a central role: the classical probability theory of gamblers, and its relation to subjects from the nature of coincidence to the direction of the flow of time; and the quantum theory, which promotes randomness from a consequence of human ignorance to a fundamental aspect of the physical world, leading to Einstein's celebrated rejection of a dice-throwing God and his more disturbing complaint about "spooky actions at a distance."

PHYS 213 Physics II: Heat/ Electromagnetism
Fall, spring, (summer 6-week session). 4 credits. Primarily for students of engineering and for prospective physics majors. Prerequisites: Physics 112 and coregistration in the continuation of the mathematics sequence required for Physics 112. Lec, T R 9:05–9:55 or 11:15–12:05, two rec. each week and six 2-hour labs. Evening exams. Fall, R. Galik; spring, staff.
Temperature, heat, thermal energy, electrostatics, behavior of matter in electric fields, DC circuits, magnetic fields, Faraday's law, Maxwell's equations, electromagnetic oscillations. At the level of *University Physics/Vol. 1&2*, by Young and Freedman. Laboratory covers electrical measurements, circuits, and some aspects of heat transfer.

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 weeks. Evening exams. Fall, J. Sethna; spring, staff.
Physics of wave phenomena, electromagnetic waves, interference and diffraction effects, wave properties of particles and introduction to quantum physics. Course includes computer use in solving problems and labs. At the level of *University Physics, Vol. 1&2*, by Young and Freedman.

PHYS 216 Introduction to Special Relativity
Fall, spring, based upon preregistration. 1 credit. S-U only. Enrollment may be limited. Course will be completed within first four to six weeks of term. Coregistration in this course is a requirement for registration in Physics 217, unless the student has taken a relativity course at the level of Physics 116 or Astronomy 106. Prerequisites: Physics 112 or Physics 207 or permission of instructor. Lec, T R 8:00–8:50. Fall, J. Rogers; spring, staff.
Introduction to Einstein's Theory of Special Relativity: Galilean and Lorentz transformations, the concept of simultaneity, time dilation and Lorentz contraction, the relativistic transformations of velocity, momentum and energy, and relativistic invariance in the laws of physics. At the level of *An Introduction to Mechanics* by Kleppner and Kolenkow or *Space and Time in Special Relativity* by Mermin.

PHYS 217 Physics II: Electricity and Magnetism (also A&EP 217)
Fall, spring. 4 credits. Enrollment may be limited. Intended for students who have done very well in Physics 112 or 116 and in mathematics and who desire a more analytic treatment than that of Physics 213. Prospective physics majors are encouraged to select Physics 217. Prerequisites: approval of student's adviser and permission from the instructor. A placement quiz may be given early in the semester, permitting those students who find Physics 217 too abstract or analytical to transfer into Physics 213, which they can do without difficulty at that time. Vector calculus will be taught in this course, but previous contact, especially with the operations *grad*, *div*, and *curl*, is helpful. It is assumed 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, A. Sievers; spring, R. Buhrman.
At the level of *Electricity and Magnetism*, by Purcell (Vol. 2, Berkeley Physics Series).

PHYS 218 Physics III: Waves and Thermodynamics
Fall, spring. 4 credits. Enrollment may be limited. A more rigorous version of Physics 214. Conditions governing enrollment are similar to those of Physics 217. Lec, M W F 11:15–12:05. Fall, C. Franck; spring, K. Berkelman.
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. At the level of *Electronic Vibrations, Waves and Radiation* by Bekefi and Barrett.

PHYS 310 Intermediate Experimental Physics
Spring. 3 credits. Enrollment may be limited. Prerequisite: Physics 208 or 213. Labs T R 1:25–4:25.
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, M W F 10:10–11:00, rec, F 1:25–2:15. C. Franck.
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 Modern Physics I
Fall, spring. 3 credits. Prerequisites: Physics 214 or 218 and coregistration in at least Mathematics 294 or equivalent. It is assumed that majors registering in Physics 316 will continue with Physics 317. Lec, M W F 9:05–9:55; rec, R 3:35–4:25. Fall, S. Teukolsky; spring, D. Rubin.
Breakdown of classical concepts in microphysics; light quanta and matter waves; Schrödinger equation and solutions in 1 and 3 dimensions; hydrogen atom, exclusion principle, spin and magnetic moments. At the level of *An Introduction to Quantum Physics* by French and Taylor.

PHYS 317 Modern Physics II
Fall. 3 credits. Prerequisite: Physics 316. Lec, M W F 9:05–9:55, rec, T 2:30–3:20. E. Flanagan.
Investigation of quantum phenomena; classical and quantum statistical mechanics; molecules; solid state physics; nuclear physics and radioactivity; elementary particle physics. At the level of *Modern Physics* by Serway.

PHYS 318 Analytical Mechanics
Spring. 4 credits. Prerequisites: Physics 116 or permission of instructor; Applied and Engineering Physics 321 or Mathematics 420. Intended for junior physics majors concentrating in physics or astronomy. Physics 314 covers similar material at a less demanding level. Lec, M W F 10:10–11:00; rec, F 2:30–3:20. P. Drell.
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 and small vibrations; introduction to chaos. At the level of *Classical Dynamics* by Marion and Thorton 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 213/214 (or equivalent) and Math 293/294 (or equivalent); coregistration in Applied and Engineering Physics 321 or Math 420 recommended. Intended for physics majors with a concentration outside of physics or astronomy; Physics 327 covers similar material at a more analytical level. Lec, M W F 11:15–12:05, rec, F 2:30–3:20. R. Talman.
Includes electro/magnetostatics, boundary value problems, dielectric and magnetic media, Maxwell's Equations, electromagnetic waves, and sources of electromagnetic radiation. 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 321 or Mathematics 420. 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 the material at the level of Physics 217. Lec, M W F 11:15–12:05, rec, F 2:30–3:20. L. Gibbons.
Electro/magneto-statics-vector and scalar potentials, Laplace's Equation and boundary value problems, multipoles; radiation-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 *Classical Electromagnetic Radiation*, by Heald and Marion.

PHYS 330 Modern Experimental Optics (also A&EP 330)
Fall. 4 credits. Enrollment limited. Prerequisite: Physics 214 or equivalent. Lec, M 2:30–3:20; Lab, T W 1:25–4:25; sec. F 3:35–4:25. A. Gaeta.
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. At the level of *Optics* by Hecht.

PHYS 341 Thermodynamics and Statistical Physics
Fall. 4 credits. Prerequisites: Physics 214 and Mathematics 294. Lec, M W F 10:10–11:00, rec, R 2:30–3:20. V. Elser.
Statistical physics, developing both thermodynamics and statistical mechanics simultaneously. Concepts of temperature, laws of thermodynamics, entropy, thermodynamic relations, free energy. Applications to phase equilibrium, multicomponent systems, chemical reactions, and thermodynamic cycles. Application of statistical mechanics to physical systems; introduction to treatment of Maxwell-Boltzmann, Bose-Einstein, and Fermi-Dirac statistics with applications. Elementary transport theory. At the level of *Fundamentals of Statistical and Thermal Physics*, by Reif, or *Introduction to Statistical Mechanics* by Betts.

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, however, 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 1:235–4:25 (also evening labs M W 7:30–10:30 spring). Fall, E. Kirkland; spring, R. Thorne.
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. At the level of *Microelectroinic Circuits* by Sedra.

PHYS 400 Informal Advanced Laboratory
Fall, spring; (summer, 6 week session). Variable to 3 credits. (3 credits *NOT* variable in summer.) Prerequisites: two years of 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 2:30–3:20, lab T W 1:25–4:25. Fall, W. Ho; spring, D. Hartill.
Selected topics in experimental concepts and techniques. About sixty 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. Lectures are on experimental techniques used in experiments in the laboratory and on current research topics.

PHYS 443 Introductory Quantum Mechanics
Spring. 4 credits. Prerequisites: Physics 327 or 323; and Physics 316 and Applied and Engineering Physics 321 or Mathematics 420; coregistration in Physics 314 or 318; or permission of instructor. Lec, M W F 9:05–9:55, rec, R 3:35–4:25. S. Teukolsky.
Introduction to concepts and techniques of quantum mechanics, at the level of *An Introduction to Quantum Mechanics*, by Griffiths.

PHYS 444 Nuclear and High-Energy Particle Physics
Spring. 4 credits. Prerequisite: Physics 443 or permission of instructor. Lec, M W F 9:05–9:55, rec, F 2:30–3:20. Staff.
Behavior of high-energy particles and radiation; elementary particles; basic properties of accelerators and detectors; general symmetries and conservation laws. At the level of *Concepts of Particle Physics*, by Gottfried and Weisskopf or *Modern Elementary Particle Physics* by Kane.

PHYS 454 Introductory Solid-State Physics (also A&EP 450)
Fall. 4 credits. Prerequisite: Physics 443, A&EP 361, Chemistry 793, or permission of instructor. Lec, M W F 9:05–9:55.
Computer lab: W or R 2:30–4:25. F. Wise.
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 323 or equivalent and at least coregistration in Physics 318 or permission of instructor. Usually offered every other spring. Not offered 1999–2000. Lec, T R 10:10–11:25.
Geometrical methods are an essential tool in modern theoretical physics and also provide deep insights into classical physics. This course will introduce basic concepts from differential geometry, emphasizing calculational methods and illustrating their utility by drawing examples from mechanics, electrodynamics, and crystal diffraction. Tensors, differential forms, covariant and Lie derivatives, Lie algebra of vector fields and gauge invarience will be developed and employed. At the level of *Geometric Mechanics* by Talman.]

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. Lec, T R 10:10–11:25. Staff.
A course designed to familiarize students with numerical techniques for solving diverse problems in physics and related fields. The problems will be drawn from many different branches of physics, but the emphasis will be on common techniques of solution. Numerical techniques discussed in the course will include ordinary and partial differential equations, linear algebra and eigenvalue

problems, Monte Carlo techniques, solving nonlinear equations, fast Fourier transforms, etc. In contrast to traditional numerical analysis courses, the flavor of the course will be "how-to," rather than theoretical. No theorems will be proved. Students will be expected to solve, both individually and in small teams, assigned numerical exercises. Text: *Numerical Recipes: The Art of Scientific Computing*, by Press, Teukolsky, Flannery, and Vetterling.

PHYS 481–489 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.

New special topics seminar for fall 1999: PHYS 488 Fall. 3 credits. Prerequisites: intermediate E&M (Phys 323 or Phys 327) and classical mechanics (Phys 314 or Phys 318). Introduction to Accelerator Physics and Technology (also Phys 688). Lec T R 10:10–11:25. G. Dugan. Fundamental physical principles of particle accelerators and enabling technologies, with a focus on circular high energy colliders, such as the Cornell Electron Storage Ring (CESR). Includes beam optical design, the single-particle dynamics of transverse and longitudinal motion, collective motion, the role of synchrotron radiation, and the interactions of colliding beams. The physics of some of the required technologies, such as particle sources, radiofrequency cavity systems, vacuum systems, and magnets, will be covered in seminars conducted by experts. Student participation in machine experiments at CESR will be arranged as the running schedule permits. At the level of *Introduction to the Physics of High Energy Accelerators* by Edwards and Syphers.

New special topics seminar for Spring 2000: PHYS 489 Spring. 3 credits. Prerequisites: intermediate level mechanics (Phys 314 or 327) and E & M (Phys 323 or 327) or permission of instructor. Previous completion of Phys 488/688 is not required. Lec, T R 10:10–11:25. S. Gruner and R. Talman. The Storage Ring as a Source of Synchrotron Radiation (also Phys 689). Physics of synchrotron radiation with a focus on characteristics of radiation from dipole magnets, electron beam properties that influence radiation characteristics, issues of flux, brightness, emittance, brilliance, beam stability, and beam lifetime. Regular lectures will alternate with visitor lectures on specialized topics on radiation from insertion devices (i.e., wigglers and undulators,) x-ray optics, coupling to beams, and coherence in x-ray beams. There will be special emphasis on understanding the requirements of experimental x-ray applications and hands-on opportunities for doing synchrotron radiation experiments.

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 the Request for Independent Study form must be filed with physics department course coordinator, 121 Clark Hall. Individual project work (reading or laboratory) in any branch of physics.

PHYS 500 Informal Graduate Laboratory
Fall, spring; summer. Variable to 2 credits. By permission of instructor. Experiments of widely varying difficulty in one or more areas, as listed under Physics 510, may be done to fill student's special requirements.

PHYS 510 Advanced Experimental Physics
Fall, spring, summer. 3 credits. Lab, T W 1:25–4:25. Fall, W. Ho; spring, D. Hartill.
About sixty different experiments are available in acoustics, optics, spectroscopy, electrical circuits, electronics and ionics, magnetic resonance, X-rays, low temperature, solid state, cosmic rays, nuclear physics. Students perform four to eight experiments selected to meet individual needs. Independent work is stressed. 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)
Spring. 4 credits. D. Chernoff.
The formation of compact objects: neutrino and gravitational radiation from supernova collapse and neutron stars. Equilibrium configurations, equations of state, stability criteria, and mass limits. The influence of rotation and magnetic fields. Pulsar phenomena. Mass flow in binary systems; spherical and disk accretion; high-temperature radiation processes. Compact X-ray sources and X-ray bursts. Emphasis will be on the application of fundamental physical principles to compact objects. Topics in diverse areas of physics will be discussed: solid-state physics, nuclear physics, relativity, fluid dynamics, high-energy physics, etc. No astronomy or general relativity prerequisites. Text: *Physics of Black Holes, White Dwarfs, and Neutron Stars*, by Shapiro and Teukolsky.

PHYS 551 Classical Mechanics
Spring. 3 credits. Prerequisite: an undergraduate course in classical mechanics at the level of books by K. Symon or J. B. Marion. Lec, T R 10:10–11:25, rec, R 1:25–2:15. L. Hand.
Lagrangian and Hamiltonian formulation of classical mechanics, using modern methods, modern applications in nonlinear dynamics. At the level of *Theoretical Mechanics of Particles and Continuia*, by Fetter and Walecka.

[PHYS 553–554 General Relativity (also Astronomy 509–510)
553, fall; 554, spring. 4 credits. Prerequisite: knowledge of special relativity at the level of Classical Mechanics, by Goldstein. Lec, T R 1:25–2:40. Not offered 1999–2000. Next offered 2000–01. E. Flanagan.
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. Lec T R 8:30–9:55. Sec M 2:30–3:20. T-M. Yan.
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), classical mechanics (at the level of Marion), and statistical mechanics (at the level of Reif). Lec, 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 distributions; Bose-Einstein, Fermi-Dirac and Boltzmann statistics; the density-matrix. The microscopic-macroscopic connection. Applications include spin systems—the Ising and related models; strongly correlated fluids, and lattice-gases, including distribution and correlation functions, thermodynamic perturbation theory and introduction to critical phenomena and the renormalization group; dense Fermi- and Bose- systems; linear response of quantal and classical systems; transport properties and the Boltzmann equation. At the level of *Statistical Mechanics* (2nd edition) by Pathria and *Statistical Mechanics of Phase Transition* by Yeomans.

PHYS 572 Quantum Mechanics I
Fall. 4 credits. Lec, M W F 11:15–12:05. P. Drell.
General principles of quantum mechanics, formulated in the language of Dirac. Systems with few degrees of freedom: hydrogen atom, including fine and hyperfine structure; the deuteron; and atomic transitions. Theory of angular momentum, symmetries, perturbations and collisions will be developed to analyze phenomena displayed by these systems. At the level of *Modern Quantum Mechanics* by Sakurai. A knowledge of the subject at the level of Phys 443 will be assumed, but the course will be self-contained.

PHYS 574 Quantum Mechanics II
Spring. 4 credits. Lec, M W F 11:15–12:05. T-M Yan.
Systems with many degrees of freedom. Quantization of the electromagnetic field; interaction of light with matter. Many electron atoms. Second quantization for fermions. Quantum liquids. Scattering of complex systems. Introduction to the Dirac equation. A knowledge of the concepts and techniques covered in Phys 561 and 572 will be assumed.

PHYS 599 Cosmology (also ASTRO 599)
For description, see ASTRO 599.

PHYS 635 Solid-State Physics I
Fall. 3 credits. Prerequisites: a good undergraduate solid-state physics course, such as Physics 454. D. Ralph.
A survey of the basics of the physics of solids: crystal structure, x-ray diffraction, phonons, and electrons. Selected topics from semiconductors, magnetism, superconductivity, disordered materials, dieletric and optical properties and mesoscopic physics. At level of *Solid State Physics* by Ashcroft and Mermin.

PHYS 636 Solid-State Physics II
Spring. 3 credits. Prerequisite: Physics 635. P. Brouwer.
A continuation of Physics 635; magnetism, superconductivity, broken symmetries, elementary excitations, and other topics in quantum condensed matter physics not covered in *Solid State Physics* by Ashcroft and Mermin, such as topological defects, superfluids, the quantum Hall effect, mesoscopic quantum transport theory, disordered systems, Anderson localization and other metal insulator transitions.

PHYS 645 High-Energy Particle Physics
Fall. 3 credits. D. Cassel.
Introduction to physics of baryons, mesons, and leptons. Strong, electromagnetic, and weak interactions. Relevance of symmetry laws to particle physics. Introduction to the quark model. At level of *The Experimental Foundations of Particle Physics*, by Cahn and Goldhaber.

PHYS 646 High-Energy Particle Physics
Spring. 3 credits. Staff.
Topics of current interest, such as high-energy electron and neutrino interactions, electron positron annihilation, and high-energy hadronic reactions. Lectures and reading material are at the level of *Introduction to High Energy Physics*, by Perkins. and *Elementary Particle Physics* by Griffiths.

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. A. LeClair.
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. H. Tye.
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, and spontaneous symmetry breaking. Topics in cosmology, supersymmetry or superstring may be introduced. Applications to the electroweak theory and quantum chromodynamics are emphasized. At the level of *An Introduction to Quantum Field Theory* by Peskin and Schroeder.

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. V. Ambegaokar.
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. Staff.
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 661 Advanced Topics in High Energy Particle Theory
Fall. 3 credits. Prerequisites: Physics 652. S-U grades only. Not offered 1999–2000.
This course will present advanced topics of current research interest. Subject matter will vary from year to year. Some likely topics are two-dimensional conformal field theory with applications to string theory and condensed matter physics, applications of the electroweak theory, lattice gauge theory, mathematical methods (e.g. group theory), perturbative quantum chromodynamics, anomalies and geometry, supersymmetry, current algebra, heavy quark physics, heavy quark symmetry and phenomenological issues beyond the standard model.]

PHYS 665 Topics in Theoretical Astrophysics
For description, see ASTRO 699.

PHYS 667 Theory of Stellar Structure and Evolution (also Astro 560)
For description, see ASTRO 560.

[PHYS 670 Instrumentation Seminar
Spring. 2 credits. S-U grades only. Not offered 1999–2000. J. Alexander.
Conception, design, and performance of innovative instrumentation in condensed matter and elementary particle physics.]

PHYS 680 Computational Physics (also Physics 480 and Astronomy 690)
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.

New special topics seminar for fall 1999:
PHYS 688 Introduction to Accelerator Physics and Technology (also Phys 488). For description see PHYS 488.

New special topics seminar for spring 2000.
PHYS 689 The Storage Ring as a Source of Synchrotron Radiation (also Phys 489). For description see PHYS 489.

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.

POLISH

See Department of Russian.

PORTUGUESE

See Department of Romance Studies.

PSYCHOLOGY

D. J. Bem, S. L. Bem, U. Bronfenbrenner, J. E. Cutting, R. B. Darlington, T. J. DeVoogd, D. A. Dunning, S. Edelman, D. J. Field, B. L. Finlay, E. J. Gibson, T. D. Gilovich, B. P. Halpern, A. M. Isen, R. E. Johnston, C. L. Krumhansl, W. W. Lambert, D. A. Levitsky, J. B. Maas, C. Maxwell-Miller, U. Neisser, M. Owren, H. S. Porte, D. T. Regan, E. A. Regan, H. Segal, M. Spivey, B. J. Strupp

The major areas of psychology represented in the department are perceptual and cognitive psychology, biopsychology, and personality and social psychology. These areas are very broadly defined, and the courses are quite diverse. Biopsychology includes such things as animal learning, neuropsychology, interactions between hormones, other biochemical processes, and behavior. Perceptual and cognitive psychology includes such courses as cognition, perception, memory, and psycholinguistics. Personality and social psychology is represented by courses in social psychology and personality (such as Psychology and Law, Judgment and Decision Making, and Social Construction of Gender), as well as courses in fieldwork and psychopathology. In addition to the three major areas mentioned above, the department also emphasizes the statistical and logical analysis of psychological data and problems.

The Major

Admission to the major is usually granted to any student in good standing in the college who has passed three or more psychology courses with grades of C+ or better. Provisional admission requires two such courses. To apply to the major and receive an adviser, a major application form may be obtained from the department office (211 Uris 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) **Perceptual and cognitive psychology**
2) **Biopsychology**
3) **Social, personality, and abnormal psychology**

The following classification of Department of Psychology offerings is intended to help students and their advisers choose courses that will ensure that such breadth is achieved.

1) **Perceptual and cognitive psychology:** Psychology 205, 209, 214, 215, 292, 305, 311, 316, 342, 412, 413, 414, 415, 416, 417, 418, 419, 436, 492.
2) **Biopsychology:** Psychology 223, 307, 322, 324, 326, 332, 361, 396, 420, 422, 424, 425, 429, 431, 440, 492.
3) **Social, personality, and abnormal psychology:** Psychology 128, 265, 275, 277, 280, 281, 325, 327, 328, 402, 404, 450, 481, 489, 491.
4) **Other courses:** Psychology 101, 199, 347, 350, 410, 440, 441, 470, 471, 472, 473, 475, 478, 479. The major adviser determines to which group, if any, these courses may be applied.

With the permission of the adviser, courses in other departments may be accepted toward the major requirements.

Fieldwork, independent study, and teaching. The department requires students to observe the following limits on fieldwork, independent study, and teaching.

1) Undergraduates may not serve as teaching assistants for psychology courses if they are serving as teaching assistants for any other course during the same semester.
2) An undergraduate psychology major cannot apply more than 12 of the credits earned in independent study (including honors work) and fieldwork toward the 40 credits required by the major.

Statistics requirement. Proficiency in statistics can be demonstrated in any one of the several ways listed below.

1) Passing Psychology 350.
2) Passing an approved course or course sequence in statistics in some other department at Cornell. The approved list of courses and sequences may change. It has usually included 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 sequence must be equivalent to at least 6 semester credits. The description of the course from the college catalog and the title and author of the textbook used must be submitted to Professor Gilovich for approval.
4) Passing an exemption examination. This examination can be given at virtually any time during the academic year if the student gives notice at least one week before. Students who have completed a theoretical statistics course in a department of mathematics or engineering and who wish to demonstrate competence in applied statistics usually find this option the easiest. Students planning this option should discuss it in advance with Professor Gilovich.

Concentration in biopsychology. Psychology majors interested in psychology as a biological science can elect to specialize in biopsychology. Students in this concentration must meet all of the general requirements for the major in psychology and must also demonstrate a solid background in biology; the physical sciences, including at least introductory chemistry; and mathematics. Students will design with their advisers an integrated program in biopsychology built around courses on physiological, chemical, anatomical, and ecological determinants of human and nonhuman behavior offered by the Department of Psychology. Additional courses in physiology, anatomy, biochemistry, neurochemistry, neurobiology, and behavioral biology may be designated as part of the psychology major after consultation between the student and his or her biopsychology adviser.

Concentration in personality and social psychology. Psychology majors who wish to specialize in social psychology are expected to meet the general requirements set by their department, including statistics. To ensure a solid interdisciplinary grounding, students in the concentration will be permitted to include some major courses in sociology and related fields. Advisers will assist students in the selection of a coherent set of courses from social organization, cultural anthropology, experimental psychology, social methodology, and several aspects of personality and social psychology. Seniors in the concentration may elect advanced and graduate seminars, with the permission of the instructor.

Undergraduate honors program. The honors program is designed for those exceptionally able students who wish to pursue an intensive and independent program of research in psychology. Successful participation in this program serves as evidence of the student's facility in the two most important skills of an academic psychologist: the capacity to acquire and integrate a substantial body of theoretical and factual material and the ability to engage in creative research activity. All qualified students planning on a graduate education in psychology or other academic fields should consider the honors program seriously. The program offers most students the closest contact and consultation with faculty that they will receive during their time at Cornell.

The core of the honors program is a research project that the student carries out in close collaboration with a faculty member in the field of psychology. It is assumed that most students will do so while enrolled in Psychology 470 (Undergraduate Research in Psychology). A written report of the research is to be given to the chair of the honors committee (currently Professor 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 cash prize, is awarded to the student who conducts the best honors project in a given year.

A student may formally apply to the honors program at any time during the senior year provided that she or he is actively engaged in independent research. However, students must do so by the second week of November. Applications should be given to Professor 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 223, 307, 322, 324, 326, 332, 350, 361, 396, 410, 420, 422, 424, 425, 429, 431, 440, 441, 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. Changes are also available on the World Wide Web site, http://comp9.psych.cornell.edu

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 102 Introduction to Cognitive Science (also COGST 101, COMS 101, LING 170, PHIL 191)

Fall. 3 or 4 credits (the four credit option involves a writing section instead of taking exams). T R 11:40–12:55. M. Spivey.

This course surveys the study of how the mind/brain works. We will examine how intelligent information processing can arise from biological and artificial systems. The course draws primarily from five disciplines that make major contributions to cognitive science: philosophy, psychology, neuroscience, linguistics, and computer science. The first part of the course will introduce the roles played by these disciplines in cognitive science. The second part of the course will focus on how each of these disciplines contributes to the study of five topics in cognitive science: language, vision, learning and memory, action, and artificial intelligence.

PSYCH 103 Introductory Psychology Seminars

Fall. 1 credit. Limited to 300 students. Prerequisite: concurrent enrollment in Psychology 101. Hours to be arranged. 12 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 201 Cognitive Science in Context Laboratory (also Cog St 201 and COM S 201)

Fall or spring. 4 credits. Prior completion of "Introduction to Cognitive Science" Psych 102/COGST 101/COM S 101/LING 170/PHIL 191 or equivalent is recommended. Knowledge of programming language is neither assumed nor required. Limited to 24 students. Disc and demos, M W 11:15–12:05; lab M W 1:25–3:25, plus additional hours to be arranged. Fall, B. Halpern and staff. Spring, D. Field and staff.

A laboratory course that explores the theories of cognitive science and provides direct experience with the techniques of cognitive science, in relation to the full range of both present and anticipated-future activities in the workplace, the classroom, and in everyday life. Discussions of laboratory exercise results, supplementation of laboratory topics, and analyses of challenging primary research literature are done in meetings of the entire class. Laboratory exercises, which are done on an individual or small group basis, include both pre-planned investigations and student-developed experiments. Use of digital computers as well as the Internet, electronic mail, and Web sites are integral components of the course.

State of the art computing, display (visual, auditory, and other perceptual/sensory systems), digital communication, and simulation approaches are used to apply cognitive science principles and concepts to the analysis, exploration, and direct testing of human-machine interfaces. The focus is on human-computer interactions that are intended to permit effective and efficient exchange of information and control of functions or operations. This approach is applied to real life settings such as interactions with touch based natural language recognition and processing, use of 'neural networks,' and personal and group transportation vehicles and systems. Students are expected to come to each discussion meeting having read and thought about assigned materials, and to come to scheduled laboratory meetings fully prepared to perform the laboratory exercises. Laboratory facilities will be available to students at all times so that statistical analysis of data, preparation of laboratory reports, and collection of experimental data will be facilitated. Fall: http://courseinfo.cit.cornell.edu/courses/csic201/

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 with emphasis on stimulus variables and sensory mechanisms. All sensory modalities are considered. Visual and auditory perception are discussed in detail.

PSYCH 209 Developmental Psychology

Spring. 4 credits. Graduate students, see Psychology 709. T R 2:55–4:10. Staff.

One of four introductory courses in cognition and perception. A comprehensive introduction to current thinking and research in developmental psychology that 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.

PSYCH 214 Issues in Cognitive Psychology

Fall. 3 credits. Sophomore standing required. Limited to 150 students. Graduate students, see Psychology 614. M W F 11:15. Staff.

Various approaches to the study of cognition will be discussed. Basic concepts in how humans process different kinds of information such as visual, auditory, and symbolic will be introduced. These concepts will then be used to explore topics such as attention and consciousness, concept formation and representation, memory processes and systems, imagery and cognitive maps, problem solving and reasoning, judgment and choice, language acquisition and comprehension, intelligence and creativity, and social cognition.

[PSYCH 215 Psychology of Language (also LING 215)

Spring. 3 or 4 credits (4-credit option involves term paper). Graduate students, see Psychology 715. M W F 11:15. Not offered 1999–2000. Staff.

One of four introductory courses in cognitive psychology. Introduction to the psychological study of language. Covers research in spoken language comprehension and production, reading, and language acquisition.]

Introductory courses in social and personality psychology. Each of the following four courses (265, 275, 277, 280) provides an introduction to a major area of study within social and personality psychology. These courses are independent of one another, and none have 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 216 Cognitive Psychology Lab

Fall. 1 credit. Limited to 16 students. Prerequisite: concurrent enrollment in Psychology 214. Hours to be arranged. Staff.

If you've ever wondered how humans manage to represent their visual world, why telephone numbers are seven digits long, why imagery works as a mnemonic device, why certain things are better remembered than others, whether bilinguals are disadvantaged relative to monolinguals, how children acquire knowledge of the world, how people make decisions...this laboratory is for you! A weekly lab meeting that encourages students to discover the scientist in themselves through the study of cognition. Much of cognitive research takes place in the laboratory and this course allows students to become familiar with the "how-to" of such research. Students will be given six to eight basic experiments to explore and tinker with. They will be encouraged to pose "what if" questions and eventually test them. The course promotes independent thinking, problem solving in an experimental setting, proposing and testing of one's own hypotheses, relating laboratory Cognition to the real world, and communication of scientific ideas through informal and formal writing and oral assignments. Be prepared for an interactive learning experience.

PSYCH 223 Introduction to Biopsychology

Fall. 3 credits. M W F 10:10. 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 224, a one hour per week one-credit section. M. J. Owren.

An introduction to psychology from a biological perspective, including both evolutionary and physiological approaches to behavior. Topics include the structure and function of the nervous system, genetic and biochemical models 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 224 Introduction to Biopsychology Seminars

Fall. 1 credit. Sections with a maximum of 16 students in each. Prerequisite: concurrent enrollment in Psychology 223. Days and times TBA. Not offered 1999–2000. M. J. Owren and staff.

A weekly seminar that may be taken in addition to Psychology 223 to allow and encourage "hands-on" involvement with some of the course material, including 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 265 Psychology and Law

Fall. 3 credits. M W F 1:25. D. A. Dunning.

This course examines the implications of psychological theory and methods for law and the criminal justice system. We concentrate on psychological research on legal topics (e.g., confession, eyewitness testimony, jury decision making, homicide, aggression, the prison system), social issues (e.g., death penalty, affirmative action), as well as on psychologists as participants in the legal system (e.g., assessing insanity and dangerousness and for expert testimony).

PSYCH 275 Introduction to Personality Psychology (also HD 260)

Spring. 3 credits. Prerequisites: Psychology 101, HDFS 115, or permission of instructor. T R 10:10–11:25. C. Hazen.

An introduction to personality psychology, with an emphasis on personality development and contemporary research. Covers the major theories of personality, influences on personality development (including genetic, biological, experiential and environmental factors), and methods for assessing personality.

[PSYCH 277 Social Construction of Gender (also Women's Studies 277)

Fall. 3 credits. Limited to 180 students. T R 2:30–4:00. Not offered 1999–2000. S. L. Bem.

Psychology/Women's Studies 277 is an interdisciplinary course that addresses two broad questions: 1) how an individual's gender and sexuality are constructed; and 2) how hidden assumptions or "lenses" embedded in our social institutions, cultural discourses, and individual psyches perpetuate male power and oppress women and sexual minorities. Three lenses in particular are emphasized: androcentrism, gender polarization, and biological essentialism. A fundamental assumption of the course is that social science has worried too much about difference per se and too little about how even our most neutral-looking institutions invisibly transform difference into disadvantage. Although some attention is given to biological perspectives, the course emphasizes the cultural and psychological processes whereby the historically contingent comes to appear as the natural. Among some of the many topics discussed are the importance of looking at biology in context, the parental "instinct," androcentrism in law, sexual orientation cross-culturally, egalitarian relationships, gender-liberated child-rearing, and homophobia.]

PSYCH 280 Introduction to Social Psychology

Spring. 3 or 4 credits; the additional (or fourth) credit requires participation in a weekly seminar. T R 1:25–2:40. T. D. Gilovich and D. T. Regan.

An introduction to research and theory in social psychology. Topics include processing of social information; social influence, persuasion, and attitude change; social interaction and group phenomena. The application of social psychological knowledge to current events will also be discussed.

PSYCH 281 The Helping Relationship

Fall. 3 credits. Limited to 60 students. C. Maxwell Miller.

This course provides an introduction to the theoretical and practical aspects of some basic elements of counseling. Students will develop an understanding of the most current research on the elements of counseling and basic theoretical foundations underlying different approaches. Students will be expected to acquire and demonstrate elementary helping skills. Through role-play, observation of videos, and in-class demonstrations, students will learn such skills as attending and active listening; they will also develop a capacity to recognize internal conflicts and cognitive distortions as well as the similarities between intra-psychic and interpersonal processes. Other topics include issues of transference and counter transference, the multi-axial dimensions of the DSMIV, defensive strategies as they appear in the DSMIV and ethical considerations and practice. While this course provides an introduction to the applied aspects of psychology, it does not prepare students to provide treatment of any sort.

PSYCH 282 Community Outreach

Fall. 2 credits. Prerequisites: Psychology 101 or HD 115. Students may not concurrently register with Psych 327 or Psych 328. T 10:10–11:25. H. Segal.

This course provides students with information and perspectives essential to volunteer field work with human and social service programs in the community. To gain a practical understanding of what mental health professionals do in the workplace, students will examine problems that emerge in fieldwork settings which raise ethical, methodological, theoretical, and practical issues in the observation or treatment of clients or patients. Although students are not required to volunteer at a local agency, the instructor will assist students in finding sites that may provide appropriate learning opportunities. A paper, relating current research to issues relevant to community mental health, is due at the end of the course.

PSYCH 292 Intelligence

Spring. 4 credits. Prerequisites: one 200-level course in psychology. M W TBA. Section meetings on Friday. U. Neisser.

A scientific overview of the controversial issues that surround intelligence tests and what they measure. Topics include the history of testing, correlates of test scores, alternative approaches to mental ability, genetic and environmental contributions to diversity in intelligence, effects of schooling, worldwide IQ gains, cultural factors and group differences.

PSYCH 305 Visual Perception

Fall. 4 credits. Limited to 20 students. Prerequisite: Psychology 205 or permission of instructor. M W F 11:15. J. E. Cutting.

A detailed examination of pictures and their comparison to the real world. Linear perspective in Renaissance art, photography, cinema and video will be discussed in light of contemporary research in perception and cognition.

[PSYCH 307 Chemosensory Perception

Fall. 3 or 4 credits; the optional (or fourth) credit is for an independent research project. Graduate students, see Psychology 607. Not offered 1999–2000. T R 9:05. B. P. Halpern.

An examination of basic theory, data, and processes for perception of the chemosensory environment. A very brief (about two weeks) lecture survey of the anatomy and physiology of human taste and olfaction, the remainder of the course uses the Socratic method, in which the instructor asks questions of the students, to cover topics such as chemosensory psychophysics, saliva, chemosensory bases for the tastes of foods, taste-smell interactions, chemosensory function in neonates and in the aged, temporal aspects of tasting, sweetness, effects of pollution of the chemosensory environment, and interactions between body state and chemosensory stimuli. At the level of *Smell and Taste in Health and Disease,* edited by T.V. Getchell et al., *Sensory Science Theory and Applications in Foods*, edited by H. T. Lawless and B. Klein; *Sensory Analysis of Foods*, 2nd edition, edited by J. R. Piggott.]

[PSYCH 311 Introduction to Human Memory

Spring. 3 credits. Limited to 40 students. Some familiarity with statistical methods and experimental design and with the study of cognition is desirable. Graduate students, see Psychology 611. T R 11:40–12:55. Not offered 1999–2000. Staff.

This course offers an overview of experimental findings and theoretical issues in the study of human 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 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. Graduate 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 patterns such as speech, music, and environmental sounds.

PSYCH 322 Hormones and Behavior (also BIONB 322)

Spring. 3 credits. Two lectures plus a section in which students will read and discuss original papers in the field, give an oral presentation, and write a term paper. Limited to juniors and seniors. Prerequisites: Psychology 223, or BIONB 221 or 222, or one year of introductory biology plus a course in psychology. S-U grades optional. Graduate students see Psychology 722. M W F 11:15. E. Adkins Regan.

A major focus of the course will be comparative and evolutionary approaches to the study of the relationship between reproductive hormones and sexual behavior in vertebrates, including humans. Also included will be hormonal contributions to parental behavior, aggression, stress, learning and memory, and biological rhythms.

PSYCH 324 Biopsychology Laboratory (also BIONB 324)

Fall. 4 credits. Limited to 20 juniors and seniors. Prerequisites: Psychology 223 or BIONB 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 (also HDFS 370)

Spring. 3 credits. Limited to sophomores, juniors, and seniors. Prerequisites: Psychology 101, HDFS 115, or Education 110; a course in statistics (e.g., Psych 350, Soc 301, Educ 352 or 353, Ag Ec 310 or equivalent). Limited to 150 students. C. Maxwell Miller.

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.

[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 2:55–4:10. Not offered 1999–2000. 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 behavior and organization, cooperation and altruism, sexual behavior, mating and marriage systems, aggression, warfare.]

PSYCH 327 Field Practicum I

Fall only. 3 credits. Prerequisites: Psychology 325 or HD 370 (or taken concurrently), and permission of instructor. No S-U grades. Enrollment is limited to 30 students. Fee: $25 each semester. Enrolled students must commit to taking Psychology 328 in the spring semester. No S-U option. M W 8:40–9:50. H. Segal.

This course is composed of three components which form an intensive undergraduate field practicum. First, students spend 3–6 hours a week at local mental health agencies, schools, or nursing facilities working directly with children, adolescents or adults; supervision is provided by host agency staff. Second, Cornell faculty provide additional weekly educational supervision for each student. Third, seminar meetings cover issues of adult and developmental psychopathology, clinical technique, case studies, and current research issues. Students write two short papers, two final take-home exams, and present an account of their field experience in class.

PSYCH 328 Field Practicum II

Spring. 3 credits. Prerequisites: Psychology 327 taken the previous term, Psychology 325 or HD 370 (or taken concurrently), permission of instructor. No S-U grades. Enrollment is limited to 30 students. Fee: $25 each semester. M W 8:40–9:50. H. Segal.

This course continues the field practicum experience from Psych 327. Students spend 3–6 hours a week at local mental health agencies, schools, or skilled nursing facilities working directly with children, adolescents or adults; supervision is provided by host agency staff.

PSYCH 332 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 Psychology 632. M W F 11:15. T. J. DeVoogd.

This course will survey the approaches that have been or are currently being used in order to understand the biological bases for learning and memory. Topics will include invertebrate, "simple system" approaches, imprinting, avian song learning, hippocampal and cerebellar function, and human pathology. Many of the readings will be from primary literature.

PSYCH 342 Human Perception: Applications to Computer Graphics, Art and Visual Display

Fall. 3 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 through a variety of media. To make the most of these media channels, it is important to consider the limitations and abilities of the human observer. The course will consider a number of applied aspects of human perception with an emphasis on the display of visual information. Topics to be covered include: "three-dimensional" display systems, color theory, spatial and temporal limitations of the visual systems, attempts at subliminal communication, and "visual" effects in film and television.

PSYCH 347 Psychology of Visual Communications

Spring. 3 credits. Limited to 15 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 as they 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

Fall. 4 credits. Limited to 120 students. M W F 9:05–9:55. T. D. Gilovich.

Acquaints the student with the elements of statistical description (measures of average, variation, correlation, etc.) and, more important, develops an understanding of statistical inference. Emphasis is placed on those statistical methods of principal relevance to psychology and related behavioral sciences.

[PSYCH 361 Biopsychology of Normal and Abnormal Behavior (also NS 361)

Fall. 3 credits. Prerequisites: limited to 50 students in psychology and 50 students in nutritional sciences. An introductory biology course and an introductory psychology course, or permission of instructor. S-U grades optional. Juniors and seniors only. M W F 9:05–9:55. Not offered 1999–2000. 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) the psychobiology of learning and memory; (2) nutritional influences on behavior/cognition (e.g., sugar, food additives, choline); (3) cognitive dysfunction (e.g., amnesia, Alzheimer's disease); (4) developmental exposure to environmental toxins and drugs of abuse; and (5) psychiatric disorders (depression, eating disorders).]

PSYCH 396 Introduction to Sensory Systems (also BIONB 396)

Spring. 3 or 4 credits (4 credits with term paper). Registration for the 4-credit option requires permission of instructor. Prerequisites: an introductory course in biology or biopsychology, plus a second course in neurobiology or behavior or perception or cognition or biopsychology. Students will be expected to have elementary knowledge of perception, neurophysiology, behavior, and chemistry. No auditors. Graduate students, see Psychology 696. M W F 10:10. Offered alternate years. B. P. Halpern.

The course will be taught using the Socratic method, in which the instructor asks questions of the students. Students read, analyze, and discuss in class difficult original literature dealing with both those characteristics of sensory systems that are common across living organisms and those sensory properties which represent adaptations of animals to particular habitats or environments. 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. Two or more 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 Acoustics, Neural Coding, and Psychoacoustics*, by W. L. Gulick, G. A. Gescheider, and R. D. Frisina; *The Retina: An Approachable Part of the Brain*, by J. E. Dowling; *Handbook of Physiology—The Nervous System III. Sensory Processes*, edited by J. M. Brookhard and V. B. Mountcastle.

PSYCH 401 Theoretical Approaches to Psychopathology and Treatment

Fall. 3 credits. Limited to 20 students. Prerequisites: Psychology 281 or 325. TBA. C. Maxwell Miller.

This course is designed to provide students with an overview of theoretical approaches to psychopathology and psychotherapy. It also aims to develop students' capacities to think in theoretical terms about psychological practice. We will examine the theoretical and pragmatic features of major contemporary models of psychotherapy and explore the conceptual traditions on which they draw. Observation of the work of children and adolescents, audio-visual demonstrations, case presentations and discussions will be included to advance students' understanding of the application of theory to practice. At the end of the course, students should be prepared to take a particular case and discuss the theoretical, practice, and research issues it raises, including intervention strategies. This course is not intended to provide students simply with an understanding of methods. It is organized around theory, research, and practice relevant to the treatment of several of the Disorders of Infancy and Childhood as well as specific disorders of Adults on Axis I and Axis II of DSM IV.

Special attention will be given to the work of:

1) Daniel Stern, M.D. and Otto Kernberg, M.D.—Psychoanalytic revisionists
2) Lorna Benjamin, Ph.D.—Interpersonal Theory
3) Aaron Beck, M.D—Cognitive Theory
   Marsha Linehan, Ph.D.—Behavioral and Cognitive-Behavioral Treatment

[PSYCH 402 Current Research on Psychopathology: Depression

Spring. 4 credits. Limited to 20 students. Prerequisite: Psychology 325 or HDFS 370 and permission of the instructor. M 1:25–4:25. Not offered 1999–2000. Staff.

Current research and theory on the nature and etiology of depression. Approaches from various perspectives (biological, psychological, socio-cultural) are considered. Minimal attention to psychotherapy and symptomatology.]

[PSYCH 404 Psychopathology and the Family
Spring. 4 credits. Limited to 20 students. Prerequisite: Psychology 325 or HDFS 370 and permission of the instructor. M 1:25–4:25. Not offered 1999–2000. Staff.
This course will explore familial influences on the development of abnormal behavior. It will examine how psychological, biological, and cultural factors in a family might contribute to such disorders as anorexia nervosa, depression, sexual abuse, psychopathy, and psychosomatic illnesses. Emphasis will be placed on early childhood experiences in the family and their impact on the development of later psychopathology. The course will also discuss how the evolution of family structures in more recent times (e.g., the rise in day care and divorce) influences the individual. Family therapy approaches and techniques will also be examined.]

PSYCH 410 Undergraduate Seminar in Psychology
Fall or spring. 2 credits. Nonmajors may be admitted, but psychology majors are given priority. Hours to be arranged. Staff.
Information on specific sections for each term, including instructor, prerequisites, and time and place, may be obtained from the Department of Psychology office, 211 Uris Hall.

[PSYCH 412 Laboratory in Cognition and Perception
Spring. 4 credits. Limited to 15 students. Prerequisite: statistics and one course in cognition or perception is recommended. Graduate students, see Psychology 612. Not offered 1999–2000. M W 2:55–4:10. D. J. Field.
A laboratory course is designed to introduce students to experimental methods in perception and cognitive psychology. Students will take part in a number of classic experiments and develop at least one independent project. Computers will be available and used in many of the experiments although computer literacy is not required. Projects will be selected from the areas of visual perception, pattern recognition, memory, and concept learning.]

[PSYCH 413 Information Processing: Conscious and Non-conscious
Spring. 4 credits. Prerequisites: at least one course in human experimental and permission of instructor; Psychology 350 or equivalent will be useful for evaluating empirical articles. R 10:10–12:35. Not offered 1999–2000. Staff.
In the past decade, a not-so-quiet revolution has been taking place in the field of cognition regarding the problem of conscious mental computation. Data have come from patients with striking neuropsychological syndromes, i.e., the phenomenon of "blindsight" in which patients can respond to visual stimuli without the conscious experience of vision or the "amnesic" syndrome in which patients show interact learning and memory without the awareness of the learning encounters. This signature of independent mental computations has also been amply demonstrated in normal individuals in laboratory settings. We will critically evaluate the theoretical worth and empirical justification of the distinction between "conscious" and "non-conscious" mental computations in normal and patient populations. Weekly readings will be from, but not limited to, topics such as visual processes, face recognition, explicit and implicit memory, language processing and social cognition. Students will be required to: (1) lead and partake in advanced level discussions of classic and current papers, (b) submit weekly summaries of the assigned readings, and (c) write a term paper on a topic of their interest. Students should be prepared to read extensively, think analytically, discuss cogently, and write succinctly.]

PSYCH 414 Comparative Cognition
Spring. 3 credits. Prerequisites: Psychology 205, 209, 214, or permission of instructor. Graduate students, see Psychology 714. T R 11:40–12:55. M. J. Owren.
This course examines some of the conceptual and empirical work resulting from and fueling the recent surge of interest in animals' thinking. Specific topics may include whether nonhumans behave intentionally, show concept and category learning, memory, and abstract thinking similar to that of humans, the role of social cognition in the evolution of intelligence, and whether animals are concious or self-aware. Evidence from communication studies in which animal signals provide a "window on the mind" will play a strong role in the deliberations, including studies of naturally occurring signaling in various species and experiments in which nonhumans are trained in human-like language behavior. Cognition in nonhuman primates will be a specific focus throughout. The course will be a mix of lecture and discussion, emphasizing the latter as much as possible.

[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. M 1:25–4:25. Not offered 1999–2000. Staff.
A consideration of what types of categories are psychologically important, how they are represented and used through concepts, and how concept structure and semantic structure are interrelated. Different models of concept structure and categorization processes are evaluated, as are models of conceptual change and concept acquisition. Other topics include: relations between concepts and broader knowledge representation systems such as scripts, mental models, and intuitive theories; relative roles of associative information and beliefs in concept structure; categorization in other species; neuropsychological studies of categorization; comparisons of categorization systems across cultures; and comparisons of concept structures across different types of categories.]

PSYCH 416 Modeling Perception and Cognition
Spring. 4 credits. Prerequisites: Psychology 205, 209, 214, or 215, or permission of instructor. M W F 11:15–12:05. M. Spivey.
This course offers a survey of several computational approaches to understanding perception and cognition. We will explore linear systems analysis, connectionist models, dynamical systems, and production systems, to name a few. Emphasis will be placed on how complex sensory information gets represented in these models, as well as how it gets processed. This course will cover computational accounts of language processing, language acquisition, visual perception, and visual development, among others. Students will complete a final project that applies a computational model to some perceptual/cognitive phenomena.

[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. M 1:25–4:25. Not offered 1999–2000. Staff.
An in-depth analysis of current theories concerning the growth of thought and knowledge in childhood. Several controversies will be discussed in detail, including: Are mental abilities organized in local domains or modules that have their own patterns of development, or is cognitive development a more general process? Do comparative studies with other species and evolutionary models provide any useful insights into cognitive development in humans? Are there qualitative restructurings of thought and knowledge with development, or is the process more continuous in nature? What restrictions should these developmental considerations place on models of thought and knowledge in adults?]

PSYCH 418 Psychology of Music
Spring. 3 or 4 credits, depending on whether student elects to do an independent project. Prerequisites: junior or senior standing with major in psychology or music and some background in both, or 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. T R 2:55–4:10. Not offered 1999–2000. 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 recognition and representation 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 required. Lab: M 12:20–5:00. Not offered 1999–2000. C. D. Hopkins.
Designed as a laboratory component for BIONB 424/Psychology 424, this course will illustrate principles of neuroethology: sensory processing, neuroanatomy, 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 done 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 neurobiology (such as Psychology 223 or BIONB 221). Graduate students, see Psychology 622. M W F 9:05–9:55. Not offered 1999–2000. 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, finding targets, and establishing 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. Classes will be held on T R at 9:05–11:00. Thursday's class will run for one hour. Recitations will be scheduled in class. Not offered 1999–2000. 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; electroreception and electrolocation; chemical communication; and visual processing. In addition, it will review studies of the neural systems involved 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 Cognitive Neuroscience

Fall. 4 credits. Prerequisites: a course in introductory biology and a course in biopsychology or neurobiology (such as Psychology 223 or BIONB 221). Graduate students, see Psychology 625. M W F 9:05–9:55. B. L. Finlay.

We will study the relation between structure and function in the central nervous system. The importance of evolutionary and mechanistic approaches for understanding the human 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. T R 9:05. Not offered 1999–2000. B. P. Halpern.

The structural and functional characteristics of olfaction and taste will be explored by reading and discussing current literature in these areas. Structure will be examined at the light levels of electron microscopes as well as at the molecular level. Function will be primarily neurophysiological and biochemical aspects. The emphasis will be on vertebrates, especially air-breathing vertebrates in the case of olfaction, but there will be some coverage of invertebrate forms. At the level of *Smell and Taste in Health and Disease*, edited by T. V. Getchell, R. L. Doty, L. M. Bartoshuk, and J. B. Snow; *The Neurobiology of Taste and Smell*, edited by T. E. Finger and W. L. Silver.]

PSYCH 431 Effects of Aging on Sensory and Perceptual Systems (also BIONB 421)

Fall. 3 or 4 credits; the optional (or fourth) credit involves a term paper. 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-maturation changes in the perceptual, structural, and physiological characteristics of somesthetic, chemosensory, 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 of receptor 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 HDFS 436, LING 436, and COG ST 436)

Spring. 4 credits. Open to undergraduate and graduate students. Graduate students should also enroll under HDFS 633/LING 700/PSYCH 600, a supplemental graduate seminar. Prerequisite: at least one course in developmental psychology, cognitive psychology, cognitive development, or linguistics. S-U grades optional. T R 2:55–4:10. B. Lust.

This course surveys basic issues, methods, and research in the study of first-language acquisition. Major theoretical positions in the field are considered in the light of experimental studies in first-language acquisition of phonology, syntax, and semantics from infancy on. The fundamental issues of relationships between language and thought are discussed, as are the fundamental linguistic issues of Universal Grammar and the biological foundations for language acquisition. The acquisition of communication systems in nonhuman species such as chimpanzees is addressed, but major emphasis is on the child. An optional lab course supplement is available. (See Cog St. 450/ Ling 450 and Psych 437.)

PSYCH 437 Lab Course: Language Development (also LING 450 and COGST 450) (in conjunction with HDFS/LING 436, Language Development)

Spring. 2 credits. B. Lust.

This laboratory course will provide undergraduates with an introduction to hands-on research experience in the Cognitive Studies Research Labs. This course is partially funded by a new National Science Foundation grant to Cornell's Cognitive Studies program, "Interdisciplinary Approaches to the Scientific Study of Language Knowledge and Acquisition." This project is intended to involve undergraduates in active research and to coordinate related subfields of several disciplines in a unified, laboratory-supported curriculum.

This course will include several structured modules dealing with topics covered in the survey course, HD/LING/PSYCH 436, Language Development. They will include training in how to study and analyze original child language data, including the use of selected portions of a large database of child language data from many languages in the Cornell Language Acquisition Lab (CLAL), and training necessary to the collection and analysis of new child language data. Emphasis will be placed on developing research methods in order to test hypotheses.

The course will meet once a week in group format. In addition, students will be given access to a research lab environment for independent work on assigned modules, and independent research, throughout the week, and throughout the term.

[PSYCH 440 The Brain and Sleep

Fall. 4 credits. Prerequisites: at least Psychology 223 or BIONB 221. An additional course in biology, biopsychology or neurobiology is recommended. S-U grades optional. Graduate students, see Psychology 640. M W 8:40–9:55. Not offered 1999–2000. H. S. Porte.

Taking a comparative evolutionary perspective, this course examines the neural events that instigate, maintain, and disturb the states and rhythms of sleep in various species. Emphasizing human data where possible, special topics will include sleep deprivation and the biological functions of sleep; sleep's putative role in learning and memory; biologically interesting deviations from normal sleep; the cognitive neuroscience of sleep.]

PSYCH 441 Laboratory in Sleep Research

Spring. 4 credits. Prerequisites: Psychology 440 or comparable preparation, and permission of the instructor during preregistration. Laboratory fee: $50. Graduate students, see Psychology 641. 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 its psychological correlates. Serving as both experimenter and subject, each student will learn the physical rationale and techniques of electroencephalography and other bioelectric measures of behavioral state. Using computerized data analysis, students will complete weekly laboratory reports and a collaborative term project. Sleep recordings will be done during the day or evening when possible. In addition, overnight recording sessions are required.

[PSYCH 450 The Lenses of Gender (also Women's Studies 450)
Spring. 4 credits. Limited to 15 seniors and graduate students. Prerequisites: 1) senior or graduate standing, with preference given to psychology majors and women's studies majors; 2) both a course related to gender and/or sexuality and a course related to clinical and/or personality psychology. Permission of instructor required. No preregistration. Interested students should attend first class. Letter grade only. Graduate students, see Psychology 650/Women's Studies 650. F 2:30-4:25. Not offered 1999–2000. S. L. Bem.
The focus of this seminar is the intersection of gender and clinical psychology. Rather than surveying a broader array of topics more superficially or studying a single topic in very great depth, the seminar will take up several gender- and sexuality-related issues in moderate depth over the course of several weeks. Possible topics include depression, eating disorders, recovery of false memories, transgender, needs of lesbian and gay clients. Course requirements will likely include a final essay examination and a term paper or a class presentation.]

PSYCH 470 Undergraduate Research in Psychology
Fall or spring. 1–4 credits. S-U grades optional. Written permission from the staff member who will supervise the work and assign the grade must be included with the course enrollment material. Students should enroll in the section listed for that staff member. A section list is available from the Department of Psychology. Hours to be arranged. Staff.
Practice in planning, conducting, and reporting independent laboratory, field, and/or library research.

PSYCH 471 Advanced Undergraduate Research in Psychology
Fall or spring. 1–4 credits. S-U grades optional. Written permission of the staff member who will supervise the work and assign the grade must be included with the course enrollment material. Students should enroll in the section listed for that staff member. A section list is available from the Department of Psychology. Hours to be arranged. Staff.
Advanced experience in planning, conducting, and reporting independent laboratory, field, and/or library research. One, and preferably two, semesters of Psychology 470 is required. The research should be more independent and/or involve more demanding technical skills than that carried out in Psychology 470.

PSYCH 472 Multiple Regression
Spring, weeks 1–7. 2 credits. Prerequisite: one solid semester of introductory statistics. Analysis of variance is helpful but not required. M W F 10:10. R. B. Darlington.
Uses and pitfalls of multiple regression in causal analysis, path analysis, and prediction. Emphasis on analyzing data collected under uncontrolled conditions. Includes colinearity, indicator variables, sets, adjusted and shrunken R^2, suppressors, hierarchical analysis, overcontrol, experimental design. Very little hand computation; uses MYSTAT computer program.

PSYCH 473 General Linear Model
Spring, weeks 8–14. 2 credits. Prerequisite: Psychology 472 or equivalent. M W F 10:10. R. B. Darlington.
Includes multicategorical variables, corrections for multiple tests, diagnostic methods, nonlinear relationships, interaction, main and simple effects, and basic power analysis. Emphasizes MYSTAT and SYSTAT, briefly discusses SAS PROC REG and SAS PROC GLM.

PSYCH 475 Multivariate Analysis of Psychological Data
Fall. 2 credits. Prerequisite: Psychology 473 or permission of instructor. R 10:10–12:05. R. B. Darlington.
Students vote on topics to cover, choosing among nonparametric methods, time series, cluster analysis, multidimensional scaling, component analysis, factor analysis, MANOVA, canonical correlation, repeated measures, logistic regression, log-linear models, corrections for unreliability in regression, nesting, power analysis, influence analysis, and other topics. First class sketches all these topics before vote.

[PSYCH 478 Psychometric Theory
Fall. 2 credits. Prerequisite: Psychology 472 or permission of instructor. Not offered 1999–2000. T R 10:10–12:05. R. B. Darlington.
Statistical methods relevant to the use, construction, and evaluation of psychological tests.]

[PSYCH 479 Multisample Secondary Analysis
Fall, weeks 11–14. 1 credit. Prerequisite: Psychology 350 or equivalent. Not offered 1999–2000. T R 10:10–12:05. R. B. Darlington.
Statistical methods for analyzing and integrating the results of many independent studies on related topics.]

PSYCH 480 The Cornell Westchester/ Payne Whitney Field Placements
Full year. 7 credits. Spring through summer and fall. Prerequisites: Psych 325 or Psych 281(for Psych), Biology or Chemistry with Lab (Pre-med). Sophomores or juniors only. C. Maxwell Miller.
The Cornell-Westchester/Payne Whitney field placement program makes available eight-week research/clinical internships for Cornell-Ithaca undergraduates who are pre-professional in psychology, neurobiology, psychiatry, or medicine. Each student is matched with a MD./Ph.D. mentor at the Cornell-Westchester or Payne Whitney hospital. Students work on one rotation throughout the summer and assist the researcher with his/her work. Students' work includes, but is not limited to, reading, reporting, observing, writing literature reviews, learning grant-writing, assisting in the conducting of experiments and planning their own experiments.

Most placements involve a clinical component as well. Under the supervision of the mentor, students work in therapy groups with patients, participate in testing, and assist in psychological rehabilitative activities. The patient populations with whom students work are diverse with regard to age and diagnosis as well as race, culture, ethnicity, and national background.

PSYCH 481 Advanced Social Psychology
Fall. 4 credits. Limited to 20 students, by application. Senior psychology majors have priority. Graduate students, see Psycholgoy 681. T R 10:10–11:25. D. T. Regan.
Selected topics in social psychology are examined in depth with an emphasis on the relationship between experimental research and the development of theory. Readings will be mostly primary sources. Among the theoretical approaches to social behavior we may discuss are social comparison theory, cognitive dissonance, attribution processes and social judgment, dramaturgy and impression management, and evolutionary perspectives.

[PSYCH 489 Seminar: Beliefs, Attitudes, and Ideologies
Fall. 4 credits. Prerequisites: admission is by application during the spring preregistration period. Seniors are given priority. M 2:30–4:25. Not offered 1999. D. J. Bem.
The seminar examines 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. Several specific idealogies are examined in detail: for example, the political ideologies of the American public, gender, sexual orientation, the ideological 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 write weekly commentaries on the readings in addition to a term paper examining a particular ideology.]

[PSYCH 491 Research Methods In Psychology
Spring. 4 credits. Enrollment limited to 25 students. Recommended: permission of instructor, Psychology 350, experience in upper-division psychology courses, or graduate standing. Graduate students, see Psychology 691. T R 10:10–11:25. Not offered 2000. 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 common pitfalls, and, finally, remain ethical. Beyond learning methods of "correct" and rigorous experimentation, we will also discuss what makes a research study actually interesting. The course 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.]

PSYCH 492 Sensory Function (also BIONB 492)
Spring. 4 credits. Limited to 25 students. Prerequisite: a 300-level course in biopsychology, or BIONB 222 or BIOAP 311, or permission of the instructors. Students are expected to have a knowledge of elementary physics, chemistry, and behavior. S-U grades optional. Offered alternate years. Graduate students, see Psychology 692. Not offered 2000–2001. M W F 10:10. B. P. Halpern and H. C. Howland.
This course covers classical topics in sensory function such as vision, hearing, touch and balance, as well as some more modern topics like sensory coding, location of stimulus sources in space, 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. This course will be taught using the Socratic method, in which the instructors ask questions of the students, and their answers will be discussed. Students will be expected to come to each class having read, thought about, and prepared to discuss, the assigned readings and other assigned information resources. Students will submit brief analyses of, and comments and questions on, all assignments by e-mail to the course's electronic mailing list a day before each class meeting. The mailing list will distribute submissions to all members of the class and to the instructors. In addition to these brief triweekly written exercises, a term paper in the form of a review article will be required.

Advanced Courses and Seminars

Advanced seminars are primarily for graduate students, but with the permission of the instructor they may be taken by qualified undergraduates. The selection of seminars to be offered each term is determined by the needs of the students.

A supplement describing these advanced seminars is available at the beginning of each semester and can be obtained from the department office (211 Uris Hall). The following courses may be offered either term and carry 4 credits unless otherwise indicated.

PSYCH 510–511 Perception

PSYCH 512–514 Visual Perception

PSYCH 518 Topics in Psycholinguistics

PSYCH 519–520 Cognition

PSYCH 521 Psychobiology

PSYCH 522 Topics in Perception and Cognition

PSYCH 523 Hormones and Behavior

[PSYCH 524 Sex Differences in Brain and Behavior (also BIONB 626)
Spring. 2 credits. Limited to 12 seniors and graduate students. Not offered 1999–2000. 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.]

PSYCH 527 Topics in Biopsychology

PSYCH 535 Animal Behavior

PSYCH 541 Statistics in Current Psychological Research

PSYCH 580 Experimental Social Psychology

PSYCH 600 General Research Seminar
Fall or spring. No credit.

PSYCH 601 Computational Models of Language
Spring. 4 credits. R 10:10–12:05. Prerequisites: consent of instructor. M. Spivey.
This seminar will involve in-depth discussion of a range of computational approaches to language representation, processing, and acquisition. We will cover pharse-structure grammars, context-free grammars, connectionist models, statistical natural language processing, and dynamical systems, to name just a few. There will also be some hands-on experience writing models in a computer lab using the MATLAB programming environment.

PSYCH 605 Perception (also Psychology 205)
Spring. 4 credits. T R 11:40–12:55. Non-Arts graduate students only. J. E. Cutting.

[PSYCH 607 Chemosensory Perception (also Psychology 307)
Fall. 4 credits. T R 9:05. Not offered 1999–2000. B. P. Halpern.]

[PSYCH 611 Introduction to Human Memory (also Psychology 311)
Spring. 4 credits. T R 11:40–12:55. Not offered 1999–2000. Staff.]

[PSYCH 612 Laboratory in Cognition and Perception (also Psychology 412)
Spring. 4 credits. M W 2:55–4:10. Not offered 1999–2000. D. J. Field.]

PSYCH 613 Obesity and the Regulation of Body Weight (also Nutritional Sciences 315)
Spring. 3 credits. Limited to 30 students. Prerequisites: one course in psychology and one course in nutrition. Undergraduate students may register with permission of instructor. S-U grades optional. Offered alternate years. T R 1:25–3:20. 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. Staff.

[PSYCH 615 Concepts, Categories, and Word Meaning (also Psychology 415)
Fall. 4 credits. M 1:25–4:25. Not offered 1999–2000. Staff.]

PSYCH 618 Psychology of Music (also Psychology 418)
Spring. 4 credits. M W 2:55–4:10. C. Krumhansl.

[PSYCH 619 Neural Networks Laboratory (also Psychology 419)
Spring. 4 credits. T R 2:55–4:10. Not offered 1999–2000. D. J. Field.]

[PSYCH 622 Developmental Biopsychology (also Psychology 422)
Fall. 4 credits. M W F 9:05–9:55. Not offered 1999–2000. B. L. Finlay.]

PSYCH 625 Cognitive Neuroscience (also Psychology 425)
Fall. 4 credits. M W F 9:05–9:55. B. L. Finlay.

[PSYCH 626 Evolution of Human Behavior (also Psychology 326)
Fall. 4 credits. T R 2:55–4:10. Not offered 1999–2000. R. E. Johnston.]

[PSYCH 629 Olfaction and Taste: Structure and Function (also Psychology 429 and BIONB 429)
Spring. 4 credits. T R 9:05. Not offered 1999–2000. B. P. Halpern.]

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)
Spring. 4 credits. M W F 11:15. T. J. DeVoogd.

[PSYCH 640 The Brain and Sleep (also Psychology 440)
Fall. 4 credits. M W 8:40–9:55. Not offered 1999–2000. H. S. Porte.]

PSYCH 641 Laboratory in Sleep Research (also Psychology 441)
Spring. 4 credits. W 7:30–10:30. H. S. Porte.

PSYCH 642 Human Perception: Applications to Computer Graphics, Art, and Visual Display (also Psychology 342)
T R 11:40–12:55. D. J. Field.

[PSYCH 650 The Lenses of Gender (also Psychology 450 and Women's Studies 450 and Women's Studies 650)
Spring. 4 credits. F 2:30–4:25. Not offered 1999–2000. S. L. Bem.]

PSYCH 681 Advanced Social Psychology (also Psychology 481)
Fall. 4 credits. T R 10:10–11:25. D. T. Regan.

[PSYCH 689 Seminar: Beliefs, Attitudes and Ideologies (also Psychology 489)
Fall. 4 credits. M 2:30–4:25. Not offered 1999–2000. D. J. Bem.]

PSYCH 691 Research Methods in Psychology (also Psychology 491)
Spring. 4 credits. T R 10:10–11:25. D. A. Dunning.

PSYCH 692 Sensory Function (also Psychology 492 and BIONB 492)
Spring. 4 credits. Not offered 2000–2001. M W F 10:10. B. P. Halpern and H. C. Howland.

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)
Spring. 4 credits. T R 10:10–11:25. Staff.

PSYCH 710 Research in Human Experimental Psychology

PSYCH 713 Information Processing: Conscious and Non-conscious (also PSYCH 413)
Spring. 4 credits. R 10:10–12:35.
B. Khurana.

PSYCH 714 Comparative Cognition (also Psychology 414)
Spring. 4 credits. T R 11:40–12:55.
M. J. Owren.

[PSYCH 715 Psychology of Language (also Psychology 215)
Fall. 4 credits. M W F 11:15. Not offered 1999–2000. Staff.]

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)
Fall. 4 credits. M 1:25–4:25. Not offered 1999–2000. Staff.]

PSYCH 720 Research in Social Psychology and Personality

PSYCH 722 Hormones and Behavior (also Psychology 322 and BIONB 322)
Spring. 3 credits. M W F 11:15–12:05.
E. A. Regan.

PSYCH 773–774 Proseminar in Cognitive Studies I and II (also COGST 773/774, PHIL 773/774, LING 773/774, and COMS 773/774)
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 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 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 cognition, but other topics, such as group dynamics, social influence, the social psychology of language, emotional experience, etc., will be covered.

PSYCH 900 Doctoral Thesis Research in Biopsychology

PSYCH 910 Doctoral Thesis Research in Human Experimental Psychology

PSYCH 920 Doctoral Thesis Research in Social Psychology and Personality

Summer Session Courses

The following courses are also frequently offered in the summer session, though not necessarily by the same instructor as during the academic year. Not all of these courses will be offered in a particular summer. Information regarding these courses and additional summer session offerings in psychology is available from the department before the end of the fall semester.

PSYCH 101 Introduction to Psychology: The Frontiers of Psychological Inquiry

PSYCH 123 Introduction to Biopsychology

PSYCH 128 Introduction to Psychology: Personality and Social Behavior

PSYCH 199 Sports Psychology

PSYCH 280 Introduction to Social Psychology

PSYCH 350 Statistics and Research Design

QUECHUA

See Romance Studies.

RELIGIOUS STUDIES MAJOR

See "Special Programs and Interdisciplinary Studies."

ROMANCE STUDIES

The Department of Romance Studies (Mitchell Greenberg, chair) offers courses in French, Italian, and Spanish literatures. In addition, the department's program includes courses in the French, Italian, Portuguese, Quecha and Spanish languages and linguistics; semiotics; and Francophone, Italian, and Hispanic culture. Through its course offerings and opportunities for independent study, the department seeks to encourage study of the interactions of the Romance literatures among themselves, with other literatures, and with other fields of inquiry.

French

J. Béreaud (director of undergraduate studies, fall), A. Berger, I. Daly, N. Furman, M. Greenberg (chair), E. Kaufman, R. Klein (director of undergraduate studies, spring), P. Lewis, A. Levy, S. LoBello, K. Long, J. Ngaté, C. Sparfel, S. Tarrow, S. Tun, M. C. Vallois, C. Waldron, L. R. Waugh.
Emeriti: A. Colby-Hall, D. I. Grossvogel, A. Seznec.

The Major

The major in French is divided into three options: French Area Studies, French linguistics, and French literature. 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. In view of the ongoing curriculum changes that will be implemented in 1999–2000, please see Professor Jacques Béraud, the director of undergraduate studies. This consultation is especially important for finding out what sequence of courses will follow the current choice of courses.

The French Linguistics Option

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.

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) or by the passing of a special examination. Typically, students in the major will have taken 312 by the end of their junior year.

2) Take six courses in French, Romance, and general linguistics (in addition to Linguistics 101). These courses will include at least one course concerning the history of French (e.g., Romance Linguistics 321, French 629 [listed under Romance Studies]), one course concerning the structure of French (e.g., French 405, 408, 410, Linguistics 323), and one other course in French linguistics.

3) Take two courses (preferably a sequence) in some allied area, for example, (a) French literature and civilization, (b) psycholinguistics, (c) philosophy of language, (d) French history, culture, music, or history of art or architecture. (This requirement may be waived for students who are double majors in other fields.)

Honors. The honors program encourages well-qualified students majoring in French linguistics to do independent work in French outside the structure of courses. The preparation of the senior honors essay, generally spread over two terms, provides a unique learning opportunity, since it allows for wide reading and extensive rewriting to a degree not practically possible in the case of course papers.

No special seminars or courses are required of honors students, but they will have regular meetings with the faculty advisers who have agreed to supervise their work. They may receive course credit by enrolling in French 429–430, but these independent study courses must be taken in addition to the courses that meet the minimum requirements for the major. At the end of the senior year each honors student is examined orally on the honors essay by a jury consisting of his or her faculty adviser and two other faculty members. The awarding of honors is determined by the student's grades in the major and the quality of the honors essay.

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 FRLIT 201, 220, or 221 plus 222 and FRROM 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 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 at the 300 level or above 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. Each area must be represented by at least two courses, and each course must have a significant French component. At least one of these six courses should be at the 400 level.

A copy of each student's program will be given to the director of undergraduate studies for approval and safekeeping.

Study Abroad in France

French majors or other interested students may study in France for one or two semesters during their junior year. Opting for one of several study-abroad plans recognized by the departments of Romance Studies and Linguistics facilitates the transfer of credit. Information about these plans is available from the director of undergraduate studies.

Students must be Cornell undergraduates with a strong academic record. The minimum French preparation is the completion of FRROM 213 or its equivalent in advanced credit or placement by the Cornell CASE examination. The taking of FRROM 301 and/or 312 is, however, strongly recommended.

Students interested in studying in France are encouraged to consider the special benefits offered by EDUCO, the program in Paris cosponsored by Cornell and by Duke University. EDUCO offers advanced students a challenging course of study and the experience of total immersion in French life and culture in Paris. Participants in this program spend the year or the semester as fully matriculated students at the University of Paris VII and other institutions of higher learning in Paris, including the Institut d'Etudes Politiques (Sciences Po), selecting courses in many fields from the regular university course offerings. Students begin the academic year with an intensive three-week orientation into French history, society, and daily life. While it is possible to enroll in the EDUCO Program for one semester, admission will be given first to students planning to study abroad for the full academic year.

EDUCO maintains a center in Paris with appropriate support staff. The resident director, chosen annually from the Cornell and Duke faculties, teaches a special seminar each semester, provides academic advice, and helps ensure the quality of the courses. The center, which includes a small library and word-processing facilities, is regularly used by students for special tutorials, seminars, and lectures, as well as informal gatherings.

Honors. The honors program encourages well-qualified students majoring in French literature or culture to do independent work in French outside the structure of courses. The preparation of the senior honors essay, generally spread over two terms, provides a unique learning opportunity, since it allows for wide reading and extensive rewriting to a degree not possible in the case of course papers.

No special seminars or courses are required of honors students, but they will have regular meetings with the faculty advisers who have agreed to supervise their work. They may receive course credit by enrolling in French 429–430, but these independent study courses must be taken in addition to the courses that meet the minimum requirements for the major. At the end of the senior year, each honors student is examined orally on the honors essay by a jury consisting of his or her faculty adviser and two other faculty members. The awarding of honors is determined by the student's grades in the major and the quality of the honors essay.

Fees. Depending on the course, a small fee may be charged for copies of texts used in course work.

Language

All language courses are offered by the Department of Romance Studies and French linguistics courses are offered by the Department of Linguistics.

Note: Students placed in 200-level courses also have the option of taking courses and/or literature courses; see listings under "Literature" for descriptions of the literature courses, some of which may be taken concurrently with French Language 200, 203, 205, or 213 or Hotel Administration 266.

FRROM 121 Elementary French
Fall, spring and summer. 4 credits. Spring enrollment limited. No prerequisites. Students who have studied French for 2 or more years must take the language placement test (LPF). Intended for beginning students or those placed by examination. C. Sparfel.
Small classes provide the opportunity for student interaction and intensive practice in listening to, speaking, reading, and writing basic French in meaningful contexts, which offer insights into French language, culture, and society.

FRROM 122 Elementary French
Fall or spring. 4 credits. Prerequisite: French 121, LPF score 37–44, or SAT II 370–480. Students who receive an LPF score of 56 after French 122 attain qualification and may enter the 200-level sequence; otherwise, satisfactory completion of French 123 is required for qualification. M. J. Highfield.
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. Courses offer intensive, context-specific practice in speaking, listening, reading, and writing.

FRROM 123 Continuing French
Fall, spring, or summer. 4 credits. Limited to students who have previously studied French and have an LPF score 45–55 or SAT II 490–590. Satisfactory completion of French 123 fulfills the qualification portion of the language requirement. C. Waldron, I. Daly.
French 123 is an all-skills course designed to improve pronunciation, oral communication, and reading ability; to establish a groundwork for correct writing; and to provide a substan-

tial grammar review. The approach in the course encourages the student to see the language within the context of its culture.

FRROM 200 Intermediate Reading and Writing
Fall or spring. 3 credits. Prerequisite: qualification in French (French 123, LPF score 56–64, or SAT II 600–680). Satisfactory completion of French 200 fulfills the proficiency portion of the language requirement. S. S. Hnin Tun.
Study of the language in different text types, prose and poetry, articles on current events, and a contemporary novel. Discussion of texts with emphasis on vocabulary development, grammar review and expansion, and appreciation of stylistic levels and cultural differences. Students have the opportunity to select reading material and work on their areas of interest. Taught in French.

FRROM 203 Intermediate Composition and Conversation I
Fall, spring, or summer. 3 credits. Prerequisite: qualification in French (French 123, LPF score 56–64, or SAT II 600–680). Satisfactory completion of French 203 fulfills the proficiency portion of the language requirement. I. Daly.
Readings, conversation, composition; various other activities based on films, videos, and newspaper articles. The course gives students the opportunity to expand their language skills and to strengthen their knowledge of grammar for better control. Taught in French.

FRROM 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 Romance Studies. This course, or its equivalent, is required for admission to the Cornell Abroad program. A. Grandjean-Lévy.
Emphasis on improving grammatical accuracy and on enriching vocabulary in oral and written expression of French. Varied types of reading including newspaper articles, short videos, films, and presentations by students, provide the basis for writing assignments and class discussions. Themes and emphases may vary from section to section. Taught in French.

FRROM 300 Directed Studies
Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. Staff.
Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

FRROM 301 Advanced French I
Fall or spring. 4 credits. Limited to 15 students. Prerequisite: FRROM 213 or Q++ on the Cornell Advanced Standing Examination (CASE). Fall, J. Bereaud or I. Daly; spring, I. Daly or N. Furman.
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.

FRROM 305 French through Film
Fall and spring. 4 credits. Prerequisite: Q++ on CASE exam, French 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.

FRROM 312 Advanced French II
Fall or spring. 4 credits. Limited to 15 students. Prerequisite: FRROM 301 or placement by the Cornell Advanced Standing Examination (CASE). Fall, J. Bereaud; spring, N. Furman.
Continuation of work done in French 301. The objective of French 301 is to teach students to speak and write correct French; in French 312 students will be expected to have a richer, more idiomatic and hopefully elegant command of the language.

Formal study of grammar will be discontinued, and more attention will be devoted to the examination of texts and to oral presentations by students. Weekly papers as in French 301.

FRROM 630 French for Reading—Graduate Students
Spring only. 3 credits. Limited to graduate students. Staff.
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.

Literature

FRLIT 201 Introduction to Techniques of Reading French Literature
Fall or spring. 3 credits. Prerequisite: qualification in French (SAT II score of 600, LPF score of 56, or French 123). E. Kaufman and staff.
French 201, like all other 200-level French literature courses, satisfies the language requirement by giving proficiency in French. Students with an SAT II score of 640 or more, or an LPF score of 60 or more, should take French 221.

French 201 is divided into small sections and is conducted in French.

French 201 is designed for students interested in improving their written and oral skills in French and also their literary proficiency. Texts have been chosen both for their literary merit and their level of linguistic difficulty. Close scrutiny of the works and active class discussions will sharpen students' critical and analytical abilities. Different genres are covered (poetry, drama, and narrative prose), and the reading list may include authors such as Baudelaire, Beckett, Ionesco, Camus, Duras, Rimbaud and Sartre.

FRLIT 220 French and Francophone Culture @
Fall. 3 credits. Prerequisite: SAT II score of 640 and above, or LPF score of 60, or FRDML 200, 203 or 205. Conducted in French. E. Kaufman.
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 Maghrebi or African writers; poetry or drama; two films will also be discussed.

FRLIT 221 Modern French Literature #
Fall or spring. 3 credits. Prerequisites: SAT II score of 640 and above, or LPF score of 60, or FRDML 200, 203, or 205. Conducted in French. Fall, N. Furman and staff; spring, staff.
This course, divided into small sections, is intended as an 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 experimentation. The course considers literary genres (poetry, drama, the novel) as solicitations to read texts differently, at different speeds, with diverse claims on our attention. The course 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 by Baudelaire, Mallarmé, Sartre, Cocteau, Proust, Duras.

FRLIT 222 Early Modern French Literature #
Spring. 3 credits. Prerequisite: FRLIT 201, 220, 221 or permission of the instructor. Required of all literature majors, but not limited to them. Conducted in French. M. C. Vallois.
Study of the classic 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 ANTHR 224)
Fall. 3 credits. Conducted in English (with the possibility of a section in French). Readings available both in French and in English translation. A. Berger and J. Siegel.
We look ethnographically and through literature at tastes and at class as they function and are discussed in France. We examine the practice of speech and how it's reflected upon. We look at views from France, America and other places. By emphasizing differences, the French experience emerges.

FRLIT 315 Modern European Literature and Culture (also COML 311 and RUSSL 311)
Fall. 4 credits. Conducted in English. G. Gibian.
For description, see Comparative Literature 311.

FRLIT 320 French Civilization II: Contemporary France
Fall. 4 credits. Prerequisite: FRROM 213 or equivalent. Conducted in French. J. Bereaud.

Detailed, analytical study of contemporary French society, its structure and its culture. 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. A variety of resources will be used: texts, magazine and television excerpts, and internet items. A few films will be shown to illustrate some aspects of French life.

FRLIT 330 Francophone African Literature @
Spring. 4 credits. E. Kaufman.
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. Rabéarivelo, S. Labou Tansi, and the Afro-Caribbean Aimé Césaire will be among the writers whose works will be read. The focus will be on the twentieth century and the nature of these writers' relationships with both the West and with Africa.

FRLIT 333 Contemporary French Thought
Spring. 4 credits. Conducted in French. R. Klein.
This course is intended to introduce students to the work of some of the major figures in contemporary French thought, in writing published since the events of May 1968. A broad range of topics and issues will be examined, with particular attention to those that have transformed traditional academic disciplines. Books have been selected not only with a view to their theoretical interest, but with an eye to the quality of their French prose. Readings will include works by Lévi-Strauss, Foucault, Cixous, Irigaray, Kristeva, Derrida, Barthes, Baudrillard.

FRLIT 334 The Novel as Masterwork (also French Literature 684)
Fall. 4 credits. Conducted in French. Prerequisite: French 201 or permission of the instructor. M. C. Vallois.
This course traces the evolution of the nineteenth century French novel. Readings include novels by Stendhal, Balzac, Flaubert and Zola.

FRLIT 356 Renaissance France
Fall. 4 credits. Conducted in French. K. Long.
This course will trace the importance of a number of movements/crises/events in the evolution of France as a nation and a culture, as well as the impact of these movements on the origins of modern thought. We will consider the ongoing debate on the status of women, known as the *querelle des femmes*; the discovery of the "New World," and its subsequent colonization; the Reformation, which led eventually to a separation of religious and national interests; and the rise of modernization and scientific disciplines. These areas of inquiry will be studied by means of various texts: the works of Marguerite de Navarre, Louise Labé, François Rabelais, Joachim du Bellay, Pierre de Ronsard, Ambroise Paré, and Michel de Montaigne, among others. Texts and discussions will be in French.

FRLIT 370 Perspectives on the Age of Enlightenment: "Enlightened" Literature
Spring. 4 credits. M. C. Vallois.
Through readings of various works of the French 18th century (by Montesquieu, Voltaire, Diderot, Rousseau and Sade), we will study the emergence of new literary discourses and practices aiming at a "secularization" of the literary field, in conjunction with the ideological and epistemological changes which took place in the age of Enlightenment.

FRLIT 396 The Contemporary French Novel: 1950 to the Present
Fall. 4 credits. Prerequisite: French 201 or permission of instructor. S. Tarrow.
The course will focus on novels written after 1960, tracing the development of new forms of the genre and new voices in the repertoire. Works by well-known authors such as Camus, Robbe-Grillet and Duras will be accompanied by those of North African and immigrant writers. Issues of language and identity will be considered in the context of European interpreter and an increasingly multi-cultural society. Weekly readings, two short essays and a final paper are required.

FRLIT 397 Orientalism, Exoticism and Interiority (also COM L 357)
Spring. 4 credits. T. Hope.
For description, see Comparative Literature 357.

FRLIT 409 Mourning People (also FRLIT 609, COM L 477/677)
Fall. 4 credits. T. Hope.
For description, see Comparative Literature 477.

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 428 Oulipo: Forms of Potential Literature (also FRLIT 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 formation 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 forms or textual principles based on novel combinatories 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, Jacques Roubaud, Georges Perec, as well as the Italian writer, Italo Calvino, and the American, Harry Matthews. 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, holorhymes, Boolian haikus, etc.). At the same time, close readings of selected texts will be encouraged.

FRLIT 429–430 Honors Work in French
429, fall; 430, spring. 8 credits year-long course, R grade fall semester, letter grade spring semester, with permission of the adviser. Open to juniors and seniors. Consult the director of the honors program. N. Furman and staff.

FRLIT 448 Medieval Literature
Spring. 4 credits. Prerequisite: French 221 or permission of the instructor. Conducted in English. A. Colby-Hall.
French 448 deals with the romance and the lyric. Facility in reading Old French and appreciation of these two major genres are the primary goals of this course.

FRLIT 477 Nationalism and National Literature in Francophone sub-Saharan Africa (also FRLIT 677, COM L 478/678)
Spring. 4 credits. D. Thomas.
For description, see Comparative Literature 478.

FRLIT 480 Francophone Sub-Sahara African Cinema & Literature (also COM L 460)
Fall. 4 credits. D. Thomas
For description, see Comparative Literature 460.

FRLIT 481 Bohemians and Dandies (also FRLIT 689)
Spring. 4 credits. N. Furman.
A study of two social and cultural phenomena of the 19th century: the bohemian and the dandy as expressed in the works of Vigny, Barbey d'Aurevilly, Villiers de l'Isle-Adam and Jules Vallès.

FRLIT 493 French Feminisms (also WOMS 493)
Fall. 4 credits. Conducted in English. N. Furman.
This course will examine the political, theoretical and literary concerns of contemporary French writers who have addressed "*la question de la femme/la question du féminin.*" Readings will include representative texts by Simone de Beauvoir, Monique Wittig, Kristeva, Jacques lacan, Luce Irigaray, Jacques Derrida, and Hélène Cixous.

FRLIT 607–608 Proseminar
607, fall; 608, spring. 2 credits each term. M. C. Vallois and staff.
Meeting every two weeks, the pro-seminar will be the place for sustained exchanges between graduate students, faculty, and visiting lecturers. Activities will include reading and discussion of seminal texts, chapters from dissertations and works in-progress, articles and essays from visiting lecturers.

FRLIT 609 Mourning People (also FRLIT 409, COM L 477/677)
Fall. 4 credits. T. Hope.
For description, see Comparative Literature 477.

FRLIT 617 Poetry and Poverty: 19th Century French Lyricism and the Times of Indigence
Fall. 4 credits. A. Berger.
From *Pauvres Gens* (Hugo) to the "pauvre Lélian" (Verlaine), from Baudelaire's poor to Rimbaud's scum, French poetry takes up the claim of the poor. But poverty as a social phenomenon doesn't simply become a poetic theme by striking lyricism's sentimental chord. If poverty is the main issue of the century, as French 19th century political and social thinkers agree, and if the question of modern times is indeed the question of poverty ("la misère"), as Michelet and Heidegger suggest in various ways, then the lyrical treatment of poverty raises the question of poverty's relation to modernity, and more specifically to the economy which defines it. Through a close examination of poems by Hugo,

Baudelaire, Rimbaud, Verlaine, Mallarmé and Jehan-Rictus, read along with Michelet, Benjamin and Heidegger among others, we will address the question of poetry's relations to the modern experience of lack and need, as well as to the poor as representative of the outcast. How can poetry give (itself!!) and what can it give in times of want?

FRLIT 639–640 Special Topics in French Literature
639, fall; 640, spring. 4 credits each term. Staff.
Guided independent study for graduate students.

FRLIT 677 Nationalism and National Literature in Francophone sub-Saharan Africa (also FRLIT 477, COM L 478/678)
Spring. 4 credits. D. Thomas.
For description, see Comparative Literature 478.

FRLIT 684 The Novel as Masterwork (also FRLIT 334)
Fall. 4 credits. M. C. Vallois.
For description, see French Literature 334.

FRLIT 689 Bohemians and Dandies (also FRLIT 481)
Spring. 4 credits. N. Furman.
For description, see French Literature 481.

FRLIT 698 Oulipo: Forms of Potential Literature (also FRLIT 428)
Spring. 4 credits. R. Klein.
For description, see French Literature 428.

Related courses in other departments

COM L 604 Europe and Its Others

COM L 650 Renaissance Poetry

COM L 671 Transatlantic Imaginaries

H ADM 266 Intermediate French: Le Français de l'Hôtellerie et du tourisme

Italian

Faculty: M. Migiel (director of undergraduate studies), A. Grossvogel (emerita), K. Battig von Wittelsbach, Flaminia Cervesa-McCobb, S. Stewart-Steinberg, M. Swenson

The Major

Students who wish to major in Italian should consult the Director of Undergraduate Studies who will assign the student a major adviser. The general plan and the details of the student's course of study will be worked out in consultation with the adviser. Italian majors are encouraged to take courses in related subjects such as history, art history, music, philosophy, anthropology, classics, linguistics, and other modern languages and literatures. While a major often occupies only the junior and senior years, it is wise for students to seek faculty advice about the major as early as possible.

Students who elect to major in Italian ordinarily should have completed Italian 201 by the end of their sophomore year. Exemptions can be made on the basis of an examination. Students majoring in Italian are expected to become conversant with a fair portion of the masterworks of Italian literature, to acquaint themselves with the outlines of Italian literary history, and to develop some skill in literary analysis. To this end, students will be expected to complete successfully 32 credits of Italian literature courses at the 300 level or higher, with papers to be written in Italian or English. Required courses for the major are ITALL 303, 304, and a course on Dante. ITALA 402, History of the Italian Language, and 403, Linguistic Structure of Italian, may be counted toward the 32 credits required for the major (an introductory linguistics course is a prerequisite of ITALA 402 and 403).

Students majoring in Italian will also be expected to acquire competence in the handling of the language. That competence may be demonstrated by passing an oral and written examination to be arranged with the adviser.

Italian majors will also be required to complete successfully two courses in related fields (for example, Italian history, Italian art history, literary theory).

Italian majors may study in Italy, generally during their junior year, under any of those study-abroad plans organized by American universities that allow the transfer of grades and credits.

To be eligible, students must have completed the first two years of their curriculum requirements and be in good academic standing.

Language

ITALA 121–122 Elementary Italian
121, fall; 122, spring. 4 credits each term. Prerequisite: for ITALA 122, ITALA 121 or equivalent. Intended for beginners or students placed by examination. At the end of ITALA 122, students who score 56 or higher on the LPI attain qualification and may enter the 200–level sequence; otherwise ITALA 123 is required for qualification. M. Swenson.
A thorough grounding in all the language skills: listening, speaking, reading, and writing. Language practice is in small groups. Lectures cover grammar and cultural information.

ITALA 123 Continuing Italian
Fall, spring, or summer. 4 credits. Limited to students who have previously studied Italian and have an LPI score 45–55 or SAT II 460–580. Satisfactory completion of ITALA 123 fulfills the qualification portion of the language requirement.
K. Battig von Wittelsbach.
ITALA 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 Conversation
203, fall or spring; 204, fall or spring. 3 credits each term. Prerequisites: for ITALA 203, qualification in Italian; for ITALA 204, 203 or equivalent.
S. Stewart-Steinberg.
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 and cinema; see separate listings under ITALA 201, 202 and 205 for description of these courses.

ITALA 207 Intermediate Composition and Conversation
Fall. 3 credits each term. Prerequisite: qualification in Italian.
K. Battig von Wittelsbach.
Guided reading, conversation, composition, and grammar review emphasizing preparation for Italian literary studies.

ITALA 300 Directed Studies
Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor.
Staff.
Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

ITALA 314 Advanced Italian: Language and Social Issues (also Italian Lit 214)
Spring. 3 credits. Prerequisite: ITALA 204 or equivalent. ITALA 313 is not prerequisite to ITALA 314 and may be taken after ITALA 314. S. Stewart-Steinberg.
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 631 Readings in Italian Opera Libretti
Spring. 2 credits. For graduate students only. Prerequisite: permission of instructor. Offered concurrently with appropriate seminars in the Department of Music.

Literature

ITALL 201–202 Introduction to Italian Literature
3 credits. Prerequisite: permission of instructor. ITALL 201 is not prerequisite to ITALL 202 or ITALL 205. Conducted in Italian. Fall, 202; spring, 201. M. Migiel and staff.
In this course, students will develop their language skills in Italian by reading, discussing, and writing about short works of fiction (twentieth-century short stories in ITALL 201; twentieth-century prose works in ITALL 202).

ITALL 205 The Cinematic Eye of Italy
Fall and spring. 3 credits. Conducted in Italian. Prerequisite: ITALA 203 or permission of the instructor. Fall: S. Stewart-Steinberg; spring: M. Migiel.
In this sophomore seminar, film will be used to explore some of the most important issues in modern Italian cultural history, such as: Italy as a relatively new nation-state; fascism; regionalism; the Southern question; Catholicism; terrorism; the new consumerism of the 80's and 90's; and Italy's recent evolution into a multicultural society. Films viewed will include those from the fascist era and the neorealist period, as well as later reformulations and critiques of these early works. There will also be readings designed to introduce students to Italian film criticism and to key debates about contemporary Italian culture.

Italian Culture Courses

The sequence of ITALL 220, 221, 222, 223, and 224 is intended to give students a broad overview of the principal issues in Italian culture. The approach will be interdisciplinary, drawing on materials from at least three

of the following cultural domains: literature, politics, economics, history, art, film, music, religion, science, psychology, philosophy, anthropology.

ITALL 220–224 are conducted in English. Students who are proficient in Italian will have the option of enrolling concurrently in the one-credit Italian practicum, ITALL 300.

ITALL 220 Medieval Italy
Spring. 4 credits. W. Kennedy.
This course will cover the late medieval period in Italy and will deal with such issues as social, economic, and political transitions to early modernity; cultural and intellectual developments in literature, philosophy, theology, and the visual arts; and modern approaches to pre-modern cultures through gender and identity studies. Topic for 2000: readings will focus on the multi-faceted allegory of Dante's *Divine Comedy*, the lyric poetry of Petrarch, and the often raucous stroytelling of Boccaccio's *Decameron*.

ITALL 221 The Italian Renaissance (also HIST 350)
Fall. 3 credits. J. Najemy.
For description, see History 350.

ITALL 224 Contemporary Italy
Fall. 4 credits. M. Migiel.
The course will cover the period from World War II to the present, and will deal with issues such as: Neorealism, the partisan experience, the impact of the economic boom and demographic changes in the 1950s and 1960s, Christianity vs. Marxism, Italian film makers and the myth of Italy, terrorism, Italian feminist thought, rethinking history, North vs. South, immigration and Italian national identity.

ITALL 300 Italian Practicum
Fall or spring. 1 credit. M. Migiel and staff.
Students enrolled in an Italian literature or culture course that is conducted in English (e.g., ITALL 221, 224, 323) may opt to take this one-credit practicum in Italian, provided that they have already attained proficiency in the language. Students in the practicum will spend one class hour per week discussing selected issues or texts in Italian; they will also complete an appropriate amount of written work in Italian.

ITALL 323 Encounters with the Dead (also ITALL 623, COM L 323/623, JWST 323/623)
Fall. 4 credits. M. Migiel.
Focusing on two epic works obsessed with death and with the dead (Dante Alighieri's *Comedy* [1321] and Claude Lanzmann's *Shoah* [1985]) this seminar will explore how Dante's poem and Lanzmann's film, often along analogous lines, address such issues as: the problems inherent in the representation of events; the search for a poetic/cinematic language adequate to convey experiences surpassing human comprehension; the creation of a narrating "I"; and the education of the reader/spectator; national, political, and religious identities; the possibility of heroism; the place of women in the epic enterprise; the challenge of writing a history based on ironic displacement; the redemptive potential of art (and its ability to deceive as well as to enlighten and console); the call to bear witness, both to life and to loss. The seminar will also ask what value there is in comparing such vastly different works (a pre-Renaissance conversion narrative bearing witness to the Creator vs. a post-Holocaust testimonial marked by a crisis of witnessing). Students may read in English translation or the original; *Shoah* will be shown with English subtitles. The seminar will be conducted in English.

ITALL 351 Machiavelli (also HIST 351)
Spring. 4 credits. J. Najemy.
For description, see History 351.

ITALL 394 Calvino and Levi: Then and Now (also ITALL 694)
Spring. 4 credits. Conducted in English. M. Migiel.
A study of the principle works by Italo Calvino and Primo Levi, two of the most important Italian writers of the second half of the twentieth century, and a critical examination of the theoretical frameworks that have been used to understand them so far.

ITALL 419–420 Special Topics in Italian Literature
419, fall; 420, spring. 2–4 credits each term. Prerequisite: permission of instructor. M. Migiel.
Guided independent study of specific topics.

ITALL 429–430 Honors in Italian Literature
429 fall; 430, spring. 8 credits. Year-long course, R for fall semester; letter grade for spring semester. Limited to seniors. Prerequisite: permission of instructor. M. Migiel.

ITALL 456 Opera, History, Politics, Gender (also HIST 456, SOC HUM 459, COM L 459, WOMNS 454)
Spring. 4 credits. M. Steinberg and S. Stewart.
For description, see History 456.

ITALL 623 Encounters with the Dead (also ITALL 323, COM L 323/623, JWST 323/623)
Fall. 4 credits. M. Migiel.
For description, see Italian Literature 323.

ITALL 639–640 Special Topics in Italian Literature
639, fall; 640, spring. 4 credits each term. M. Migiel.

ITALL 694 Calvino and Levi: Then and Now (also ITALL 394)
Spring. 4 credits. Conducted in English. M. Migiel.
For description, see Italian Literature 394.

Portuguese

Faculty: J. Oliviera

PORT 121–122 Elementary Portuguese
121, fall; 122, spring. 4 credits each term. Intended for beginners. Students may attain qualification upon completion of 122 by achieving a satisfactory score on a special examination. J. 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; 204, spring. 3 credits each term. Prerequisites: for Portuguese 203, Portuguese 122 or permission of instructor; for Portuguese 204, Portuguese 203 or permission of instructor. J. Oliviera.
Conversational grammar review with special attention to pronunciation and the development of accurate and idiomatic oral expression. Includes readings in contemporary Portuguese and Brazilian prose and writing practice.

Quechua

Faculty: L. Morató-Peña.

QUECH 131–132 Elementary Quechua
131, fall; 132, spring. 3 credits each term. Prerequisite: qualification in Spanish. This language series (131–132) cannot be used to satisfy the language requirement. L. Morató-Peña.
A beginning conversation course in the Cuzco dialect of Quechua.

QUECH 133–134 Continuing Quechua
133, fall; 134, spring. 3 credits each term. Prerequisites: for Quechua 133, Quechua 131–132 or equivalent; for Quechua 134; Quechua 133 or equivalent. Satisfactory completion of Quechua 134 fulfills the qualification portion of the language requirement. L. Morató-Peña.
An intermediate conversation and reading course. Study of the Huarochiri manuscript.

QUECH 300 Directed Studies
Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. L. Morató-Peña.
Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

Romance Studies

C. Arroyo

ROMS 363 The European Novel (also COM L 363)
Fall. 4 credits. C. M. Arroyo.
For description, see Comparative Literature 363.

Spanish

C. Morón Arroyo, L. Carrillo, D. Castillo, D. Cruz de Jesús, E. Dozier, M. A. Garcés, Z. Iguina, J. W. Kronik, N. Maldonado-Méndez, L. Morató-Peña, J. E. Paz-Soldán, J. Piedra (director of undergraduate studies), M. K. Redmond, J. R. Resina, M. Rice, J. Routier-Pucci, A. Stratakos-Tió, M. Stycos.

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 Piedra—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.

SPANL 201 and SPANR 204 (or equivalent) are prerequisite to entering the major in Spanish. All majors will normally include the following core courses in their programs:

1) SPANR 311 and 312
2) SPANL 315, 316, and 318 (not necessarily in that order)

Spanish majors have great flexibility in devising their programs of study and areas of concentration. Some typical options of the major are:

1) Spanish literature, for which the program of study normally includes at least 20 credits of Spanish literature beyond the core courses. Literature majors are strongly urged to include in their programs courses in all the major periods of Hispanic literature.
2) A combination of literature and linguistics.
3) Either of the above options with a maximum of three (3) courses at the 300 level or above 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 Latino 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 concentration in Spanish linguistics, see Department of Linguistics—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 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 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 in "residencias," or in a few cases in "colegios mayores." 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 SPANR 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.

Honors. Honors in Spanish may be achieved by superior students who want to undertake guided independent reading and research in an area of their choice. Students in the senior year select a member of the Spanish faculty to supervise their work and direct the writing of their honors essays (see Spanish 429–430).

Fees. Depending on the course, a small fee may be charged for film use or for copies of texts for course work.

Language

All language courses are offered by the Department of Romance Studies, and Spanish linguistics courses are offered by the Department of Linguistics.

Note: Students placed in the 200-level courses have the option of taking language and/or literature courses; see listing under SPANL 201 for description of the literature course that may be taken concurrently with SPANR 203–204.

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 two or more years in the language are required to take the placement test before taking any Spanish course.

Background	Course
0 Spanish	Spanish 121
less than 2 years	Spanish 121
2 years or more	Placement test score required for any Spanish course
Language Placement Score*	
less than 37 or SAT II below 370	Spanish 121
37–44 or SAT II 370-450	Spanish 112; fall, 122; spring
45–55 SAT II 460-580	Spanish 123
56 or more (Romance Stds), 203, 213 or SAT II 590 and above	Spanish 200, 201

*the placement score can be from an SAT II test, the CPT, or the LPS.

SPANR 112 Elementary Spanish: Review and Continuation
Fall. 4 credits. Prerequisite: LPS score 37–44. M. Rice.
This course is designed for students who have taken some Spanish and who have a placement score of 37–44 or SAT II 370–450. 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. As part of the final exam, students take the LPS and, according to their score, may place into Spanish 123 (score below 56) or receive qualification (56 or above), and placement into the 200-level courses.

SPANR 121–122 Elementary Spanish
121, fall and summer; 122, spring. 4 credits each term. Prerequisite: for Spanish 122, Spanish 121. Z. Iguina and staff.
This course is intended for students with no experience in Spanish. (Students who have previously studied 2 or more years of Spanish are not eligible for 121 unless they have an LPS score lower than 37 or SAT II lower than 370.) The course provides a thorough grounding in all language skills. Language practice in small groups. Lectures cover grammar, reading, and cultural information. Evening prelims.

SPANR 123 Continuing Spanish
Fall, spring, or summer. 4 credits. Prerequisite: Spanish 112, Spanish 122, or an LPS score 45–55 or SAT II 460–580. M. K. Redmond and staff.
An all-skills course which requires daily preparation before class and active student participation in class. Includes researching cultural topics of the student's choice, oral presentations, grammar review, audio tapes, video, journal and essay writing, speaking in small groups and authentic readings. Satisfactory completion of Spanish 123 fulfills the qualification portion of the language requirement. After this course, the student may take 201, 203, 213.

SPANR 200 Spanish for English/Spanish Bilinguals (also Latino Studies Program 202)
Fall or spring. 3 credits. Prerequisite: LPS score 56 or higher, SAT II 590 or higher, CASE placement, or permission of instructor. N. Maldonado-Mendez.
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. Not available to students who have taken Spanish 203 or 213.

SPANR 203 Intermediate Composition and Conversation I
Fall, spring, or summer. 3 credits. Prerequisite: Spanish 123, LPS score 56–64, or SAT II 590–680. Not available to students who have taken Spanish 213. N. Maldonado-Mendez, M. Rice and staff.
Conversational grammar review with special attention to the development of accurate and idiomatic oral expression. Includes readings in contemporary Spanish prose and practice in writing.

SPANR 204 Intermediate Composition and Conversation II
Fall or spring. 3 credits. Prerequisite: Spanish 203, 213, CASE placement, or permission of instructor. This course, or its equivalent, is required for admission to the Cornell Abroad program. E. Dozier and staff.
An advanced-intermediate course designed for students who want to go beyond the basic language requirement, and further broaden their knowledge of the language and related cultures, as well as improve their comprehension and communication skills. This course guides students to take greater command of their own language learning process to optimize their continued progress. Includes a strategic focus on specific problems in listening and reading comprehension, and in accurate writing and speaking.

SPANR 205 Spanish Translation
Summer. 4 credits. Prerequisite: proficiency in Spanish. J. Routier-Pucci.
The objective of the course is to learn to translate from Spanish into English and in so doing, to investigate the various technical, stylistic and cultural difficulties encountered in the translation process.

SPANR 213 Intermediate Spanish for the Medical and Health Professions
Fall or spring. 3 credits. Prerequisite: qualification in Spanish (Spanish 123, LPS score 56–64, or SAT II 590–680) or permission of instructor. Students who have taken Spanish 203 or 200 should speak to the instructor. A. Tió.
Conversational grammar review, with dialogues, debates, compositions, and readings on health-related themes. Special attention is given to relevant cultural differences. Fulfills proficiency requirement.

SPANR 300 Directed Studies
Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. Staff.
Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

SPANR 310 Advanced Conversation and Pronunciation
Spring. 3 credits. Prerequisite: Spanish 204 or equivalent. Z. Iguina.
A conversation course with intensive oral practice obtained through the production of video programs. Study of the fundamental aspects of communication in the standard spoken and written Spanish, with some focus on dialectal variations. Weekly pronunciation labs.

SPANR 311 Advanced Composition and Conversation
Fall or spring. 4 credits. Prerequisite: SPANR 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
Fall or spring. 4 credits. M. Stycos.
Readings and class discussion will focus on the stylistic analysis of modern texts. Increased emphasis, through weekly essays, on students' development of an effective Spanish prose style.

SPANR 630 Spanish for Reading
Spring. 3 credits. Limited to graduate students. E. Sánchez-Blake.
Designed for those with little or no background in Spanish and little exposure to written Spanish, this course primarily aims to develop skill in reading Spanish. Grammar basics, extensive vocabulary, and strategies for reading in a foreign language are covered. The types of texts to be covered will be based on the interests of the students in the course.

SPANR 660 Latino Languages, Ideology and Practice (also Anthropology 660 and Latino Studies Program 660)
Spring. 4 credits. V. Santiago-Irizarry.
For description, see Anthropology. Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

Literature

SPANL 201 Introduction to Hispanic Literature @
Fall or spring. 3 credits. Prerequisite: qualification in Spanish or permission of instructor. The course is divided into small sections and is conducted mainly in Spanish. (Fulfills both the language proficiency requirement and the humanities distribution requirement. The literature course that normally follows SPANL 201 is either 316 or 318.) J. Piedra and staff.
An intermediate course designed to improve Spanish skills through reading and discussion of contemporary literary works from Spain and Spanish America. Emphasis 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 246 Contemporary Narratives by Latina Writers (also LSP 246)
Fall. 3 credits. L. Carrillo.
This course offers a survey of narratives by representative Latina writers of various Latino ethnic groups in the United States including Chicana, Chilean, Cuban, Dominican, and Puerto Rican. We will investigate the parallel development of a Latina perspective on personal, social, and cultural issues alongside that of the U.S. ethnic liberation/revitalization movements of the 1960s through to contemporary feminist activism and women of color movements. We will investigate these works as artistic attempts to deal with such issues as culture, language and bilingualism, family, gender, sexuality, and domesticity. We will account for regional distinctions and contributions. Readings will include works by Julia Alvarez, Gloria Anzaldúa, Elena Castedo, Ana Castillo, Denise Chávez, Sandra Cisneros, Judith Ortiz Cofer, Cristina García, Nora Glickman, Nicholasa Mohr, Cherríe Moraga, Achy Obejas, Esmeralda Santiago, Ana Lydia Vega, and Helena María Viramontes.

SPANL 301 Hispanic Theater Production
Fall or spring. 1-2 credits. S-U only. D. Castillo.
Students develop a specific dramatic text for full-scale production. The course will involve selection of an appropriate text, close analysis of the literary aspects of the play, and group evaluation of its representational value and effectiveness. All students will be involved in some aspect of production and will write a final paper as a course requirement. Credit will be variable depending upon the student's role in play production: a minimum of 50 hours of work is required for one credit; a maximum of two credits will be awarded for 100 hours or more of work.

SPANL 315 Renaissance Hispanisms: Spain and the Americas #
Spring. 4 credits. Conducted in Spanish. Prerequisite: SPANL 316 or SPANL 318. M. A. Garcés.
In Spain, the cultural revolution known as the Renaissance produced a glittering array of artistic works, which gave rise to the term, Golden Age. There was a "darker side" to the Renaissance, however, which juxtaposed the conquest of America with the establishment of the Inquisition and the expulsion of the Jews and later, of the *Moriscos*. The tale of these relations of exclusion and fascination, of domination and communication with the *other* is recapitulated by the literature of the period. Texts include Columbus, Cabeza de Vaca, *Lazarillo*, Garcilaso de la Vega, San Juan de la Cruz, Cervantes, María de Zayas, Lope de Vega, Calderón, and others.

Note: SPANL 316 and 318 can be taken in any order. Prerequisite: Spanish 201 or 4 years of high school Spanish or permission of instructor.

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, J. Kronik or M. Stycos; spring, staff.
Readings and discussion of representative texts from Spain from the romantic period to the present. Bécquer, Galdós, Unamuno, García Lorca, Cela, and others.

SPANL 318 Readings in Spanish-American Literature @
Fall or spring. 4 credits. Fall, J. E. Paz-Soldán or M. A. Garcés; spring, J. Piedra and staff.
Readings and discussion of representative texts of the nineteenth and twentieth centuries from Spanish America: Darío, Borges, Valenzuela, Cortázar, García Márquez, and others.

Note: The prerequisite for the following courses, unless otherwise indicated, is SPANL 315, 316, or 318 or permission of instructor.

SPANL 320 Perspectives on Latin America @
Spring. 3 credits. Conducted in English. D. Castillo.
This interdisciplinary, co-taught course will be offered every spring through the Latin American Studies Program. It is highly recommended for Latin American Studies Concentrators. Topics will vary by semester, but readings will always focus on current research in various disciplines and regions of Latin America. The range of issues addressed will include the economic, social, cultural, and political trends and transitions in the area. In the weekly meetings, instuctors and guest lecturers will facilitate student discussions. Students are required to participate in all class discussions and write one research paper in their chosen focus area.

SPANL 339 Islamic Spain: Culture and Society (also NES 339, JWST 339, COM L 334, RELST 334 and SPANL 699) @ #
Fall. 3 credits. S-U option. This course can also be used to fulfill the requirements of the Medieval Studies Program. Offered every other year. R. Brann.
For description, see NES 339.

SPANL 345 Contemporary Spanish-American Novel @
Spring. 4 credits. Prerequisite: SPANL 317 or equivalent. E. Paz-Soldán.
Reading and discussion of selected works of narrative fiction by today's leading authors: Cabrera Infante, Cortázar, Donoso, Fuentes, García Márquez, Puig, Vargas Llosa, and others. Two abiding concerns will be the way in which history interacts with aesthetic form and the role of the bicultural reader in actualizing the text's potential.

SPANL 348 Cuban Literature @
Fall. 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 frm before the twentieth-century, particulary 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 375 Fictions of the Picaresque in Spain and America (also SPANL 475)
Spring. 4 credits. M. A. Garcés.
While one critic defines the picaresque novel as the autobiography of "an unscrupulous wretch," narrated as a sequence of episodes, others have described it as a drama of consciousness. A fragmentary confession that emphasizes the traumas and vicissitudes that shaped a particular life since its origins, including dreams and fantasies which often question sexual identity, the picaresque bears an uncanny resemblance to the discourse of the analysand in psychoanalysis. We will explore the relationships of the picaresque with such genres as psychoanalysis, autobiography, travel literature, romance, soldierly adventure, and semi-documentary fictions, like some chronicles of the conquest. Our trans-Atlantic voyage starts in Europe with *Lazarillo de Tormes* and works by Alemán, Cervantes, Delicado, and Quevedo, ending in the New World with with the infamous *Vida y sucesos de la monja Alférez*, attributed to the transvestite nun-soldier, Catalina de Erasau, and *Conquista y descubrimiento del Nuevo Reino de Granada*, known as *El Carnero*, by Rodríguez Freyle. Readings will be supplemented with an ample range of theoretical and critical perspectives.

SPANL 397 Reality and Fiction in Modern Spanish Narrative
Fall. 4 credits. Conducted in Spanish.
J. W. Kronik.
This course will examine the various ways in which selected novelists from the nineteenth-century realist period (Galdós, Clarín) and across the twentieth century (Baroja, Carmen de Burgos, Cela) to the present day (Rosa Montero, Lucía Etxebarría) have defined and coped with the task of representing in their imaginative writings the social and political reality they lived and observed. Consideration will be given to the tensions between reality and its fictional figuration and the technical processes of narrative.

SPANL 399 Spanish Film
Fall. 4 credits. Conducted in Spanish.
Screenings to be announced. J. R. Resina.
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 illustrates a postmodern aesthetic. 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. Staff.
Guided independent study of specific topics. For undergraduates interested in special problems not covered in courses.

SPANL 429–430 Honors Work in Hispanic Literature
429, fall; 430, spring. 8 credits. Year-long course, R grade fall semester, letter grade spring semester. Limited to seniors. Prerequisite: permission of instructor. M. Garcés.

SPANL 475 Fictions of the Picaresque in Spain and America (also SPANL 375)
Spring. 4 credits. M. A. Garcés.
For description, see Spanish Literature 375.

SPANL 479 Colonial Spanish American Literature: Voices of the Colonized
Spring. 4 credits. Conducted in Spanish.
J. Piedra.
The course will explore the birth of dissent within Spanish colonial literature as a semi-official, alternative compendium of other vehicles of expression: history and philosophy, grammar and religion, "anthropology" and "ethnology." The emphasis is on the dissenting voices of native Americans, Blacks and women, as well as other "minorities" as they converge in the emergence of a "Creole" conscience. The textual selections or complete works to be considered emphasize the aspects of colonial texts that attempted to side with the "colonized" or that were indeed written by them. The list includes the following authors: Columbus, Pane, Las Casas, Inca Garcilaso, Guaman Poma, Silvestre de Balboa, Madre Castillo, Motolinia, Concolorcorvo, Mateo Alemán, Sor Juana, and Lizardi.

SPANL 487 Borges
Fall. 4 credits. E. Paz-Soldán.
This course examines the life and work of Jorge Luis Borges, one of the indisputable masters of twentieth century literature. We will study his poems, essays and short stories within the modernity/postmodernity debate, and in multiple contexts: local, Latin American, and global. The course will also read other writers of the River Plate region, those who influenced Borges (Macedonio, Fernández), those influenced by him (Cortázar), and those who resisted his enormous influence (Onetti), trying to establish a genealogy of literary affiliations and ruptures. There will be a particular interest in studying film adaptations of Borges' stories.

SPANL 492 Latin American Women Writers (also WOMNS 481 and COM L 482) @
Spring. 4 credits. Conducted in English.
D. Castillo.
This course will provide a sampler of novels and short stories by and about Latin American women. We will look at the question of self-construction and issues such as the social and political concerns involved in a specifically Latin American feminine identity. All works will be read in translation. (Romance Studies students should read originals of the works from the Spanish.) Authors may include writers such as Luisa Valenzuela (Argentina) and Rigoberta Menchú (Guatemala), Helena Parente Cunha and Clarice Lispector (Brazil), Helena Maria Viramontes (U.S.A.), and Simone Schwartz-Bart (Guadaloupe).

SPANL 497 Modern Spanish Poetry and Poetics
Fall. 4 credits. Conducted in Spanish.
C. M. Arroyo.
This course will focus on the development of modern Spanish poetry from Bécquer to the present. Readings will include texts by Bécquer, Machado, Lorca, Jiménez, Guillén, and others as well as poetic and theoretical works designed to help us situate Spanish poetry with respect to such contemporary European aesthetics as romanticism, symbolism, and postsymbolism.

SPANL 639–640 Special Topics in Hispanic Literature
639, fall; 640, spring. 2–4 credits each term. Staff.

SPANL 660 Tales of Love, Trauma and Creation in Cervantes
Fall. 4 credits. M. A. Garcés.
From his first to his last writings, Cervantes' fiction turns around that void represented by the traumatic experience of his Algerian captivity. Linked to explorations in memory, captivity in Cervantes is also paradoxically associated with fantastic—and often perverse—tales of love, as if approaching the site of trauma would elicit an explosion of fantasy. Our seminar will undertake a panoramic survey of Cervantes' works using a wide range of theoretical perspectives. The writer's interest in the problem of fantasy and reality, his exploration of madness in relation to meaning, makes him a cultural ancestor of Freud. More important, the act of bearing witness to a traumatic event that simultaneously functions as a fountain of creation, pressures the relationship between trauma and fantasy, traumatic knowledge and literary studies. Selections from *La Galatea*, *Don Quijote*, the *Novelas ejemplares*, the plays *El Trato de Argel* and *Los baños de Argel*, and the *Persiles* will be approached through theoretical readings from texts by Freud, Lacan, Kristeva, and others.

SPANL 699 Islamic Spain: Culture and Society (also SPANL 339, COM L 334/639, JWST 339 and NES 339/639) #
Fall. 4 credits. R. Brann.
For description, see Spanish Literature 339.

RUSSIAN

P. Carden, director of undergraduate studies [literature], 235 Goldwin Smith Hall, 255–8350;
E. W. Browne, G. Gibian, L. Paperno,
S. Paperno, N. Pollak, S. Senderovich,
G. Shapiro, V. Tsimberov

The Russian Major

Russian majors study Russian language, literature, and linguistics, and emphasize their specific interests. It is desirable, although not necessary, for prospective majors to complete Russian 121–122, 201–202, and 203–204 as freshmen and sophomores, since these courses are prerequisites to most of the junior and senior courses that count toward the major. Students may be admitted to the major upon satisfactory completion of Russian 122 or the equivalent. Students who elect to major in Russian should consult Professor Carden as soon as possible. For a major in Russian, students will be required to complete (1) Russian 301–302 or 303–304 or the equivalent, and (2) 18 credits from 300- and 400-level literature and linguistics courses, of which 12 credits must be in literature in the original Russian.

Certain courses may, with the permission of the instructor, be taken for one additional hour's credit. Such courses will involve a one-hour section each week with work in the Russian language. These courses count one hour each of credit toward the 12 courses of Russian literature in the original language required for the major.

Study Abroad

Cornell is an affiliated institution with the Council on International Educational Exchange program for Russian language study at St. Petersburg State University. Cornell students also frequently attend the American Council of Teachers of Russian program in Moscow and other Russian language programs. Opportunities are available for study during the summer, a single semester, or the full year. Further information is available from W. Browne, in the Department of Linguistics.

Honors. Students taking honors in Russian undertake individual reading and research and write an honors essay.

Fees. Depending on the course, a small fee may be charged for photocopied texts for course work.

Freshman writing seminar requirement. The following courses will satisfy the freshman writing seminar requirement: Russian 103, 104 and 105.

Russian and East European Studies Major

See "Special Programs and Interdisciplinary Studies," which follows the department listings.

Russian Language

RUSSA 103–104 Conversation Practice
103, fall; 104, spring. 2 credits each term. Must enroll in one section of 103 and one section of 121, in the fall; and one section of 104 and one section of 122 in the spring. L. Paperno.

RUSSA 121–122 Elementary Russian
121, fall or summer; 122, spring or summer. 4 credits each term. May be taken alone and qualification will be achieved with satisfactory completion of 121–122–123; or may be taken concurrently with 103–104 and qualification will be achieved at completion of 122–104. Includes a guest lecture by Prof. Peter Holoquist. S. Paperno, V. Tsimberov and staff.
A thorough grounding is given in all the language skills: listening, speaking, reading, and writing. Course materials include clips from original Russian films and TV programs.

RUSSA 123 Continuing Russian
Fall. 4 credits. Limited to students who have previously studied Russian or been placed by department. Satisfactory completion of Russian 123 fulfills the qualification portion of the language requirements. Includes a guest lecture by Prof. George Gibian. V. Tsimberov, S. Paperno, L. Paperno.
A course designed to prepare students for study at the 200 level. Passing this course is equivalent to qualification. Authentic Russian materials are used: TV, books, etc.

RUSSA 203–204 Intermediate Composition and Conversation
203, fall or summer; 204, spring or summer. 3 credits each term. Prerequisites: for Russian 203, qualification in Russian (Russian 123 or placement by department); for Russian 204, Russian 203 or equivalent. Includes a guest lecture by Prof. Gavriel Shapiro. L. Paperno, S. Paperno, V. Tsimberov.
Guided conversation, composition, reading, pronunciation, and grammar review, emphasizing the development of accurate and idiomatic expression in the language. Course materials include video clips from an original Russian feature film.

[RUSSA 205–206 Reading Russian Press
205, fall; 206, spring. 2 credits each term. Prerequisite: qualification in Russian (Russian 123 or placement by department). Both semesters must be taken in order to satisfy the proficiency level for the language requirement. This course cannot be used to satisfy the humanities requirement. Not offered 1999–2000. Staff.
Reading unabridged articles on a variety of topics from current Russian periodicals and web pages.

Note: Students placed in the 200-level courses also have the option of taking courses in introductory literature; see separate listings under Russian 201 and 202 for descriptions of these courses, any of which may be taken concurrently with the 203–204 and 205–206 language courses described above.]

RUSSA 300 Directed Studies
Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. Staff.
Taught on a specialized basis to address particular student needs including native speakers of Russian. Times will be arranged with instructor.

RUSSA 303–304 Advanced Composition and Conversation
303, fall; 304, spring. 4 credits each term. Prerequisites: for Russian 303, Russian 204 or equivalent; for Russian 304, Russian 303 or equivalent. L. Paperno, S. Paperno, V. Tsimberov.
Writing, reading, and conversation: viewing and reading authentic language materials; current Russian films (feature and documentary), newspapers, TV programs, and other materials are used.

[RUSSA 305–306 Directed Individual Study
305, fall; 306, spring. 2 credits each term. Prerequisite: placement by the department. Not Offered 1999–2000. Staff.
This course is intended for students with special needs (e.g., children of Russian immigrants who speak Russian at home) 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 advanced reading skills. The weekly reading assignment is 20–40 pages of unabridged Russian prose (50–60 pages for native speakers), mostly (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 401–402 History of the Russian Language (also Linguistics 417–418)
401, spring; [402.] 4 credits each term. Prerequisites: for Russian 401, permission of instructor; for Russian 402, Russian 401 or equivalent. Offered alternate years. Not offered 1999–2000. W. Browne.
Phonological, morphological, and syntactic developments from Old Russian to modern Russian.]

[RUSSA 403–404 Linguistic Structure of Russian (also Linguistics 443–444)
403, fall; 404, spring. 4 credits each term. Prerequisites: for Russian 403, Linguistics 101 and permission of instructor, for Russian 404, Russian 403 or equivalent. Offered alternate years. Not offered 1999–2000. 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 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. V. Tsimberov.
Discussion of authentic unabridged Russian texts and films (feature or 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. 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 651–652 Comparative Slavic Linguistics (also Linguistics 671–672)
651, fall; 652, spring. 4 credits each term. Prerequisites: for Russian 651, Russian 601 taken previously or simultaneously or permission of instructor, for Russian 652, Russian 651 or permission of instructor. Offered alternate years. Not offered 1999–2000. W. Browne.
Sounds and forms of the Slavic languages and of prehistoric common Slavic; main historical developments leading to the modern languages.]

[RUSSA 700 Seminar in Slavic Linguistics
Offered according to demand. Variable credit. Not offered 1999–2000. Staff.
Topics chosen according to the interests of staff and students.]

Russian Literature

There are a variety of courses: some with readings in English translation, others in the original Russian, or both. The connection between Russian history, society, and literature is particularly close, so instruction and discussion in class often include a variety of topics, such as culture and intellectual history, as well as literature. Several courses are interdisciplinary, cosponsored with the departments of History, Economics, Government, Comparative Literature, etc.

RUSSL 103 Freshman Writing Seminar: Classics of Russian Thought and Literature
Fall or spring. 3 credits. D. Galloway.
Russian society has always seen its literature as having a mission important to the development of the nation. In this course we will examine Russian literature as it participates in the debate, whither Russia? We will look in particular at the conflict between the Slavophiles, those who thought Russia had its own unique destiny, and the Westernizers, those who thought Russia should look to the West as a model for its development. We will be reading such Russian authors as Turgenev, Dostoevsky, Herzen, and Solzhenitsyn in English translation. The course will examine the rhetorical means each author uses to make his argument. All reading is in English translation.

RUSSL 104 Freshman Writing Seminar: Nineteenth-Century Russian Literary Masterpieces
Fall. 3 credits. P. Carden.
This course will introduce students to a broad selection of the major short works of the Russian literary tradition. Our emphasis will be on what makes each work interesting as writing, what themes have been particularly interesting to Russians, and how we recognize the distinctive voice of each of the writers we are studying. Among the authors read are Pushkin, Gogol, Turgenev, Dostoevsky, Tolstoy, and Chekhov. All reading is in English translation.

RUSSL 105 Freshman Writing Seminar: Twentieth-Century Russian Literary Masterpieces
Fall or spring. 3 credits. D. Galloway.
We will read and write about a selection of works from the major Russian literary movements of the twentieth century. The course will concentrate in part on important literary responses to the first Russian Revolution and the society it created. Authors to be read include Zamyatin, Olesha, Zoshchenko and Vladimov. Readings in English translation.

RUSSL 201–202 Readings in Russian Literature
Fall or spring. 3 credits. Prerequisites: qualification in Russian. Open to freshmen. Fall: 201, N. Pollak; spring: 202, G. Shapiro.
These courses are designed as the initial courses students take after qualification in Russian and are conducted mainly in Russian. Considerable guidance is provided, however, and there is no presumption of fluency. The goal of the course is to introduce students to original Russian literature, to sample differing literary styles, and to accomplish both with minimal recourse to English in class. Several short papers in Russian and English will be assigned. Readings from nineteenth- and twentieth-century masters of prose and verse such as Pushkin, Lermontov, Tiutchev, Tolstoy, Chekhov, Babel, and Zoshchenko.

RUSSL 207 Themes from Russian Culture
Spring. 3 credits. G. Shapiro.
This course is based on lectures, discussions, and audio-visual presentations (slides, tapes, films). Included within its scope are various aspects of Russian culture such as literature, art, music, religion, philosophy, and social thought from its very beginning through the eighteenth century. The course is designed to give undergraduates a broad familiarity with the cultural traditions of the country which plays a major role in the world today. Russian culture will be presented as part of Western civilization with attention given to its distinctive character. The basic texts are literary works of moderate length in English translation.

[RUSSL 208 Themes from Russian Culture II
Spring. 3 credits. Not offered 1999–2000. G. Shapiro.
This course is based on lectures, discussions, and audiovisual presentations (slides, tapes, films). Included are various aspects of Russian culture such as literature, art, music, religion, philosophy, and social thought over the last two hundred years. The course is designed to give undergraduates a broad familiarity with the cultural traditions of the country that plays a major role in the world today. Russian culture will be presented as part of Western civilization with attention given to its distinctive character. The basic texts are literary works of moderate length in English translation.]

RUSSL 279 The Russian Connection, 1830–1867 (also COM L 279)
Fall. 3 credits. P. Carden.
As Russian prose began to find its voice, it responded with enthusiasm to the European prose tradition. One line of development in the Russian novel began with Rousseau's division between the needs of individual growth, nourished by solitude and introspection, and the demands of society. Tolstoy's *War and Peace* can be read as a summary and a testing of the novelistic tradition that grew out of the work of Rousseau, in both European and Russian literature. We will follow the line that leads to Tolstoy's multifaceted inquity, beginning with two short novels that set the tone for the introspective novel in the two traditions, Constant's *Adolphe* and Lermontov's *Hero of Our Time*. Looking at relevant excerpts from a range of European prose writers Rosseau, Musset, Goethe, Stendhal, Thackeray among others, we will think about the possibilities and limitations of the introspective novel as a form, especially as manifested in one of the monuments of the genre, *War and Peace*.

RUSSL 280 The Russian Connection, 1870–1960 (also COM L 280)
Spring. 3 credits. P. Carden.
The European novel of introspection developed a second line of inquiry, in some respects counter to the tradition that grew out of the writings of Rousseau. Diderot's "Rameau's Nephew" may be taken as emblematic of a novel that goes beyond the search for self-understanding to focus on alientation, resentment and rebillion. Dostoevsky was the inheritor of this line in the European prose tradition. His works, in particular *Notes from Underground* and *The Idiot*, will be the focal point of our discussion. We will follow up the tradition as Dostoevsky's influence returns the line to Europe in the works of writers like Camus and Sarraute.

RUSSL 311 Modern European Literature and Culture (also COMP L 311, ROM ST 311)
Fall. 4 credits. Core course for European Studies concentration; no prerequisites. G. Gibian.
For course description, please see Comparative Literature 311.

[RUSSL 330 Understanding Russia Today (also Govt 357)
Fall. 4 credits. Not offered 1999–2000. G. Gibian and guest speakers.
An interdisciplinary inquiry into Russian society and its history, designed as an introduction for students not majoring in Russian studies. This course also acts as a synthesis for those who are studying various aspects of Russia in separate disciplines, and is organized into a variety of approaches to Russian language, culture, history, and literature. It aims to teach both basic information and different ways of interpreting that information. Topics will include: the land and the people; doing business in Russia; literary traditions and revolts; Russian national identity; nationalism; persistent cultural traits; religion, history; politics and government; relations with other nations, inside Russia and outside; Jews and Russians; folklore; social matters, customs, values; position of women; education; music, architecture; agriculture and industry; Russian maximalism; regionalism; the ecology; film, TV, theatre, journalism.]

[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. Not offered 1999–2000. S. Senderovich.

A survey of Russian poetry with primary emphasis on the analysis of individual poems by major poets.]

RUSSL 332 Russian Drama and Theatre (also Thetr 322, COM L 322)

Spring. 4 credits. S. Senderovich.

Selected topics. Discussion of a number of the most representative Russian plays of the nineteenth and twentieth centuries in chronological order. Introductions to the historical period, cultural atmosphere, literary trends, and crucial moments in the history of the Russian theater will be especially emphasized. Among the works we will be studying will be Gogol's *Inspector General,* Ostrovsky's *The Storm*, and Chekhov's *The Cherry Orchard.* All readings will be in English translation. Additional assignments in critical literature will be made for graduate students.

[RUSSL 333 Twentieth-Century Russian Poetry

Spring. 4 credits. Not offered 1999–2000. N. Pollak.

Close readings of lyrics by major twentieth-century poets. All reading is in Russian. Geared towards undergraduates.]

[RUSSL 334 The Russian Short Story

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 1999–2000. N. Pollak.

A survey of two centuries of Russian story telling. Emphasis on the analysis of individual stories by major writers, on narrative structure, and on related landmarks of Russian literary criticism.]

RUSSL 335 Gogol

Fall. 4 credits. G. Shapiro.

Selected works of Gogol read closely and viewed in relation to his life and to the literature of his time. Readings in English translation.

RUSSL 337 Films of Russian Literary Masterpieces (also Comparative Literature 338)

Fall. 4 credits. S. Senderovich.

War and Peace and *Dr. Zhivago* are well-known American films relating to Russian literature of the 19th and 20th centuries. Russian literature has been a matter of great interest both in the West and East. A clear cut practice of cultural translation is presented by film versions of Russian literary masterpieces. We will perform a comparative analysis of these films, which will provide an excellent opportunity for discussing problems of translation between various media and of cultural translation.

RUSSL 350 Education and the Philosophical Fantasies (also COM L 350)

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 context 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 Russian Literature from 1917 to the Present

Spring. 4 credits. Also open to graduate students. No prerequisites. There will be a special section for students who read Russian. Not offered 1999–2000. G. Gibian.

In translation. A survey of Russian literature focusing on the most important writers. Among the themes to be explored will be Russian Modernism, social command, socialist realism, the Thaw, dissident and emigre literature, post-modernism. Writers include Blok, Mayakovsky, Babel, Olesha, Platonov, Pasternak, Nabokov, Solzhenitsyn, the two Erofeevs, and contemporary women poets and short story writers.]

[RUSSL 369 Dostoevsky #

Fall. 4 credits. Not offered 1999–2000.]

[RUSSL 373 Chekhov in the Context of Contemporary European Literature and Art (also Comparative Literature 375) #

Fall. 4 credits. Not offered 1999–2000. S. Senderovich.

Reading and discussion of Anton Chekhov's short stories in the context of the European art of the short story and painting of that era. The course is designed for nonspecialists as well as literature majors. All reading is in English translation.]

[RUSSL 377 Baltic Literature (also German Studies 377)

Spring. 4 credits. In English translation. Not offered 1999–2000. I. Ezergailis.

For course description, please see German Studies 377.]

[RUSSL 384 Dialogue in/as Text (also Comparative Literature 384)

Spring. 4 credits. Not offered 1999–2000. 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 *The 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. 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 Ithaca while teaching literature at Cornell—*Lolita* (1955) and *Pnin* (1957).

[RUSSL 389 Contemporary Literature in Central and East Europe (also Comparative Literature 389)

Fall. 4 credits. Not offered 1999–2000. G. Gibian.

The course this year will study developments in literature (and to some extent in other areas of culture) in Hungary, Poland, Slovakia, and the Czech Republic 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 1999–2000. 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 Stylistics

Spring. 4 credits. Also open to graduate students. Prerequisite: three years of Russian. Not offered 1999–2000. S. Senderovich.

A few steps beyond normative grammar. Introduction to the subtleties of idiomatic Russian on the levels of morphology, syntax, vocabulary, and phraseology. Introduction to the genres of live colloquial and written language. Development of writing skills through short assignments and their analyses. First notions of literary stylistics and their practical application.]

RUSSL 415 Post-Symbolist Russian Poetry

Spring. 4 credits. Prerequisite: permission of instructor. N. Pollak.

We will examine works by three poets in the first quarter of this century: Innokentij Annenskij, the Symbolist whom the Acmeists considered their mentor; Osip Mandelstam, a founding Acmeist; and Boris Pasternak,

associated, at least for a time, with the Futurists. Through close readings of their verse, and also critical prose and manifestoes, we will attempt to determine some of the general features that link poets of such diverse orientations in the years following the crisis of Symbolism. We will also outline the features that distinguish them as representative of their respective movements.

[RUSSL 425 Vladimir Nabokov vs. Jean-Paul Sartre (also COMP L 445)
Spring. 4 credits. Not offered 1999–2000. S. Senderovich.
Jean-Paul Sartre reviewed Nabokov's *Despair* in 1938. Ten years later Nabokov returned the favor in his review of the English translation of Sartre's *La Nausée*. The apparent tension between the two celebrated men of European letters of the twentieth century allows us to look at the works of both through the eyes of the other, to go into the problems of Existentialist philosophy, into Nabokov's brand of it, and into responses to Sartre in Nabokov's works. The latter gives an excellent yet unexplored approach to the poetic world of Vladimir Nabokov. Nabokov's major response to Sartre occurred in the novel *Pnin* written in Ithaca and largely about Cornell.]

[RUSSL 427 Russian Formalism (also Comparative Literature 427)
Fall. 4 credits. Not offered 1999–2000. N. Pollak.
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 430 Practice in Translation
Spring. 4 credits. Prerequisites: proficiency in Russian or approval of instructors. Not offered 1999–2000. W. Browne and S. Senderovich.
A practical workshop in translation: documents, scholarly papers, literary works (prose and poetry). Translation mostly from Russian to English, partly from English to Russian. Attention to problems and development of skills.]

[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 1999–2000. 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 Russia 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 #
Fall. 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 441 Bakhtin as Reader (also RUSSL 641, COMPL 641)
Spring. 4 credits. Open to undergraduates with permission of instructor. Not offered 1999–2000. P. Carden.
The course will investigate the literary and cultural theories of Mikhail Bakhtin, focusing in particular on his interpretations of literary texts. We will read a representative selection of works by Bakhtin covering the chronological development of his ideas. Each member of the class will select one or more of the literary texts commented on by Bakhtin as an occasion for independent work. A reading knowledge of Russian is not required, although Russian readers may have alternate assignments in the language.]

[RUSSL 445 Batiushkov and Pasternak
Fall. 4 credits. Prerequisites: at least one 300-level course in Russian literature in the original, or permission of the instructor. Not offered 1999–2000. N. Pollak.
A study of the works of Konstantin Batiushkov (b. 1787) and Boris Pasternak (b. 1890), two poets who have been described as innovators in Russian poetic language. We will examine the poetry (and prose) of these poets and some of their contemporaries, with a view to exploring their parallel roles in two ages of poetry a century apart.]

[RUSSL 460 Short Works of Tolstoy and Dostoevsky
Spring. 4 credits. Not offered 1999–2000. G. Gibian.
Readings in Russian and in translation. Open to graduate students.]

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
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 a second-year course in Russian, or who has equivalent reading skills in Russian. May be used in satisfaction of the 12 hours of reading required for the Russian major. Not offered 1999–2000. P. Carden.
The first decades of the twentieth century was perhaps the richest period ever in Russian literature and the arts. It begins with the brilliant experimentation in poetry and prose of Andrei Bely, Blok, Remizov and others. It continues with the breakthroughs in painting and sculpture of Malevich, Goncharova, Tatlin, etc. In the second decade the rambunctious Futurists take over in literature and establish a compact with theater and the visual arts in which all the art forms break down the barriers to produce a new kind of art. During this period Russian artists in every medium were on the cutting edge of the European art scene. After the Revolution Russian artists and writers of the avant-garde continued their dominance for a time, now including the developing medium of film.
In this course we will read representative Russian texts by the major authors of the period and we will also investigate developments in the theater, the visual arts and film.]

Graduate Seminars

[RUSSL 603 Graduate Seminar: Neglected Masterpieces of Short Russian Prose
Spring. 4 credits. Not offered 1999–2000. G. Gibian.
Nineteenth- and twentieth-century works chosen according to the needs of the students enrolled. Stress on skills useful in teaching Russian literature.]

RUSSL 611 Supervised Reading and Research
Fall or spring. 2–4 credits. Prerequisite: permission of the department. Staff.

[RUSSL 617–618 Russian Stylistics I and II
Not offered 1999–2000.]

[RUSSL 619 Seventeenth-Century Russian Literature
Fall. 4 credits. Not offered 1999–2000. G. Shapiro.
Seventeenth-century Russian literature is often studied together with Medieval literature. Is such an arrangement justified, or does seventeenth-century literature have its own problematic that makes it worth studying separately? In scholarship the seventeenth century is referred to as the Age of Baroque. Did Muscovite Russia experience its own Baroque, and, if so, what are its unique features? These and other important issues will be addressed in the seminar. In the course of the seminar a variety of concepts, genres, and themes characteristic for the epoch will be discussed. We will read the works of such authors as Simeon Polotsky, Silvester Medvedev, Karion Istomin, and the archpriest Avvakum.]

[RUSSL 620 Twentieth-Century Russian Poetry
Spring. 4 credits. Open to advanced undergraduates with permission of instructor. Not offered 1999–2000. N. Pollak.
An in-depth study of the writings of selected twentieth-century poets. Authors may include Blok, Mandelstam, Pasternak, Tsvetayeva, and Khlebnikov.]

[RUSSL 621 Old Russian Literature
Spring. 4 credits. Not offered 1999–2000. S. Senderovich.
A survey.]

[RUSSL 622 Eighteenth-Century Literature
Spring. 4 credits. Not offered 1999–2000. S. Senderovich.
Introduction to the first century of modern Russian literature. Cultural identity of the age: Baroque, Neo-Classicism, Enlightenment, Sentimentalism. Reading of representative texts of the major writers of the century: Trediakovsky, Lomonosov, Sumarokov, Novikov, Karamzin, etc. Main connections with nineteenth-century literature: roots, evolution, intertextuality.]

[RUSSL 624 Russian Romanticism
Spring. 4 credits. Taught in Russian. Not offered 1999–2000. S. Senderovich.
A survey of concepts, themes, genres, and main individual contributions in Russian literature of the Age of Romanticism. The Age of Romanticism encompasses the first four decades of the nineteenth century. Zhukovsky, Batiushkov, Pushkin, Baratynsky, Gogol, and Lermontov are the major representatives of this style and the most important period of Russian literature. The emphasis is on poetry, its historical and theoretical problems. It was, above all, the golden age of Russian poetry, which prepared and deeply influenced the following age of great Russian prose. Turgenev, Tolstoy, Dostoevsky, and Chekhov are full of allusions to the texts of the golden age and cannot be properly understood without it.]

[RUSSL 625 Russian Realism
Fall. 4 credits. Not offered 1999–2000. P. Carden.
A study of the development of psychological realism in Russian prose of the nineteenth century, with some attention to the poetic tradition. In addition to reading representative works, we will pay attention to the historical background of the period. We will approach the works through the critical writings of several important theorists, in particular those of Lydia Ginzburg.]

[RUSSL 626 The Tradition of Russian Poetry
Spring. 4 credits. Not offered 1999–2000. N. Pollak.
This course will examine a selection of poems that have been particularly important for the tradition of Russian literature in the nineteenth and twentieth centuries. Our focus will include critical and literary responses to these poems as well as close readings.]

[RUSSL 627 Russian Formalism (also Comparative Literature 627)
Spring. 4 credits. Not offered 1999–2000. N. Pollak.
See RussL 427 for course description.]

[RUSSL 630 Gogol
Fall. 4 credits. Taught in Russian. Not offered 1999–2000. 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 641 Bakhtin as Reader (also COMP L 641)
Spring. 4 credits. Not offered 1999–2000. P. Carden.]

[RUSSL 650 Russian Intellectual History
Spring. 4 credits. Not offered 1999–2000. S. Senderovich.
Nineteenth- and twentieth-century selected topics. Taught mostly in English.]

[RUSSL 669 Dostoevsky
Fall. Also open to advanced undergraduates. Not offered 1999–2000. G. Gibian and guest lecturers.
Study of representative works from various periods of Dostoevsky's life, including some articles, speeches, and parts of *The Diary of a Writer*, against the context of nineteenth-century Western European and Russian literature. A variety of critical and scholarly approaches (from Russian Formalists to recent Western scholars) will be sampled and evaluated.]

[RUSSL 671 Seminar in Nineteenth-Century Russian Literature
Fall. 4 credits. Not offered 1999–2000. P. Carden.
Topic: *War and Peace*.]

[RUSSL 672 Seminar in Twentieth-Century Russian Literature
Fall. 4 credits. Open to advanced undergraduates. Not offered 1999–2000.]

[RUSSL 673 The Russian Nabokov
Fall. 4 credits. Also open to advanced undergraduates. Not offered 1999–2000. 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 1999–2000.
This semester will focus on the achievements of Russian prose between the two World Wars. Among the authors whose works will be closely read and discussed, there are Babel, Olesha, Zoshchenko, Ilf and Petrov, Bulgakov, and Nabokov.]

[RUSSL 676 Russian Literature, 1945–Present
Spring. 4 credits. Not offered 1999–2000.]

[RUSSL 698 Russian Symbolism
Fall. 4 credits. Not offered 1999–2000. 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. Not offered 1999–2000. P. Carden.
We will be investigating the rich and innovative period of the avant-garde in Russia from 1910 to 1925. In addition to examining outstanding works in a variety of forms, we will look at the movements, social context, and ties to the European avant-garde. Among the writers whose works we will examine are Blok, Bely, Mayakovsky, Khlebnikov, Pilnyak and Babel. We will examine theater through the Futurist performance piece, "Victory Over the Sun," through Meyerhold's productions of Mayakovsky's plays and other experimental pieces, and through mass spectacles. We will discuss the film theories of Eisenstein and Dziga Vertov and see several of their films. In the visual arts we will be examining the experiments of Larionov and Goncharova, Malevich, Kandinsky, and Tatlin. We will also look at the photomontage of Rodchenko.]

Related Languages

Czech

[CZECH 300 Directed Studies
Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. Not offered 1999–2000. Staff.
Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.]

Hungarian

HUNGR 300 Directed Studies
Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. Staff.
Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

[HUNGR 427 Structure of Hungarian (also Linguistics 427)
Fall. 4 credits. Prerequisite: Ling 101 or equivalent. Offered alternate years. Not offered 1999–2000. W. Browne.
For description, see Linguistics.]

Polish

[POLSH 131–132 Elementary Polish
131, fall; 132, spring. 3 credits each term. Prerequisite: for Polish 132, Polish 131 or equivalent. This language series (131–132) is not sufficient to satisfy the language requirement. Offered alternate years. Not offered 1999–2000. Staff.
Covers all language skills: speaking, listening comprehension, reading, and writing.]

POLSH 133–134 Continuing Polish
133, fall; 134, spring. 3 credits each term. Prerequisites: for Polish 133, Polish 132 or equivalent; for Polish 134, Polish 133 or equivalent. Satisfactory completion of Polish 134 fulfills the qualification portion of the language requirement. Offered alternate years. W. Browne.
An intermediate conversation and reading course.

POLSH 300 Directed Studies
Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. W. Browne.
Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

Serbo-Croatian

SEBCR 131–132 Elementary Serbo-Croatian
131, fall; 132, spring. 3 credits each term. Prerequisite for Serbo-Croatian 132: Serbo-Croatian 131 or equivalent. This language series (131–132) is not sufficient to satisfy the language requirement. Offered alternate years. W. Browne.
Covers all language skills: speaking, listening comprehension, reading, and writing including Bosnian.

[SEBCR 133–134 Continuing Serbo-Croatian
133, fall; 134, spring. 3 credits each term. Prerequisites: for Serbo-Croatian 133, Serbo-Croatian 132 or equivalent; for Serbo-Croatian 134, Serbo-Croatian 133 or equivalent. Satisfactory completion of Serbo-Croatian 134 fulfills the qualification portion of the language requirement. Offered alternate years. Not offered 1999–2000. W. Browne.
An intermediate conversation and reading course.]

SEBCR 300 Directed Studies
Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. Staff.
Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

Ukrainian

UKRAN 300 Directed Studies
Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. Staff.
Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

RUSSIAN AND EAST EUROPEAN STUDIES MAJOR

See "Special Programs and Interdisciplinary Studies."

SANSKRIT

See Asian Studies.

SERBO-CROATIAN

See Department of Russian.

SCIENCE AND TECHNOLOGY STUDIES

T. J. Pinch, chair; R. N. Boyd, P. R. Dear, M. A. Dennis, S. H. Hilgartner, R. Kline, B. V. Lewenstein, W. R. Lynn; emeritus, A. G. Power, J. V. Reppy, M. W. Rossiter, L. P. Williams, emeritus. Adjunct faculty: J. J. Brumberg, R. W. Miller, H. Shue, Z. Warhaft

The importance of science & technology in the modern world is difficult to overstate. Whether one looks at the role of computers in society, the history of evolutionary theory, the challenges of environmental controversies, the ethical dilemmas of biomedicine, or the military applications of research, science and technology profoundly affect our lives—often in ways that we scarcely understand or only dimly perceive. The field of science and technology studies uses tools from the history, philosophy, sociology, and politics of science and technology to examine science and technology in their social and cultural context and to explore their political and policy implications. Systematic, integrated study of the origins and impacts of science and technology provides an understanding of the interactions among science, technology, and society and yields invaluable insights into the nature of the modern world.

The Science & Technology Studies Major

The major in Science & Technology Studies offers students wishing to pursue careers in law, public policy, health care, or management an opportunity to develop a full appreciation of the place of science and technology in society. The curriculum aims to further students' understanding of the historical, social, political, and ethical aspects of science and technology and to enable students to participate effectively in policy debates and decision making. In today's world, issues at the intersection of the technical and social arise continually in professional practice, management, and research. Thus, the integrated approach of the S&TS major provides a strong foundation for careers in the professions, in public policy, and in management, as well as in research and teaching.

Themes of the Major

Students in the S&TS major develop a program individually tailored to their particular interests. To give their coursework a coherent focus, students select a theme that draws together a group of related courses. Available themes include:

1. *Science, Technology & Public Policy.* Many of the most important policy issues of our time involve science and technology. This theme offers students an opportunity to gain a deep appreciation of the problems this situation raises in democratic societies. Through courses that survey the place of science in American politics and through courses that focus on such substantive issues as national technology policy or the politics of genetic engineering, this theme explores the tensions between expertise and democracy, the uses of scientific knowledge in making and legitimating policy, social movements that question technology and science, and contemporary debates over economics, innovation, and technology policy.
2. *Technology, Culture, and Society.* Students interested in this theme may examine the connections among technology and society by studying the manifold ways in which social groups (scientists, engineers, inventors, corporations, government agencies, and consumers) interact to construct technological artifacts and systems, and how the use of these artifacts and systems is related to social and cultural change. Areas of particular interest are: computers and society, the military and technological change, gender and technology, biotechnology and society, and telecommunication policy.
3. *Environment, Science, & Society.* By focusing on the relationship between scientific knowledge and political power, this theme offers unique insights into the making and implementation of environmental policy. Courses are available on such topics as American environmental politics, international environmental policy, science and the law, the history of agricultural science, and environmental communication. Students explore the causes and consequences of environmental controversies, the nature of risk and uncertainty in environmental issues, the roles of experts and the public in environmental decisions, and the challenges of global environmental policy.
4. *History and Philosophy of Science and Technology.* This theme provides students with an appreciation of science and technology in historical perspective and with an understanding of the philosophical problems posed by scientific knowledge. Courses available range from broad surveys to intensive studies of focused subjects. Students in this theme address such topics as the emergence of modern science; gender and science; the goal of achieving valid knowledge and the philosophical and institutional problems that this entails; the issues for history and philosophy of science raised by the new sociology of scientific knowledge; the relationship between knowledge, technology, and ethics; and the impact of major institutions—such as religion, medicine, the military, and the modern consumer economy—on the development of the sciences.

Beyond the four themes described above, S&TS majors may also create their own themes, carefully tailored to their particular interests. Examples might include "Computers, Innovation, and Society" or "Science, Technology, and Globalization."

Admission to the Major

Students intending to major in Science & Technology Studies should submit an application during their sophomore year. Juniors are considered on a case-by-case basis. The application includes (1) a one-page statement explaining the student's intellectual interests and why the major is consistent with the student's academic interests and goals; (2) the theme the student wishes to pursue in the major; (3) a tentative plan of courses fulfilling S&TS requirements; and (4) an up-to-date transcript of work

completed at Cornell University (and elsewhere, if applicable).

Acceptance into the major requires completion of the following prerequisites: a) two introductory courses chosen from some combination of history, philosophy, sociology, or government; b) the science requirement of the College of Arts and Sciences; c) mathematics or computer science courses in fulfillment of the Arts College Group Two distribution requirement. Sophomores in the process of completing these prerequisites may be admitted to the major on a *provisional* basis. Further information and application materials are available at 275 Clark Hall (255–6047).

Requirements

S&TS majors must complete the following requirements:

1. Core courses: Science and Technology Studies majors will be required to take:
   (a) either S&TS 250 (Technology in Society) or S&TS 282 (Science in Western Civilization); and
   (b) S&TS 381 (Philosophy of Science: Knowledge and Objectivity) or S&TS 389 (Philosophy of Science: Evidence and Explanation) or S&TS 201 (What is Science? An Introduction to Social Studies of Science and Technology); and
   (c) S&TS 390 (Science in the American Polity: 1800–1960) or S&TS 391 (Science in the American Polity: 1960–now) or S&TS 442 (Sociology of Science).
2. Additional Science and Technology Studies courses: Science and Technology Studies majors will be required to complete at least 21 credit hours of additional courses in Science and Technology Studies, subject to the following restrictions:
   (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.
3. 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 student's major adviser and should be related to the theme selected by the student.

The Honors Program

The honors program is designed to provide independent research opportunities for academically talented S&TS majors. Students who enroll in the honors program are expected to do independent study and research, with faculty guidance, on issues in science and technology studies. Students who participate in the program should find the experience stimulating and rewarding whether or not they intend to pursue a research career. S&TS majors are considered for entry into the honors program at the end of the spring semester before their junior year. More information on the honors program is available from the S&TS undergraduate office at 275 Clark Hall (255–6047).

The Biology and Society Major

The Department of Science & Technology Studies also offers the Biology and Society major, which includes faculty from throughout the university. The Biology and Society major is ideally suited for students who wish to combine training in biology with exposure to perspectives from the social sciences and humanities on the social, political, and ethical aspects of modern biology. In addition to providing foundational training in basic biology, biology and society students obtain background in the social dimensions of modern biology and in the biological dimensions of contemporary social issues.

The biology and society major is offered to students enrolled in the College of Arts and Sciences and the College of Human Ecology. Undergraduates in the College of Agriculture and Life Sciences can develop an approved sequence of courses from the biology and society curriculum under general studies. The major is coordinated for students in all colleges through the Biology and Society office. Students can get information, specific course requirements, and application procedures for the major from the office in 275 Clark Hall, 255–6042.

A full description of the Biology and Society major can be found in the Courses of Study section entitled Special Programs and Interdisciplinary Studies.

The Concentration in Science and Technology Studies

T. J. Pinch, chair; R. N. Boyd, P. R. Dear, M. A. Dennis, S. H. Hilgartner, R. Kline, B. V. Lewenstein, W. R. Lynn; emeritus, R. W. Miller, A. G. Power, J. V. Reppy, M. W. Rossiter, L. P. Williams, emeritus. Adjunct faculty: J. J. Brumberg, H. Shue, Z. Warhaft

The concentration (or minor) in Science & Technology Studies (S&TS) is designed for students who wish to engage in a systematic, interdisciplinary exploration of the role of science and technology in modern societies. The concentration is intended for students with varied academic interests and career goals. Majors in the natural sciences and engineering have an opportunity to explore the social, political, and ethical implications of their selected fields of specialization, while students majoring in the humanities and social sciences have a chance to study the processes, products, and impacts of science and technology from multiple disciplinary perspectives.

The S&TS concentration permits students to develop an individualized program of study closely related to their major field. For example, students might use the S&TS concentration to further explore issues related to their major, focusing on such topics as computers and society; gender and technology; science and law; biotechnology; science and politics; and environmental policy. By choosing courses in S&TS which fit their particular goals, students can tailor the concentration to provide breadth and depth in areas of special interest.

S&TS courses are organized into three areas: history, philosophy, and social studies of science and technology. To satisfy the requirements for the S&TS concentration, students must complete with letter grades a minimum of four courses selected from the course offerings listed for the major. At least one course should be chosen from the list of core courses. The remaining three courses should be chosen in consultation with an S&TS faculty adviser and must be drawn from at least two of the three areas. Interested students may obtain further information about courses by contacting the S&TS undergraduate office, 275 Clark Hall (255–6042).

Course Offerings

Introductory Course
History
Philosophy
Social Studies of Science
Independent Study

S&TS 101 Science and Technology in the Public Arena
Fall. 3 credits. J. Reppy.
An introduction to public policy issues arising from developments in science and technology. We will study such topics as the politics of expertise, the effect of technical change on workers, and the management of risk. The emphasis will be on understanding the role played by technical expertise in political controversies. Students will work in small groups to prepare position papers on selected topics such as biological cloning, encryption on the internet, gendered design in automobiles, outbreaks of rare diseases, and nuclear waste disposal.

History

S&TS 233 Agriculture, History, and Society: From Squanto to Biotechnology
Fall. 3 credits. M. W. Rossiter.
This course will survey the major themes in the development of agriculture and agribusiness in the United States in the nineteenth and twentieth centuries. These include particular individuals (such as Liberty Hyde Bailey, Luther Burbank, G. W. Carver, Henry A. Wallace, and Norman Borlaug), the rise of government support and institutions (including U.S.D.A. and Cornell), noteworthy events (the Dust Bowl, World War II, and the environmental movement), and the achievements of the recent Green and "Gene" Revolutions.

S&TS 250 Technology in Society (also Electrical Engineering 250 and History 250)
Fall. 3 credits.
For description, see ENGRG 250.

S&TS 281 Science in Western Civilization (also History 281) #
Fall. 4 credits.
For description, see HIST 281.

[S&TS 282 Science in Western Civilization #
Spring. 4 credits. Not offered 1999–2000.
For description, see HIST 282.]

S&TS 283 The Sciences in the Twentieth-Century
Spring. 4 credits. M. Dennis.
Science emerged as a powerful source of social, economic, and political power during the twentieth century. Through an examination of the development of the sciences—physical and biomedical—during the twentieth century students will learn about the reciprocal relations between science and society. Topics covered may include: the rise and development of quantum mechanics; the emergence of Big Science; the history of the sciences in totalitarian nations, especially the former Soviet Union and Nazi Germany and Communist China; the evolutionary synthesis; the rise and fall of molecular biology; the multiple forms of eugenics; the transformation of the social sciences; the role of new technologies in scientific change, especially computer and communication technology; the growth of science as a profession; and the development of science in non-western cultures.

S&TS 287 Evolution (also History 287)
Fall. 4 credits.
For description, see BIO G 207.

S&TS 292 Inventing an Information Society (also Electrical Engineering 298 and Engineering 298 and History 292)
Spring. 3 credits.
For description, see ENGRG 298.

S&TS 355 Computers: From Babbage to Gates
Fall. 4 credits. M. Dennis.
Computers have not always been the ubiquitous beige boxes gracing our desktops: in Victorian London, Charles Babbage attempted to build his analytical engine using brass gears and steel rods; and during World War II the Allied governments used sophisticated electro-mechanical and electronic "brains" to break Axis codes. Machines that once occupied entire rooms now travel in knapsacks. How did this technology, once considered esoteric and useful to only technical specialists, colonize industry, academia, the military, the federal government, and the home? Using primary historical materials, including novels, films, archival documents and other texts we will follow computers from Babbage's Victorian dream of an analytical engine to the visions of contemporary moguls like Bill Gates whose goal is "information at your fingertips." We will explore not only how computer technology affects society, but how culture and politics enable and sustain the development of the machine. This is a course in the history and sociology of computers; a background in computer science is not required. (No technical knowledge of computer use is presumed or required.)

[S&TS 433 International History of Science
Spring. 4 credits. Not offered 1999–2000. M. W. Rossiter.
A survey of the major scientific events and institutions in several foreign nations, including developing countries. The course covers the period 1660 to the present and gives some attention to who in each country becomes a scientist, who rises to the top, and who emigrates. Weekly readings and a research paper.]

S&TS 444 Historical Issues of Gender and Science (also Women's Studies 444)
Fall. 4 credits. Open to sophomores. M. W. Rossiter.
One-semester survey of women's role in science and engineering from antiquity to the 1980s, with special emphasis on the United States in the twentieth century. Readings will include biographies and autobiographies of prominent women scientists, educational writings and other primary sources, and recent historical and sociological studies. By the end of the semester, we shall have attained a broad view of the problems that have faced women entering science and those that still remain.

S&TS 447 Seminar in the History of Biology (also Biology and Society 447, History 415, and Biological Sciences 467)
Summer. 4 credits. Limited to 18 students. S-U grades optional.
For description see Biology Sci (BIO G) 467.

S&TS 525 Seminar in the History of Technology (also History 525)
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 616 Enlightened Science (also HIST 616)
Fall. 4 credits. Limited to graduate students. P. Dear and M. Dennis.
For description, see HIST 616.

[S&TS 644 Topics in the History of Women in Science (also Women's Studies 644)
Fall. 4 credits. Not offered 1999–2000. 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 680 Seminar in Historiographical Approaches to Sciences (also History 680)
Fall. 4 credits. Not offered 1999–2000.
For description, see History 680.]

[S&TS 682 Topics in the Scientific Revolution (also History 682)
Fall. 4 credits. Not offered 1999–2000.
For description, see HIST 682.]

[S&TS 687 Seminar in the History of the Agricultural Sciences
Fall. 4 credits. Open to advanced students interested in the history of the agricultural sciences, broadly defined. Not offered 1999–2000. M. W. Rossiter.
Weekly readings and a research paper.]

[S&TS 777 Science, Technology and the Cold War
Fall. 4 credits. Permission of instructor required for undergraduate students. Not offered 1999–2000. M. Dennis.
This graduate seminar will examine the historical transformation wrought in the organization and practice of the physical, biomedical, and environmental sciences since 1945. How did military and federal patronage affect the development of the sciences, the organization of the postwar university, and the armed services? Students will read contemporary historical materials as well as primary texts to understand the development of particular institutions, technologies, and individuals. In addition to participation in the weekly discussion, each student will prepare a research paper for presentation to the seminar.]

Philosophy

S&TS 205 Ethical Issues in Health a nd Medicine (also Biology and Society 205)
Fall. 4 credits.
For description, see B&SOC 205.

S&TS 206 Ethics and the Environment (also Biology and Society 206)
Spring. 4 credits.
For description, see B&SOC 206.

S&TS 286 Science and Human Nature (also Philosophy 286)
Spring. 4 credits.
For description, see PHIL 286.

[S&TS 381 Philosophy of Science: Knowledge and Objectivity (also Philosophy 381)
Fall. 4 credits. Not offered fall 1999.
For description, see PHIL 381.]

S&TS 681 Philosophy of Science (also Philosophy 681)
Spring. 4 credits.
For description, see PHIL 681.

Social Studies of Science

S&TS 201 What is Science? An Introduction to the Social Studies of Science and Technology
Spring. 3 credits. T. Pinch.
This course is not a science or engineering course. It is not an introduction to science and technology. It is a course which allows both science and non-science majors to reflect a little on the nature of science and technology as activities. How come science is so successful? Has it always been that way? How different really is science from other activities? How does a new invention come about?

In order to understand better what science is we will also look at what it is not. We will look at episodes of mainstream science, along with science from the X-Files. One week students may study what went on in the confirmation of Einstein's theory of relativity;

another week we may hear about crop circles and parapsychology.

Throughout, we will be looking at the infrastructure of science and technology—the bits that scientists, engineers, and their textbooks take for granted. No particular science or arts requirements are needed for this course. The materials are chosen so as to be understandable by all. We will use a variety of media, including still images, video and computer simulations.

S&TS 285 Communication in the Life Sciences (also COMM 285)
Spring. 3 credits. B. Lewenstein.
For description, see COMM 285.

S&TS 311 Sociology of Medicine
Spring. 4 credits. S. Hilgartner.
This course provides an introduction to the ways in which medical practice, biomedical technology, and the medical profession are embedded in society and shaped by social phenomena. Accountability to patients and the public, and struggles over the control of medical practice in a world where medicine is connnected to gender, class, race, and personal autonomy are important overarching themes. We will examine the structure of the medical profession; medical training and professional socialization; the social organization of the hospital; and doctor-patient interactions. The course will also explore how biomedical knowledge and technology get produced, assessed, and introduced into clinical practice. Topics may include the intensive care unit, the training of surgeons, the regulation of pharmaceuticals, AIDS and breast cancer activism, genetic testing, and priority setting in biomedical science.

[S&TS 324 Environment and Society (also Rural Sociology 324 and Sociology 324)
Fall. 3 credits. Not offered 1999–2000.
For description, see R SOC 324.]

S&TS 350 Atomic Consequences: The Incorporation of Nuclear Weapons in Postwar America (also Government 305, AM ST 350)
Spring. 4 credits. M. Dennis.
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. In addition to class meetings, there is also a required screening session on W 7–10 p.m. in Uris 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.

S&TS 352 Science Writing for the Mass Media (also Communication 352)
Fall. 3 credits.
For description, see COMM 352.

S&TS 360 Ethical Issues in Engineering (also Engineering 360)
Spring. 3 credits.
For description, see ENGR 360.

[S&TS 390 Science In the American Polity, 1800–1960 (also Government 308, AM ST 388)
Fall. 4 credits. Not offered 1999–2000. 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–Now (also Government 309, AM ST 389)
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 (also Mechanical and Aerospace Engineering)
Spring. 3 credits. Not offered 1999–2000.
For description, see M&AE 400.]

S&TS 401 Biology and Society: The Social Construction of Life (also Biology and Society 301)
Fall. 4 credits.
For description, see B&SOC 301.

[S&TS 406 Biotechnology and Law (also Biology and Society 406)
Fall. 4 credits. Not offered 1999–2000. Staff.]

[S&TS 407 Law, Science and Public Values (also Government 407 and Biology and Society 407)
Fall. 4 credits. Not offered 1999–2000.]

[S&TS 409 From the Phonograph to Techno (also Society for the Humanities 409)
Fall. 4 credits. Limited to 15. Permission of the instructor. Not offered 1999–2000. T. Pinch.
In this seminar, we will treat music and sound and the ways they are produced and consumed as socio-cultural phenomena. We will be concerned to investigate specifically the way that music and sounds are related to technology and how such technologies and sounds have been shaped by and have shaped the wider society and culture of which they are a part. We will look at the history of sound technologies like the phonograph, the electronic music synthesizer, samplers, and the Sony walkman. Our perspective will be drawn from social and cultural studies of science and technology. Students will be encouraged to carry out a small original research project on their own favorite sound technology.]

S&TS 411 Knowledge, Technology, and Property
Spring. 4 credits. Prerequisites: at least one course in science and technology studies. S. Hilgartner.
Should the human genome be treated as private property or a public resource? How should copyright be managed in the digital environment of the Internet? Is music "sampling" high-tech theft or artistic expression? Does bioprospecting represent an enlightened strategy for preserving biodiversity or a post-colonial means for transferring resources from the developing world to the North? Debate about the nature and scope of intellectual property is an increasingly salient feature of contemporary politics. This course examines the ownership of knowledge and technology, exploring fundamental tensions that intellectual property systems express and incompletely reconcile. Perspectives from science and technology studies, sociology, law, and economics will inform the course. Case studies will explore the construction of property in contexts ranging from the early history of copyright to the ownership of life forms, airwaves, algorithms, artistic content, electronic databases, and the personal identities of celebrities.

[S&TS 427 Politics of Environmental Protection in America (also Government 427)
Fall. 4 credits. Not offered 1999–2000. Staff.
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 442 The Sociology of Science (also City and Regional Planning 442 and Biology and Society 342)
Fall. 4 credits. T. Pinch.
A view of science less as an autonomous activity than as a social institution. We will discuss such issues as controversies in science, analysis of scientific text, gender and the social shaping of scientific knowledge.

[S&TS 466 Public Communication of Science and Technology
Fall. 4 credits. Limited to 15. Prerequisite: COMM 352 or 360, ENGRG 350 or permission of instructor. Not offered 1999–2000. B. Lewenstein.
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. Not offered 1999–2000. 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 Winter and Bijker and Pinch.]

[S&TS 469 Food, Agriculture, and Society (also Biology and Society 469, and Biology General 469)
Spring. 3 credits. Not offered 1999–2000.
For description, see BIO G 469.]

[S&TS 483 The Military and New Technology
Fall. 4 credits. Not offered 1999–2000.
For description, see GOVT 483.]

[S&TS 490 The Integrity of Scientific Practice
Fall. 4 credits. Not offered 1999–2000. 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. The 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 493 Economics Meets Science Studies
Spring. 4 credits. Not offered 1999–2000. J. Reppy.
This course will cover a variety of possible interactions between the disciplines of economics and science and technology studies. Economists (at least some economists) are interested in science and technology as important components in economic growth, while scholars in science studies often appeal to economic motives and institutions to explain behavior in the production of scientific and technological knowledge. We will explore ways in which economics can provide new questions and theoretical approaches for science and technology studies. From another perspective, economics, as the most "scientific" of the social sciences, is itself a subject for study. Internal critiques by economists will be compared to external analyses in the science studies literature. Readings will include works on the epistemology and use of rhetoric in economics and on the "new economics of science", and examples of the use of economic analysis in the science studies literature.]

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 631 Qualitative Research Methods for Studying Science
Fall. 4 credits. T. J. Pinch.
Much has been learned about the nature of science by sociologists and anthropologists donning lab coats and studying scientists in action. In this course we will look at the methods used in this new wave of science studies. We will examine what can be learned by interviewing scientists, from videos and from detailed examinations of scientific texts. Students will gain hands-on experience by conducting a mini-project in which they investigate some aspect of scientific culture.

[S&TS 645 Genetics: Politics & Society in Comparative Perspective (also Government 634)
Spring. 4 credits. Limited to seniors and graduate students. Not offered 1999–2000. S. Hilgartner.
Contemporary genetics and biotechnology are highly controversial, creating high hopes for some and deep anxieties for others. This course will trace the conflicts and power struggles over genetic engineering, using it as a case to examine some crucial issues in the relationships among science, technology, and politics. In particular, the course will focus on three themes—the politics of property, the politics of identity, and the politics of risk—as they pertain to genetics. Topics may include the social shaping biological research; eugenics and genetics; genetics and medicine; the regulation of risks; the growth of commercial biotechnology; university-industry relationships; Green parties and social movements; North-South issues and biotechnology; the Human Genome Project; intellectual property and patenting genes; and the debate over human cloning.]

[S&TS 700 Special Topic 1: Science Studies and the Politics of Science
Fall. 4 credits. Prerequisites: S&TS 711 or permission of the instructor. Not offered 1999–2000.
Theoretical developments in science and technology studies have called attention to the contingent and socially embedded character of both knowledge claims and technological systems. Drawing on literature from several disciplines, this seminar explores the consequences of these findings for social and political studies of science. Issues and problems to be considered include trust and skepticism, political and legal agency, reflexive institutions, relativism and social action, science and norms, and the co-production of knowledge and social order.]

[S&TS 700 Special Topic 2: Technology Transfer Issues
Spring. 4 credits. Not offered 1999–2000. J. Reppy.
The goal of this course is to develop a coherent analytical framework for analyzing technology transfer, using insights from economics, sociology, history, and science and technology studies and to employ that framework to evaluate current policy issues. We will study the process of technology transfer in different contexts, ranging from intra-firm and intra-industry to technology transfer between civil and military sectors and between industrialized countries and LDCs. The readings will include a mix of theoretical writings and case studies.]

S&TS 711 Introduction to Science and Technology Studies (also HIST 711)
Fall. 4 credits. S. Hilgartner.
This introductory course will provide students with a foundation in the field of science and technology studies. Using classic works as well as contemporary exemplars, seminar participants will chart the terrain of this new field. Topics for discussion include, but are not limited to: historiography of science and technology and their relation to social studies of science and technology; laboratory studies; intellectual properties; science and the state; the role of instruments; fieldwork; politics and technical knowledge; philosophy of science; sociological studies of science and technology; and popularization.

Independent Study

S&TS 399 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. 3–4 credits.

SINHALA (SINHALESE)

See Department of Asian Studies.

SOCIOLOGY

V. Nee, P. Becker, R. L. Breiger, M. Brinton, S. Caldwell, M. Clarkberg, R. Grannis, D. Grusky, S. Han, D. Heckathorn, E. Lawler, M. Macy, P. Moen, R. Stern, D. Strang, J. M. Stycos, S. Szelenyi, P. Tolbert, H. A. Walker, E. Wethington

Emeritus: D. Hayes, R. McGinnis, B. C. Rosen, 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 pyschology 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 the study of social behavior and institutions. Graduates of the department take up careers in university, government, and business settings and in law, management, architecture, and other professions seeking men and women who demonstrate a disciplined understanding of society and social issues.

Sociology Courses for Nonmajors

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 the introductory courses (101, 103, 105, 115, 150) 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, 310, 354, 370, 380, for which there are no prerequisites other than junior or senior status.

Related Courses in Other Departments

Students interested in sociology should consult the course lists of the other social science departments in the College of Arts and Sciences (including Anthropology, Economics, Government, and Psychology) and of these other departments: Organizational Behavior (College of Industrial and Labor Relations), Human Development and Family Studies (College of Human Ecology), and Rural Sociology (College of Agriculture and Life Sciences).

The Major

Requirements for general sociology: (1) 101 and any other 100-level 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 6 may be taken in related departments on the approval of the student's major adviser. A list of pre-approved courses is maintained by the director of undergraduate studies, some of which are listed under "Related Courses."

Requirements for honors: Potential honor students are encouraged to begin taking the methods and statistics courses during their sophomore year and to take at least 2 credits of Sociology 491, Independent Study, during their junior year. Honors students take Sociology 495–496 during their senior year. Graduation with honors requires a cumulative average of at least B+ in all sociology courses and the successful completion of an oral defense of the honors thesis. Interested students should consult the director of undergraduate studies no later than the second semester of their junior year.

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.

Business and Organizational Studies Concentration

Sociology majors who wish to prepare for postgraduate study in professional schools (business, management, or law) or a career in business or nonprofit organizations may elect to acquire a concentration in Economic and Organization Sociology. This program provides Cornell students with training in economic sociology, organizational studies and comparative societal analysis useful in a world increasingly shaped by economic and social forces of a truly global dimension. The required ***core*** courses in the concentration are: SOC 105, SOC 215, and a research-oriented honors seminar to be fulfilled as an independent study course (SOC 491) with faculty members affiliated with the concentration. Affiliated faculty include: P. Becker, M. C. Brinton, M. Clarkberg, S.-K. Hap, M. M. Macy, V. Nee, P. Tolbert, R. Stern, and D. Strang. In addition to the required courses, students must take four elective courses from the following list: SOC 217, SOC 220, SOC 311, SOC 314/515, SOC 315, SOC 322, SOC 326/526, SOC 370/570, SOC 373, Soc 421, and SOC 427. Students completing the concentration receive a letter of recommendation from the Chair based on the cumulative academic record in the concentration. Please contact Crystal Chapman, Undergraduate Program Coordinator, or Elaine Wethington, DUS, for additional information on the Business and Organizational Studies concentration.

Introductory Courses

SOC 101 Introduction to Sociology (also RS 101)
Fall, spring, or summer. 3 credits. Fall, M. Macy; spring, S. Szelenyi.
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 Self and Society (also R Soc 103)
Fall. 3 credits. W. Burkard.
An introduction to microsociology, focusing on social processes within small groups, including the family. Emphasis is on leadership, conformity, social influence, cooperation and competition, distributive justice, and micro analyses of interaction.

SOC 105 Introduction to Economic Sociology (also RS 105)
Fall. 3 credits. C. Leuenberger.
Modern social thought arose out of attempts to explain the relationship between economic development and the social transformations that gave rise to the contemporary world. Classical theorists from Karl Marx and Max Weber to Karl Polanyi focused their writings on emergent capitalist economies and societies. Contemporary social theorists likewise have sought to understand the interaction between capitalism and the social forces reacting against and emerging from modern economic development. From exchange and rational choice theories to network analysis and institutional theory, a central theme in contemporary social thought has been the relationship between the economy and society, economic action and social structure, rationality and fundamental social processes. This course provides an introduction to social thought and research seeking to understand and explain the relationship between economy and society in the modern era.

SOC 115 Utopia in Theory and Practice
Spring. 3 credits. D. Strang.
People have always sought to imagine and realize a better sort of society, with both inspiring and disastrous results. In this course we discuss the literary utopias of More, Morris, and Bellamy, and also the dystopias of Huxley, Orwel, and Zamiatin. We also examine real social experiments, including nineteenth century intentional communities, 20th century socialisms and religious cults, and modern ecological, political, and millennial movements. Throughout, the emphasis is on two sociological questions. What kinds of social relationships appear as ideal? How can we tell societies that might work from those that cannot?

SOC 151 Families and the Life Course (also HDFS 151)
Spring. 3 credits. T. Mitrano.
For description, see HDFS 151.

General Education Courses

SOC 200 Social Problems (also RSOC 200)
T. Hirschl.
For course description, see RSOC 200.

[SOC 201 Religion and Family in the U.S. (also RSOC 202 and RELST 203)
3 credits. Not offered 1999–2000.
P. Becker.
This course will examine how two fundamental social institutions—religion and the family—are interlinked in American society. As recently as the 1950s, religious institutions were organized around the needs of one dominant family form, the male-breadwinner family with a stay-at-home mother. But since the 1950s, that family form is no longer statistically dominant or culturally normative. How have religious institutions adapted to new family forms? How do religious beliefs influence behavior within families, for example, the raising of children? How do religious groups foster ideals of family life or influence our beliefs about what are "good" families? How do people's family experiences and family values influence their participation

in organized religion? What models of family life are religious groups organized around? We will begin to answer these questions by drawing on readings that explore the religion-family link in a variety of religious, ethnic, and social class contexts within the contemporary United States.]

SOC 202 Population Dynamics (also RSOC 201)
Spring. 3 credits. L. Williams.
For course description, see RSOC 201.

SOC 203 Work and Family (also Women's Studies 203)
Spring. 3 credits. W. Burkard.
Home and family life often is portrayed in the popular media as a haven away from the harsh realities of public life, suggesting that work and family constitute separate and distinct spheres. By contrast many sociologists contend that there is a link between work and family, and that this link has different consequences for men and women. It will highlight the responses of individuals, employers and governments, both in the U.S. and internationally, to the dilemmas posed by the interface between work and family.

[SOC 204 Race and Ethnic Relations
4 credits. Prerequisite: SOC 101, SOC 103, or R SOC 101. Not offered 1999–2000.
Staff.
This course focuses on race and ethnic relations in contemporary perspective. It examines the social and behavioral implications of attributions of race and ethnicity in small group interaction, the world of work, and the larger society. Topics: inequalities in income and employment, affirmative action, ethnic political mobilization, patterns of marriage and family formation.]

SOC 206 International Development (also RSOC 205)
Spring. 3 credits. P. McMichael.
For course description, see RSOC 205.

SOC 208 Social Inequality
Spring. 3 credits. D. Grusky.
This course reviews contemporary approaches to understanding the distribution of valued goods and the social processes by which such inequality comes to be seen as legitimate, natural, or desirable. We address questions of the following kind: What are the major forms of stratification in human history? Is inequality and poverty an inevitable feature of human life? How many social classes are there in advanced industrialism? Is there a "ruling class?" Are lifestyles, attitudes, and personalities shaped fundamentally by class membership? Can individuals born into poverty readily escape their class origins and move upward in the class structure? Is there much countervailing downward mobility? Are social contacts and "luck" important forces in matching individuals to jobs and class positions? What types of social processes serve to maintain and alter racial, ethnic, and gender discrimination in labor markets? Is there an "underclass?" Will stratification systems take on new and distinctive forms in the future? These and other questions are addressed in light of classical and contemporary theory and research.

SOC 210 Social Problems
Spring. 3 credits. D. Heckathorn.
Course description is to be announced.

SOC 215 Organizations: An Introduction (also R SOC 215)
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 a Boston neighborhood, a minority community, industrial corporations, modern universities, Silicon Valley and Route 128, and more. Hence, a sampler. These brief glimpses serve as exercises in looking behind and beyond diverse rhetoric for common patterns in organizational phenomena. The focus of the course is upon research scholarship, not the training of managers. Nonetheless, the analytical skills you will acquire are applicable to work in firms, government agencies, and nonprofit organizations.

SOC 217 Embedded Markets
Spring. 3 credits. S. Han.
This is a course designed for a wide range of students who are generally interested in organization perspectives on markets and businesses. The primary focus of the course is on modes of organizing. In particular, we will look at the ways in which economic actions are played out in social settings. Basic conceptual frameworks will be provided. Yet the course will extensively use, and ask you to come up with, contemporary and local problems to illustrate the core issues.

SOC 220 Culture and Conflict in Organizations
Spring. 3 credits. P. Becker.
How do the organizations we belong to shape us? What is organizational identity and how does it come about? How do cultural beliefs shape organizations? What kinds of organizations strike us as legitimate and effective, and why? Organizations may be goal-directed problem-solvers, but they're also locations for storing and transmitting social facts, like the hierarchical relations among groups, and powerful ideas, including moral codes. Organizations may seem to evolve naturally, but are often shaped by internal conflicts or powerful outsiders. The first part of this course will examine theories of organizational culture and power; the second part will consist of case studies or organizations, businesses, religious denominations, little league teams, and social movement organizations.

[SOC 222 Social Policy and Organization in Health, Education, and Welfare
3 credits. Not offered 1999–2000.
D. Strang.
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 250 Religion and Public Life (also RELST 249)
3 credits. Not offered 1999–2000.
P. Becker.
This course explores how religion provides a basis for moral critique, political mobilization, and social identity in a modern society. The first part introduces basic issues—definitions of religion, the sociological approach to the study of religion, religion and modernity. In the main body of the course, we will read studies of specific religious groups and organizations in the contemporary United States—examining such questions as: "How does religion provide a basis for gender identity and gender norms? "What do religious groups and discourses contribute to public debate on issues ranging from economic justice to abortion? "How do religious leaders mobilize citizens for social action in their communities?"]

SOC 265 Latinos in the U.S. (also LSP 201 and R SOC 265)
Spring. 3 credits (4-credit option available). H. Velez.
Exploration and analysis of the Hispanic experience in the United States. An examination of sociohistorical background and economic, psychological, and political factors that converge to shape a Latino group identity in the United States. Perspectives are suggested and developed for understanding Hispanic migrations, the plight of Latinos in urban and rural areas, and the unique problems faced by the diverse Latino groups. Groups studied include Mexican Americans, Dominicans, Cubans, and Puerto Ricans.

[SOC 281 Contemporary Social Issues
Not offered 1999–2000. H. A. Walker.
This course uses contemporary social issues to introduce students to sociological reasoning, explanation, and analysis. Topics include race, gender, and performance differences in face-to-face groups; gender and double standards; the origins of economic inequality; and crime and deviance. Students will complete guided research problems that require the analysis of existing data. Classroom instruction will give students all the skills necessary to complete the research exercises.]

[SOC 290 Social Psychology of Interpersonal Relations
Fall. 3 credits. Not offered 1999–2000.
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 293 Inequality, Diversity and Justice (also City and Regional Planning 293, Government 293, Philosophy 193, Sociology 293)
Fall. 4 credits. No prerequisites: intended for freshmen and sophomores. R. Miller.
An interdisciplinary discussion of the nature and moral significance of social inequality, diversity and poverty and of the search for just responses to them. How unequal are economic opportunities? What are the causes of poverty? To what extent is greater equality a demand of justice? Are traditional welfare programs an appropriate response to poverty? What special significance have race and gender as sources of inequality? Do they merit special remedies such as affirmative action? How should governments deal with

religious diversity and other differences in ultimate values? For example, should abortion statutes be neutral toward rival views of the importance of potential human life? What are the causes of worldwide inequality? To what extent do people in per-capita rich countries have a duty to help the foreign poor? Moral argument, investigations of social causes and legal reasoning interact in the search for answers to these questions. To provide these resources, the course will be taught by leading faculty researchers in philosophy, political theory, the social sciences and law.

SOC 301 Evaluating Statistical Evidence
Spring. 3 credits. M. Clarkberg.
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. S. Caldwell.
Foundations of sociological analysis; issues arising from using humans as data sources; the quality of our primary data; methods of its collection; research designs in wide use and their limitations; pragmatic considerations in doing research on humans, organizations, communities, and nations.

Intermediate Courses

SOC 309 The Sociology of Marriage (also SOC 509)
Spring. 3 credits. M. Clarkberg.
Contemporary debate on the nature of the family in the U.S. often assumes a simplistic decay of the "traditional marriage." This course unpacks the myths and facts that undergird this model. We will overview the historical patterns of marriage in the United States, examine data on contemporary union formation and dissolution and their consequences, and explore various theoretical models of marriage and its decline.

[SOC 311 Solidarity and Social Control
4 credits. Not offered 1999–2000. M. Macy.
What is the most important group that you belong to? What makes it important? What holds the group together, and how might it fall apart? How does the group recruit new members? Select leaders? Make and enforce rules? Do some members end up doing most of the work while others get a free ride? We will explore these questions from an interdisciplinary perspective, drawing on sociobiology, economics, and social psychology, as we apply alternative theories of group solidarity to a series of case studies, such as urban gangs, spiritual communes, the civil rights movement, pro-life activists, athletic teams, work groups, and college fraternities.]

[SOC 313 Social Networks and Social Structure (also SOC 513)
Spring. 4 credits. Not offered 1999–2000. Staff.
A critical survey of theories and techniques of structural analysis in sociology, centering on the usefulness of social network analysis in providing integration of studies at different levels of generality. Applications in the areas of the sociology of organizations, community studies, social stratification, and dependence relations among nations. Emphasis on the mutual relevance of theories and operational research procedures.]

SOC 315 Contemporary Business Organization
Fall. 4 credits. D. Strang.
Corporate America appears constantly in the throes of rapid change. In recent years, demographic change and downsizing has restructured the face of management, breaking the implicit social contracts many employees thought they enjoyed. Large bureaucratic organizaitons have declined relative to small networked firms, while at the same time mergers and acquisitions consolidate operations in many industries. Japanese frameworks like total quality management have become American business movements. This course examines what is new and not so new in contemporary American business.

SOC 322 Organizations and Social Inequality (also ILR 325)
Spring. 3 credits. P. Tolbert.
For course description, see ILR 325.

SOC 324 Environment and Society (also ST&S 324 and RSOC 324)
Spring. 3 credits. M. Pfeffer.
For course description, see RSOC 324.

SOC 326 Social Policy (also SOC 526)
Fall. 4 credits. S. B. Caldwell.
The dramatic growth of the policy research sector as an institutional and intellectual force signals a changing relationship of social science to social policy in the United States. With an eye on that relationship, this course examines the development of social policy in selected areas, among them welfare, poverty, housing, crime, and health. The policy research sector itself—people, values, and institutions—is also surveyed.

SOC 333 Primate Societies
Spring. 3 credits. R. Grannis.
All primates (including humans) share a common social and cultural, as well as biological, heritage which was bequeathed to us by our common ancestors. This shared inheritance is even more pronounced between humans and their closest non-human relatives, chimpanzees and gorillas. This course will survey the social behaviors and cultural forms of our primate cousins with a special focus on baboons, chimpanzees, and gorillas. We will begin by reviewing the diversity of primates and their societies. We will then look at primate socioecology including demography, hunting and gathering, and kinship. Next, we will examine the politics, economics, communication, and culture of some of our more closely related primate cousins. In addition to sharing a common past, all primates (except for some recent humans) are hunter-gatherers with similar biological capacities and needs who have solved similar socioecological problems. We will end the course by considering the implications of these findings for our lives as human primates.

SOC 336 Segregation
Spring. 3 credits. R. Grannis.
Over seven decades ago, Robert Park noted that "Physical distances frequently are the indices of social distances." As we near the beginning of a new millennium, very little has changed. Segregation may have disappeared from our public discourse, but it is a very present reality in our cities. This course will survey residential segregation by asking some very basic questions: What does it mean to be segregated? How has segregation been different in different times and places? What are the consequences of segregation? Why does segregation occur? How can illegal segregation persist? What can be done about segregation?

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 341 Modern Euro Society and Politics (also GOVT 341)
Fall. 3 credits. J. Pontusson and D. Schirmer.
For course description, see GOVT 341.

[SOC 350 Comparative Revolutions
Not offered 1999–2000.
For description, see GOVT 350.]

SOC 353 Knowledge and Society
Spring. 3 credits. C. Leuenberger.
This course will focus on the historical evolution of the sociology of knowledge as a theoretical paradigm and an empirical research field. We will examine the phenomenological origins of the sociology of knowledge and many of its central texts. We will study how it has been applied to such areas as personhood, interaction, religion, identity and the emotions. We will also consider epistemological questions that arise and will cover various theoretical and empirical approaches which have been influenced by the sociology of knowledge such as ethnomethodology, conversation analysis and the sociology of science and technology.

[SOC 354 Law and the Social Order
Spring. 4 credits. Not offered 1999–2000. Staff.
In what ways, if any, do laws and legal institutions make a difference to people who have disputes? How did lawyering come to be a modern profession? How do business organizations deal with legal ambiguity in constructing symbols of compliance with laws? How do networks of interpretive communities structure the authority of law? By exploring selected topics such as these, we seek to understand the distinctive contributions of sociology to the study of law and the social order.]

SOC 356 Law in Society (also SOC 556)
Fall. 4 credits. W. Burkard.
The phrase "law and society" misleadingly suggests that we are speaking of two discrete entities: 'law' and 'society'. But law is itself part of society, its basic processes are social processes, and it contains within its own internal workings social dimensions worthy of study by the sociologist.

In this course we will examine law in society. The 'classical' sociological models of law-those of Marx, Weber and Durkheim-are well-represented. The works of several significant American and European critical legal theorists-those of the American Legal Realists, the Frankfurt School, Michel Foucalt, Roberto Unger, Duncan Kennedy, and Jurgen Habermas-are also well-represented, not only to facilitate an understanding of the bases for

the attacks on the liberal Rule of Law, but also to facilitate an understanding of the relationship between law and politics and the potential for revitalizing the Rule of Law through democracy. The major themes in 'classical' and contemporary legal anthropology-e.g. hegemony v. resistance, rule-centered v. processual v. interpretive paradigms-are reviewed. We also consider the extent to which the various perspectives on law in society have been appropriated internationally.

[SOC 358 Modes of Institutional Analysis (also SOC 558)
3 credits. Not offered 1999–2000.
D. Strang.
Much social theory treats individual behavior as occurring within and shaped by "institutions." For example, discussions of American health care policy emphasize not only the preferences of physicians, businesses, and consumers, but also the institutional structure of American government that provides multiple veto points and makes broad cross-class coalitions difficult to build. This course will examine the main types of institutional analysis active in contemporary social science.]

[SOC 370 Careers (also SOC 570)
4 credits. Not offered 1999–2000. 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 the career development takes place, giving some comparative attention to the ways of organizing careers in other societies.]

SOC 371 Comparative Social Stratification (also RSOC 370)
Fall. 3 credits. S. Feldman.
For course description, see RSOC 370.

SOC 373 Organizational Behavior Simulations
Fall. 3 credits. Prerequisites: ILROB 170 and 171 or equivalent. Limited enrollment. R. Stern.
See ILROB 373 for course description.

SOC 375 Classical Theory
Spring. 3 credits. S. Szonja.
Introduces students to major macro-sociological paradigms and encourages them to participate in "cross-paradigm" debates. The three main theorist of sociology (i.e., Marx, Durkheim, and Weber) are compared with respect to their approaches to the social sciences, their views on human history, their conceptions of capitalist society, and their ideas on social change. The assigned reading focus on the original writings of these theorists, while the lectures provide the requisite socio-historical context.

[SOC 380 Gender, Ideology, and Culture (also WOMNS 380)
4 credits. Not offered 1999–2000.
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 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.]

SOC 393 Sociology of War & Peace
Fall. 4 credits. R. M. Williams, Jr. and J. Reppy.
Every human group, community, or society presents many examples of altruism, helping, cooperation, agreement, and social harmony. Each grouping or society also manifests numerous examples of competition, rivalry, opposition, disagreement, conflict, and violence. Both conflict and cooperation are permanent and common aspects of the human condition. Collective conflicts, especially wars and revolutions, are frequent and dramatic events. But "peace" and "war" are equally active social processes, not passive happenings. This course describes various commonly accepted but erroneous notions of the causes and consequences of war and deterrence. It deals with the major theories concerning the sources of war in international and intranational social systems. The last half of the course analyzes the modes, techniques, and outcomes of efforts to restrict, regulate, and resolve international conflicts.

Advanced Courses

The following courses are intended for advanced undergraduates with substantial preparation as well as for graduate students in sociology and related disciplines. The normal prerequisite for all 400-level courses is one introductory course plus 301 (or an equivalent statistics course). Students who are not sure whether their background is sufficient for a particular course should consult the professor in charge.

SOC 402 Doctors and Lawyers
Spring. 4credits. W. Burkard.
This seminar will examine sociological and historical materials on the education and training of physicians and attorneys and the practice of medicine and law. Students will utilize these materials to develop projects, e.g., the effects of managed care on medical practice, the role of clinical training in legal education, and will present their works-in-progress during the last half of the course. This course may interest upper-level students considering careers as physicians or attorneys, as well as potential sociologists of medicine, law, or the professions.

SOC 404 Economy and Family—Interrelationships Over the Life Course (also SOC 504)
Fall. 4 credits. M. Clarkberg.
While sociologists have often argued that the modern family has shed most of its "productive" functions, economic models have never been more central in the study of the family. This course explores the emerging dialogue between economists and family scholars along two related dimensions. First, we examine the [reciprocal] relationship between the structure of the economy (including income, careers, and workplace characteristics and policies) and family structure and outcomes. Second, we weigh the contribution of economic or "rational actor" models to the study of the family behaviors. These related economic processes will be used to examine marriage and divorce, time use and the division of labor within families, population growth, and the dynamics of health and aging.

SOC 408 Qualitative Methods (also SOC 508)
Spring. 4 credits. P. Becker.
This course is designed to introduce students to qualitative research. We will focus on interviewing, document review, and participant observation, although we will also talk about validity, reliability, ethics, and research-involvement, issues that are applicable to qualitative research more broadly. Each student will design and carry out a semester-length research project, keep a field journal, and do á final research report.

SOC 421 Regulating the Corporation (also ILROB 421)
Spring. 4 credits. R. Stern.
See ILROB 421 for course description.

SOC 427 The Professions: Organization and Control (also ILROB 427).
Fall. 3 credits. Prerequisite: permision of the instructor. P. Tolbert.
See ILROB 427 for course description.

[SOC 429 Culture and Agency (also SOC 529)
3 credits. Not offered 1999–2000.
P. Becker.
This course will look at the development of sociological theory on questions of culture and agency. Starting with various reflection or materialist approaches to culture that decenter agency, we will then follow the development of theories that explicitly link culture to actors and events in an attempt to account for both social reproduction and social change. The readings will cover a broad time span and a variety of intellectual approaches, including critical theory and cultural studies, but will center on the sociology of culture.]

SOC 430 Social Organization of Economic Action (also Soc 530)
Spring. 4 credits. S. Han.
See SOC 530 for course description.

SOC 437 Social Demography (also RSOC 438)
Fall. 3 credits. D. Gurak.
For course description, see RSOC 438.

[SOC 438 Immigration and Ethnic Identity
4 credits. Not offered 1999–2000.
V. G. Nee.
Immigration has been a central process in the peopling of American society. The early immigration to the United States 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 causes of international migration, the dynamics of immigrant incorporation into American society, and the making of new ethnic groups and identities.]

[SOC 444 Contemporary Research in Social Stratification
4 credits. Not offered 1999–2000.
R. L. Breiger.
Stratification and mobility as paired concepts, requiring mutual articulation. The interplay of structure (occupational groups, labor markets, organizational demographics, social classes)

and process (tracking, career trajectories, socioeconomic attainment). Recently formulated log-linear models of mobility and structure provide a central focus of the course.]

SOC 457 Health and Social Behavior (also HDFS 457)
Fall. 3 credits. Prerequisites: HDFS 150, HSS 201, Sociology 101, or Rural Sociology 101 and a course in statistics. Letter grades only. E. Wethington.
See HDFS 457 for course description.

SOC 480/580 Identity and Interest in Collective Action
Fall. 4 credits. M. Macy.
This seminar examines the problem of collective action from alternative theoretical perspectives: on centered on shared *interests*, the other on common *identities*. The former claims that groups are held together because the members are interdependent and thus benefit from cooperating in a common endeavor. Others argue that effective mobilization may depend on affective ties among participants who share a salient demarcation. We will explore this debate, and its possible resolution, through an examination of formal theoretical studies (especially computer simulation) as well as empirical research using experimentation and comparative case analysis. Key concepts addressed in the social dilemmas (and game-theoretic analysis), the free-rider problem, rational choice theory, formal and informal social control, social identity theory, and the role of networks and institutions as mechanisms for reconciling the tension between individual self-interest and collective obligations.

SOC 491 Independent Study
Fall or spring. 1–4 credits. For undergraduates who wish to obtain research experience or to do extensive reading on a special topic. Permission to enroll for independent study will be granted only to students who present an acceptable prospectus and secure agreement of a faculty member to serve as supervisor for the project throughout the term. Graduate students should enroll in 891–892.

SOC 495 Honors Research
Fall or spring. 4 credits. Limited to sociology majors in their senior year. Prerequisite: permission of instructor.

SOC 496 Honors Thesis: Senior Year
Fall or spring. 4 credits. Prerequisite: Sociology 495.

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. Nee.
Analysis of theory shaping current sociological research. Examination of several central problems in sociological inquiry provides an occasion for understanding tensions and continuities between classical and contemporary approaches, for indicating the prospects for unifying microsociological and macrosociological orientations, and for developing a critical appreciation of efforts to integrate theory and research.

SOC 502 Basic Problems in Sociology II
Spring. 4 credits. D. Heckathorn.
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 504 Economy and Family (also SOC 404)
Fall. 4 credits. M. Clarkberg
For course description, see SOC 404.

SOC 505 Research Methods I: Logic of Social Inference
Fall. 4 credits. Prerequisite: a first course in statistics and probability. M. Clarkberg.
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 505 or equivalent. D. Grusky.
Introduction to the general linear model for discrete and continuous variables. Discussion of principles of estimation, model selection, coefficient interpretation, specification error, and fit assessment. The linear regression model is covered in depth and then generalized to the cases of logistic regression, probit, log-linear, log-multiplicative, latent class, and related models. Although the statistical theory underlying these models is reviewed, issues of interpretation and estimation typically take precedence. Emphasis is accordingly place on the analytic and stylistic issues that arise in writing research papers based on the general linear model.

SOC 507 Research Methods in Sociology III
Fall. 4 credits. Prerequisite: Sociology 506. D. Strang.
Models and methods for the quantitative and formal analysis of social dynamics. The course focuses on event history analysis in the case of discrete outcomes and pooled cross-sectional and time-series analysis in the case of continuous outcomes.

Graduate Seminars

These seminars are primarily for graduate students but may be taken by qualified advanced undergraduates who have permission of the instructor. Which seminars are to be offered any term is determined in part by the interests of the students, but it is unlikely that any seminar will be offered more frequently than every other year. The list below indicates seminars that are likely to be offered, but others may be added and some may be deleted. Students should check with the department before each term.

SOC 508 Qualitative Methods (also SOC 408)
Spring. 4 credits. P. Becker.
This course is designed to introduce students to qualitative research. We will focus on interviewing, document review, and participant observation, although we will also talk about validity, reliability, ethics, and research-involvement, issues that are applicable to qualitative research more broadly. Each student will design and carry out a semester-length research project, keep a field journal, and do a final research report.

SOC 509 The Sociology of Marriage (also SOC 309)
Spring. 3 credits. M. Clarkberg.
For course description, see SOC 309.

[SOC 513 Social Networks and Social Structure (also SOC 313)
Spring. 4 credits. Not offered 1999–2000. Staff.]

SOC 526 Social Policy (also SOC 326)
Fall. 4 credits. S. B. Caldwell.

[SOC 529 Culture and Agency (also SOC 429)
4 credits. Not offered 1999–2000. P. Becker.
For description, see SOC 429.]

SOC 530 Social Organization of Economic Action (also SOC 430)
Spring. 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 556 Law in Society (also SOC 356)
Fall. 4 credits. W. Burkard.
For course description, see SOC 556.

[SOC 558 Modes of Institutional Analysis (also SOC 358)
4 credits. Not offered 1999–2000. D. Strang.]

[SOC 575 Seminar in Institutions and Rationality
2 credits. Not offered 1999–2000. V. Nee.
This year-long seminar examines the theoretical logic and assumptions of the new institutionalism in sociology and other social sciences. Understanding the part played by informal constraints of social norms and networks and by formal institutional arrangements (i.e., contracts, property rights, laws, regulations and the state) encompass the domain of study. The seminar will focus on comparative analysis and case studies illuminating and explaining the part played by institutions in structuring the economic and social transactions of society and specifying the causal mechanisms shaping path dependent institutional change.]

SOC 580 Simulating Social Dilemmas (also SOC 480)
Fall. 4 credits. M. Macy.

SOC 583 Transitions to Market Economies in China and Eastern Europe
Spring. 4 credits. V. Nee.
This course examines the problems and prospects of transitions to markets in China and Eastern Europe. It introduces concepts for understanding the state socialist economy that is being transformed and analyzes important social and economic developments since 1988. Topics include privatization, joint ventures, new capital markets, entrepreneurship, and labor relations in these changing economies.

SOC 591 Special Seminars in Sociology
Fall and spring. 2–4 credits.
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
Not offered 1999–2000.
For description, see GOVT 660.]

SOC 691 Independent Study
Fall or spring. 2–4 credits. Prerequisite: graduate status and permission of a faculty member willing to supervise the project. Staff.
For graduates 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.

SOC 707 Literacy, Social Organization, Consciousness, and the Information Society (also ENGL 707, LING 707, PSYCH 707, WRIT 707
Fall. 5 credits. Letter or S-U.
C. Bazerman, visiting professor.
This course will investigate the literate practices of contemporary academic, disciplinary, and professional cultures, which are deeply implicated in contemporary forms of social organization and consciousness. We will examine the historical emergence and elaboration of literate practices and the implications for contemporary society moving from print to electronic media. This investigation will start with considering the interaction of literacy and social organization at earlier moments and will then consider some relevant theory to expose the ways text, social organization, and consciousness interact. We will then return to the rise and organization of academic, disciplinary, professional, and information culture. Each participant in the seminar will be responsible for developing a project examining socio-cognitive discursive practices within a classroom, disciplinary, professional, or cyber-information domain.

SOC 725 Analysis of Published Research in Organizational Behavior (also ILROB 725)
Fall. P. Tolbert.
For course description, see ILR 725.

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.

SPANISH

See Department of Romance Studies.

SWAHILI

See Africana Studies and Research Center.

SWEDISH

See Department of German Studies.

TAGALOG

See Department of Asian Studies.

TAMIL

See Department of Asian Studies.

THAI

See Department of Asian Studies.

THEATRE, FILM & DANCE

D. Bathrick, chair; R. Archer, S. Brookhouse, J. Chu, S. Cole (on leave spring 2000), D. Feldshuh, A. Fogelsanger, (coordinator, dance program); D. Fredericksen, (director, film studies); J. E. Gainor, (director, graduate studies, on leave fall 1999); K. Goetz (on leave spring 2000), D. Hall, C. Hatcher, E. Intemann, J. Johnson, J. Kovar, B. Levitt, P. Lillard, J. Morgenroth, C. Orr Brookhouse, M. Rivchin, R. Schneider, J. Self, B. Suber (on leave spring 2000), A. Van Dyke, (director, undergraduate studies); A. Villarejo

Through its courses and production laboratories, the department provides students with a wide range of opportunities in theatre, film, and dance. 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 studies in the history of theatre, dramatic theory and criticism, playwriting, acting, directing, design/technology, and stage management. Students interested in the Theatre Arts major should consult with Alison Van Dyke (Director of Undergraduate Studies, Theatre, Film & Dance).

Course requirements for theatre concentration: **Credits**

1) **THETR 240** and **THETR 241** (two-semester introduction to theatre) 8
THETR 250 Introduction to Theatre Design and Technology 4
THETR 280 Introduction to Acting 3

2) Four laboratory courses distributed as follows: **Credits**
THETR 151 Production Lab I 1–3
THETR 153, THETR 253, or **THETR 353** Stage Management Lab I, II, or III 1–3
THETR 155 Rehearsal and Performance or **THETR 151** in a different area 1–3
THETR 251 or **THETR 351** Production Lab II or III 1–4

3) Four courses in the area of **Theatre Studies** (see Theatre Studies section of theatre courses) chosen in the following manner:
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 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.

Honors

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 part of the honors program the student must maintain a GPA of 3.5 in classes for the theatre major and an average of 3.0 in all courses. Students must consult with their advisers in the spring of their junior year in order to enroll in the honors programs.

The Advanced Undergraduate Theatre Program

The department offers advanced study in directing, playwriting, design/technology and

stage management to students who qualify on the basis of outstanding achievement in course work. Admission to the AUTP is by invitation of the area faculty supervisor and the completion of a recommended "track" of courses or equivalent experience. (For recommended course of study please see listing of courses at end of departmental listings.) 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.

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, romance studies and women's 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. In addition, courses in film production and the history and theory of film as an art are centered in this department.

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 the Department of Theatre, Film & Dance; 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, Film & Dance). Students interested in options 2 or 3 should consult Don Fredericksen (Theatre, Film & Dance) and Lynne Abel (director, College Scholar and Independent Major programs). Students interested in the first option should consult Don Fredericksen (director, Film Studies, Theatre, Film & Dance).

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, during the fall semester. 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. **In particular, students must plan to be in residence at Cornell during *both* their junior and senior year fall semesters.** 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 653. 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 4

   [**THETR 375** History and Theory of Commercial Narrative Film (offered alternate fall semesters; not offered 1999–2000)] 4

   THETR 376 History and Theory of Documentary and Experimental Film (offered alternate fall semesters; offered 1999–2000) 4

   [**THETR 277** Video Production I (offered alternate spring semesters, and summers; not offered 1999–2000)] 3

   OR

   THETR 377 Fundamentals of 16mm Filmmaking 4

2. *One* of the following theatre courses:

   THETR 250 Fundamentals of Theatre Design/Technology 4

   THETR 280 Introduction to Acting 3

   THETR 398 Directing I (prerequisite: permission) 3

3. *Four* courses (15–16 credits) in film offered by Theatre, Film & Dance as below, or by other departments (with consent of adviser):

   THETR 264 Interpreting Hitchcock 4

   [**THETR 275** Introduction to Film Theory (offered alternate spring semesters; not offered 1999–2000)] 4

   [**THETR 277** Video Production I (offered alternate spring semesters; not offered 1999–2000)] 3

   THETR 291 Filming Other Cultures 3

   THETR 369 Studies in Film Analysis 4

   [**THETR 378** Soviet Film of 20s and French Film of 60s (offered alternate spring semesters not offered 1999–2000)] 4

   THETR 379 Modern Documentary Film (offered alternate spring semesters; offered 1999–2000) 4

   THETR 383 Screenwriting 4

   THETR 386 Third Cinema (Not alternate years; offered 1999–2000) 4

   THETR 391 Media Arts Studio I 3

   THETR 392 Media Arts Studio II 3

   THETR 395 Video: Art, Theory, Politics 4

   [**THETR 396** German Film (offered occasionally; not offered 1999–2000)] 4

   [**THETR 413** Film and Performance (offered occasionally; not offered 1999–2000)] 4

   AS&RC 435 African Cinema 4

   [**THETR 473** Film and Spiritual Questions (offered alternate years; not offered 1999–2000)] 4

   THETR 474 Jung, Film, and the Process of Self-Knowledge (offered alternate years; offered 1999–2000) 4

   THETR 475 Seminar in the Cinema I 4

   [**THETR 476** Seminar in the Cinema II (offered occasionally; not offered 1999–2000)] 4

   THETR 477 Intermediate Film and Video Projects 4

   THETR 493 Advanced Film and Video Projects 4

   THETR 653 Myth onto Film 4

4. 15 credits of related coursework inside or outside of the Department of Theatre, Film & Dance (as approved by adviser). The 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" in those areas.
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.

Honors

Students who have maintained a GPA of 3.5 in their film concentration courses and an average of 3.0 in all courses may elect to work for honors in film during their senior year. They must consult with their adviser in the spring of their junior year about the honors program in film.

The Advanced Undergraduate Film Program

The department offers advanced study in filmmaking to students who qualify on the basis of outstanding achievement in film studies and film production courses. Acceptance to the AUFP and admission to the advanced film production course (THETR 493) will be determined by a committee of film faculty in December of each year, based on applications from students who have a proposal (script or treatment) for a film or video project. Up to four of these students will also be selected to receive the Melville Shavelson Award to help fund their advanced film projects.

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 or 275 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, anatomical analysis of movement, and the history, theory, and criticism of dance. Technique courses include modern dance at four levels and ballet at three levels. Other dance forms, such as historical dances, Japanese Noh, Indian and Javanese, dance are offered on a rotating basis. Courses in African, 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 classes in the dance program. The schedule for all dance technique classes is available in the main office of the Center for Theatre Arts. Students taking technique for academic credit must also register through their own colleges.

The faculty offer rehearsal and performance workshops in which they choreograph and rehearse original dances, performed in public concert. Admission to rehearsal and performance classes is by audition. Students may receive one academic credit (S-U grades only) when performing in student-faculty concerts by registering for THETR 155.

The Dance Major

To be admitted to the major, students must have completed two technique courses in modern dance or ballet at level II or above, and THETR 210 (Beginning Dance Composition). It is recommended that THETR 201 (Dance Improvisation), THETR 250 (Fundamentals of Theatre Design and Technology) and Music 105 (Introduction to Music Theory) be taken before the junior year. It is also strongly recommended, but not required, that dance majors take THETR 233 (Explorations in Movement and Performance). The following requirements are expected of the major.

Prerequisites for the Major:

THETR 210 Beginning Dance Composition and Music Resources

Two technique courses in modern dance or ballet at level II or above

Requirements for the Major:	**Credits**
Music 105 Introduction to Music Theory (or substitute at the appropriate level)	3
ONE course in historical dance, jazz, a non-western form, folk dance, or ballroom dance	0–3
TWO semesters each of ballet and modern dance (in addition to the prerequisite)	4
THETR 155 Rehearsal and Performance	1
THETR 201 Dance Improvisation	3
THETR 250 Fundamentals of Design and Technology	4
THETR 310–311 Intermediate Dance Composition	8
THETR 312 Physical Analysis of Movement	3
THETR 314–315 Western Dance History	8
THETR 410 Advanced Dance Composition	4
THETR 418 Seminar in History of Dance (or other 400-level academic dance course)	4
THETR 491 Senior Project	4
Total	46–49

Students will be expected to perform in at least two concerts and to present at least two of their own dances, in addition to the senior project.

Honors

Students who have maintained a GPA of 3.5 in classes for the dance major and an average of 3.0 in all courses may elect to work for honors in dance during their senior year. They must consult with their adviser in the spring of their junior year about the honors program in dance.

Department Courses:

See individual sections for: Freshman Writing Seminars; General Survey Courses; Theatre Studies; Acting; Directing; Playwriting; Design; Technology; Stage Management; Independent Study, Internships and Honors; Film; Dance.

First-Year Writing Seminars

THETR 147 FWS Phantasms and Philes
Fall. 3 credits. T. Rhys.
What is it about the supernatural that appeals to audiences? Is it the visual spectacle, or something deeper? What happens when we put our darkest fears on stage? This course explores these questions by juxtaposing a present-day drama—Fox Television's The X-Files—with the plays of the British gothic period.

THETR 152 FWS Smoking Sirens: Femmes Fatales in Popular Culture
Fall and spring. 3 credits. H. Young Jr.
This course explores the development of the 'femme fatale' in popular culture. It uses novels, films, and plays in conjunction with relevant theoretical texts to chronicle her rise over the past seventy years. Specifically, this course studies the socio-political positioning of women in modern art, closely analyzes gender construction and performances and probes into the issues of sexuality and sexual differences. Representative texts will include *Double Indemnity*, the play M Butterfly, and the films The Blue Angel, Jules et Jim, La Femme Nikita, and Basic Instinct. Writing assignments will include short first person narratives, play analyses, film reviews and a screenwriting exercise. Weekly films screenings will be required.

THETR 162 FWS Beyond Bruce Lee: Martial Arts Films of Hong Kong
Fall. 3 credits. C. Conceison.
"Kung-fu" films featuring Bruce Lee, Jackie Chan, and Jet Li will be viewed and discussed in terms of their impact domestically and internationally, and examined more deeply to explore their cultural and political significance: How do they define Chinese masculinity? How do they contribute to the effort to construct a narrative history for colonized Hong Kong? What do they reveal about Hong Kong's relationship with mainland China? We will evaluate this in light of the recent return of HK to Chinese governance. Weekly film screenings will be required. Readings include background material in history and film theory, and both popular and scholarly articles on the films and relevant issues. Papers will include the above topics, as well as a movie review and brief scene script. Films include *Dragon*, *Rumble in the Bronx*, *Once Upon a Time in China*, *Lethal Weapon 4* and others.

THETR 181 FWS Stages of Desiring
Fall and spring. 3 credits. D. Matson.
Is gay theater its own art? Is theater a gay art? This course is a sampling of English and American drama dealing with or written by lesbians, gays, bisexuals, and transgendered persons, or more simply, queers. Using Oscar Wilde's *The Importance of Being Earnest* as our point of departure, we'll work our way to the present, visiting such playwrights as Tennessee Williams, Edward Albee, Carol Churchill, Holly Hughes, and Larry Kramer before finishing out the course with Tony Kushner's epic *Angels in America*. Through reaction papers, class discussion, and possibly even the writing of a one-act play, students will be expected to confront candidly questions of queerness and theater; need there be any distinction between queer theater and straight theater? and just what is it about the theater that offers queerness a sanctuary? These questions will inevitably lead us to issues of stereotyping, stigmatizing, performing, gender, and dressing in drag.

THETR 185 FWS Film, Fantasy, and the Bard
Fall and spring. 3 credits. E. Intemann.
Today's popular literature and films are often inspired by historical literary sources, and Shakespeare's plays are especially rich in finding their way into current works. This course will examine Shakespeare, as realized in various forms of today's film and popular literature. The class will explore *King Lear* and *A Midsummer Night's Dream* as envisioned by Shakespeare and as reinterpreted in the modern film and fantasy literature genres. Although the writing assignments will be primarily critical essays, students will be given the opportunity to write some fiction. Issues discussed might include how content relates to form, be it literary or dramatic; how our modern sensibility affects our perception of the work; how themes are emphasized or de-emphasized depending on the historical and cultural biases of the audience; and how the liberties that Shakespeare may have taken with his source material compare to those currently taken with his works.

General Survey Courses

THETR 230 Creating Theatre
Spring. 3 credits. Limited to 25 students. D. Hall and faculty.
An introduction to theatrical production for the non-major. Students will develop a new critical perspective of the performing arts by examining 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. Some writing is required.

THETR 301 Mind and Memory: Explorations of Creativity in the Arts and Sciences (also English 301 and Music 372)
Spring. 4 credits. Limited to 40 students. For description, see English 301.

[THETR 430 Introduction to Theatre Management
Fall. 4 credits. Limited to 15 students. Not offered 1999–2000. J. E. Gainor.
This class is designed to introduce students to the profession of theatre management. The class will be a project-oriented study of components of the field, such as marketing, fundraising, contracts, organizational structures, personnel management, accounting, and box office.]

Theatre Studies Courses

[THETR 223 The Comic Theater (also Comparative Literature 223 and Classics 223) #
Spring. 3 credits. Not offered 1999–2000. J. Rusten.
For description, see Classics 223.]

THETR 240 Introduction to World Theatre I #
Fall. 4 credits. R. Schneider.
A survey of the roots of theatrical representation around the world from ritual practice to classical Greek and Roman theatre as well as Indian, Chinese, Japanese, African, and native performance. A charting of major developments in the theatre—playwriting, acting, staging, architecture—through the 17th century.

THETR 241 Introduction to World Theatre II #
Spring. 4 credits. R. Schneider.
A survey of the major developments and innovations in world theatre since 1642, exploring the evolution of naturalism, the birth of the director, as well as the emergence of the avant-garde in the West and its supposed demise today. This course will examine the impact of colonialism on theatre practices around the world.

THETR 320 Queer Theatre (also English 352 and Women's Studies 320)
Spring. 4 credits. Limited to 20 students. J. E. Gainor and D. Matson.
What is Queer Theatre and did it exist before the politicization of Queer Identity? Starting with the Renaissance in England, we will examine dramatic, critical, historical and other writing as we pose questions about spectatorship, visibility and professionalism. Evening film screenings will be required.

THETR 322 Russian Drama and Theatre (also Russian Literature 332)
Spring. 4 credits. S. Senderovich.
See Russian Literature 322 for description.

[THETR 332 Medieval and Renaissance Theatre (also Comparative Literature 332 and English)
Spring. 4 credits. Prerequisites: THETR 240 or permission of instructor. Not offered 1999–2000. J. E. Gainor.
Besides the discussion of representative plays from these periods, this class may focus on questions such as the staging 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 class, race, and gender on stage as well as in the audience.]

[THETR 333 European Drama 1660–1900: Moliere to Ibsen (also English 335 and Comparative Literature 336)
Spring. 4 credits. Not offered 1999–2000. R. Parker.
See English 335 for description.]

THETR 334 American Indians and Film (also Am. St. 338)
Fall only. 4 credits. L. Black.
We will use documentaries, classic Westerns, comedies, modern-day commentaries on American Indians, and recent films made by American Indians (*Smoke Signals*, *Imagining Indians*) to explore constructions of Indians in film and the creations of Indian and non-Indian identities through film narrative.

[THETR 335 The Modern and Contemporary Theatre (also Comparative Literature 335)
Fall. 4 credits. Prerequisites: THETR 240 or permission of instructor. Not offered 1999–2000. R. Schneider.
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)
Spring. 4 credits. Limited to 25 students. Prerequisite: permission of instructor. Not offered 1999–2000. J. E. Gainor.
A survey of American theatre from 1900–1960. Emphasis will be placed on the relationship among theatre, culture, and history.]

[THETR 337 Contemporary American Theatre (also English 337)
4 credits. Limited to 20 students. Not offered 1999–2000. J. E. Gainor.
A survey of American drama and theatre post-1960. Particular emphasis will be placed on plays by women and dramatists of color to explore questions of identity and theatrical responses to contemporary American culture.]

[THETR 339 Theories and Techniques of 20th Century Western Theatre
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. R. Schneider.
A look at Western performance across the 20th century emphasizing theatre theory and directing technique rather than drama. Beginning with symbolism, naturalism and the avant-garde we'll move on to explore Meyerhold, dada, Brecht, Artaud, Happenings and performance art, Boal, theatre images, feminist theatre, multicultural theatre, theatre of AIDS, and other theatre issues and innovations. Students will engage in performance projects.]

THETR 345 The Tragic Theater (also Classics 345 and Comp. Literature 344)
Spring. 4 credits. Limited to 40 students. F. Ahl.
See Classics 345 for description.

[THETR 372 English Drama to 1700 (also English 372) #
Fall. 4 credits. Not offered 1999–2000. S. McMillin.
See English 372 for description.]

[THETR 373 English Drama from 1700 to the Present (also English 373)
4 credits. Not offered 1999–2000. S. McMillin.
See English 373 for description.]

THETR 405 Operatic Contacts (also Society for the Humanities 405, German Studies 404, Comparative Literature 408)
Fall. 4 credits. Permission of instructor. Limited to 15 students. A. Groos.
See Society for the Humanities for complete description.

[THETR 420 Brecht, Artaud, Mueller, Wilson (also German Studies 430 and Comparative Literature 430)
4 credits. Not offered 1999–2000. D. Bathrick.
See German Studies 430 for description.]

[THETR 424 Elizabethan and Jacobean Drama (also English 425)
Fall. 4 credits. Limited to 15 students. Not offered 1999–2000. B. Adams.
See English 425 for a complete description.]

[THETR 425 Introduction to Dramaturgy and Dramatic Criticism
4 credits. Prerequisite: THETR 240 & 241, or their equivalents. Limited to 15 students. Not offered 1999–2000. J. E. Gainor.
What is dramaturg? What does a dramaturg do? We will examine this position in the theatre in both historical and practical modes. The class will be primarily a practicum, involving dramaturgical work on departmental productions, participation with student playwrights on new script development, and practice in the writing of dramatic criticism.]

THETR 431 Theory of the Theatre and Drama (also Comparative Literature 433) #
Spring. 4 credits. Prerequisite: some theatre history and dramatic literature work at the 300 level or permission of instructor.
A survey of dramatic theory and theories of theatrical representation from Aristotle to the present.

[THETR 433 Dramaturgy: Play and Period (also English 435)
Fall. 4 credits. Not offered 1999–2000. J. E. Gainor.
Topic for 1997: The Theatre of George Bernard Shaw. A survey of the plays and non-dramatic writings in their social, historical, and theatrical contexts.]

[THETR 435 Special Topics: The Victorian and Edwardian Theatre (also English 422)
Fall. 4 credits. Limited to 15 students. Prerequisite: permission of instructor. Not offered 1999–2000. J. E. Gainor.
An in-depth exploration of theatre and drama in England from the mid-nineteenth through early twentieth centuries. Topics will include melodrama, the social problem play, the popular stage, the conditions of theatrical production, and the impact of European theatre. Representative authors include Robertson, Pinero, Shaw, Wilde, Robins, Galsworthy, and St. John.]

[THETR 436 The Female Dramatic Tradition (also Women's Studies 433)
4 credits. Not offered 1999–2000. 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 438 East and West German Drama (also German Studies 438 and Theatre 648)
4 credits. Not offered 1999–2000. D. Bathrick.
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 439 Theatre of Commodities: Advertising, TV, and Performance (also Women's Studies 441/641)
Spring. 3 credits. Not offered 1999–2000. R. Schneider and A. Villarejo.
This course will explore the employment of bodies and objects as representational emblems of value and desire in late capitalism. We will analyze the ways in which desire circulates through print advertising, television, and the avant-garde. We will examine socio-cultural constructions of the relationship between screen bodies and live bodies, especially as involves advertising and audience. We will explore conceptual and culturally inscribed spaces between notions of desire, fulfillment, deferral and value coding. Throughout, feminist analyses of gender construction and deployment in the realms of the market, popular culture, and "high" art will frame our inquiry. Finally we will ask questions about the problematic of interventionary tactics in art and popular culture relative to consumption and commodity aesthetics. The course will draw on Williamson, Marx, Benjamin, Freud, Irigaray, de Certeau, Baudrillard, Dienst, Goldman, McClintock, Bordieu, Friedan, Haug, Lee, Fiske, Goffman, Lears, Murray, Taylor, and others as well as numerous print advertisements, television texts, and performance artworks.]

THETR 445 Text Analysis for Production: How to Get from the Text onto the Stage
Fall. 4 credits. Prerequisite: THETR 240 or THETR 281 or THETR 250 or THETR 398, and permission of instructor. Limited to 15 students. B. Levitt.
This course examines the play as the central, essential source for production decisions made by the actor, the director, the designer and the dramaturg. Students "present" their conclusions about the performance of studied texts through project work as either an actor, director, designer or dramaturg, as well as through two to three papers.

[THETR 454 American Musical Theatre (also English 454)
Spring. 4 credits. Prerequisite: ENGL 272 or THETR 240 and 241 and ability to read music at the level of MUSIC 105. Not offered 1999–2000. S. McMillin.
See English 454 for description.]

[THETR 459 Contemporary British Drama (also English 459)
Fall. 4 credits. Limited to 15 students. Not offered 1999–2000. S. McMillin.
See English 459 for a complete description.]

[THETR 470 The Japanese Noh Theater and Modern Dramatists (also Asian Studies 470 and Comparative Literature 470) @
Fall. 4 credits. Alternates with THETR 471. Not offered 1999–2000. K. Brazell.
For description, see Asian Studies 470.]

[THETR 471 Japanese Theatre (also Asian Studies 471) @ #
Fall. 4 credits. Not offered 1999–2000. K. Brazell.
For description, see Asian Studies 471.]

THETR 600 Proseminar in Theatre Studies
Spring. 4 credits. Limited to Theatre Arts graduate students.
An introduction to the theory and methods involved in the study of the theatre. Attention will focus on pedogogy and the profession in Part I. Part II will explore current scholarly trends.

THETR 637 Seminar in Dramatic Theory (also Comparative Literature 638)
Fall. 4 credits. Prerequisite: permission of instructor. R. Schneider.
Topic varies each semester.

[THETR 648 East and West German Drama: Post-1945 (also THETR 438 and German Studies 438)
3 credits. Not offered 1999–2000. D. Bathrick.]

THETR 660 Visual Ideology (also Comparative Literature 660 and German Studies 660)
Spring. 4 credits. G. Waite.
For description, see German Studies 660.

[THETR 679 Bertolt Brecht in Context (also German Studies 679 and Comparative Literature 679)
4 credits. Requirements: seminar paper that will form the basis for an oral presentation for class discussion. Not offered 1999–2000. D. Bathrick.
See German Studies 679 for description.]

[THETR 703 Theorizing Film (also English 703 and French Lit 695)
Fall. 4 credits. Not offered 1999–2000. T. Murray.
See English 703 for description.]

Acting

THETR 155 Rehearsal and Performance
Fall or spring. 1–2 credits. 1 credit per production experience per semester up to 2 credits per semester. 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. Prerequisites: participation in a particular department production; and by permission. Staff.
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).

THETR 280 Introduction to Acting
Fall or spring. 3 credits. Each section is limited to 16 students. Preregistration and registration only through roster in the department office, Center for Theatre Arts. Staff.
An introduction to the actor's technique and performance skills, exploring the elements necessary to begin training as an actor, i.e., observation, concentration, and imagination. Focus will be on physical and vocal exercises, improvisation, and text and character. There is required play reading, play attendance, and some scene study.

THETR 281 Acting I
Fall or spring. 3 credits. Each section limited to 14 students. Prerequisites: THETR 280 and audition. Registration only through roster in department office, the Center for Theatre Arts. 281 is restricted to sophmores and above. B. Levitt and S. Cole.
Practical exploration of the actor's craft through improvisation and exercises in physical and psychological action. Scene study utilizing the plays of Williams, Inge, and Miller.

THETR 282 Standard American Stage Speech
Fall. 3 credits. Prerequisites: THETR 280 and permission of instructor. A. Van Dyke.
An introduction to Standard American Stage Speech. We will study various regional American accents and Standard American Stage Speech using the International Phonetic Alphabet (IPA) as a way to designate the vowel, diphthong, and consonant sounds of spoken English. The goal of this course is to learn speech for use in performing Shakespeare, Shaw, Checkov, Moliere, etc.

[THETR 283 Voice and Speech for Performance
2 credits. Limited to 12 students. Primarily for department majors. Prerequisite: permission of instructor. Not offered 1999–2000. Faculty.
Registration only through department roster in the main office of the Center for Theatre Arts. Development of the speaking voice with additional emphasis on dramatic interpretation.]

[THETR 284 Speech and Dialects for Performance
Spring. 3 credits. Limited to 12 students. Primarily for department majors or advance undergraduate training program candidates. Prerequisites: THETR 281 and permission of instructor. Not offered 1999–2000. A. Van Dyke.
Development of speech and dialects in dramatic text.]

THETR 287 Summer Acting Workshop
Summer. 3 credits. Limited to 16 students in a section. Levitt and staff.
An introduction to the processes of acting. Practice in training techniques, rehearsal procedures, and methodology.

THETR 380 Acting II
Fall. 3 credits. Prerequisite: THETR 281 and audition. Limited to 12 students. S. Cole.
A continuation of Acting I. Special consideration will be given to a physical approach to characterization utilizing the plays of Chekhov and Ibsen.

THETR 381 Acting III: Advanced Scene Study
Spring. 3 credits. Prerequisite: THETR 380 and audition. Limited to 10 students. B. Levitt.
This course focuses on advanced problems in language and period style (movement, bows, curtsies, and period dances). Monologues and scenes will be drawn from these playwrights: Shakespeare and Moliere.

[THETR 385 Advanced Studies in Acting Techniques
Spring. 3 credits. Prerequisites: THETR 281, Audition and permission of instructor. Limited to 10 students. Topic varies each semester. May be repeated for credit. Not offered 1999–2000. B. Levitt.]

[THETR 387 Movement for the Actor
Fall. 3 credits. Prerequisites: THETR 281 and permission of instructor. Limited to 10 students. Not offered 1999–2000. Staff.
Physical skills for the actor will be developed through work with LeCoq-based Neutral Mask corporeal mime, and physical acting techniques.]

[THETR 415 The History of Acting
Spring. 3 credits. Limited to 10 students. Prerequisites: THETR 380 and permission of instructor. Not offered 1999–2000. S. Cole.
A study of the art of acting in its historical and cultural context from the Greeks to the early 20th Century, with an emphasis on an analytical understanding of acting methodology in relation to social context. Lectures and film showings, with student papers and presentations required.]

Directing

THETR 177 Student Laboratory Theatre Company
Spring. 1–2 credits.
The Student Laboratory Theatre Company is a group of student-actors who earn credit by acting in three scenes directed by students taking THETR 498. Students enrolling in SLTC for credit will earn 1 credit for 2 projects and 2 credits for 3 projects. SLTC also meets with directors once a week.

THETR 398 Fundamentals of Directing I
Fall. 3 credits. Limited to 10 students. Prerequisite: permission of instructor. Special consideration is given to students who have completed THETR 280 or are intending to continue in the area of stage or screen directing. D. Feldshuh.
Focused, practical exercises teach the student fundamental staging techniques that bring written text to theatrical life. A core objective 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. Special consideration is given to students who have completed THETR 280 or are intending to continue in the area of stage or screen directing. 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.

THETR 499 Practicum in Directing
Fall or spring. 1–4 credits. Prerequisites: THETR 240, 250, 280, 398, 498, and permission of instructor. D. Feldshuh.
This course will allow the student who has completed the appropriate prerequisites the opportunity to direct a full presentation of theatre in conjunction with a faculty mentor. It may also involve an internship with a prominent director on campus or the opportunity to assistant direct a faculty or guest director.

Playwriting

THETR 348 Playwriting
Fall. 4 credits. Limited to 12 students. Prerequisite: permission of instructor. Staff.
Various approaches and techniques are examined as the student is introduced to the art and craft of dramatic writing. The student is required to read dramatic texts, observe theatre productions and rehearsals and write. The semester culminates in the completion of a twenty to thirty minute one-act play.

[THETR 349 Advanced Playwriting
Spring. 4 credits. Prerequisite: THETR 348 or permission of instructor. Not offered 1999–2000. Staff.
A continuation of Theatre Arts 348, emphasizing advanced techniques and culminating in the completion of a full-length play.]

[THETR 497 Seminar in Playwriting
1–4 credits. Prerequisite: THETR 348 and 349 and permission of instructor. Not offered 1999–2000. Staff.
This class is an extension of THETR 348 and 349. Students formulate a process for developing a full-length play, which they develop over the course of the semester. The class meetings are made up of discussions about the students' process and creative tactics, and reading of material generated by the playwrights.]

Design, Technology, and Stage Management

Design

THETR 250 Fundamentals of Theatre Design and Technology
Fall and spring. 4 credits. Not open to first term freshman. Limited to 12 students. 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, C. Orr Brookhouse, and E. Intemann.
An introduction to design and technology in the theatre. Lectures, discussion, and project work introduce the principles of designing scenery, costumes, lighting and sound, and the technical process of realizing designs on stage. Students are required to purchase materials, which the instructors will specify (approximate cost, $40).

[THETR 263 CAD Studio for the Theatre
Spring. 3 credits. Limited to 8 students. Prerequisite: permission of instructor. Not offered 1999–2000. K. Goetz and selected theatre production faculty and staff.
Students will utilize commercially available 3D modeling and rendering software to explore the process of designing scenery and lighting for the live theatre. MiniCAD, Vectorworks, Artlantis, and Photoshop will be the primary applications used. Former theatre experience is helpful but not essential.]

[THETR 319 Music, Dance, and Light
Fall. 3 credits. Attendance at dance concerts and music concerts is required. Not offered 1999–2000. E. Intemann and A. Fogelsanger, J. Morgenroth.
Artistic values, parameters, and concerns of music (sound design), dance, and lighting design are compared and contrasted, and the combination of design elements is analyzed in contemporary dance. Includes writing in response to readings, audio and video recordings, and performances. Some classes devoted to creating sound, movement, and lighting.]

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 early 20th century. 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. 4 credits. Prerequisite: THETR 250 or permission of instructor. Limited to 6 students. E. Intemann.
The theory and practice of lighting design as a medium for artistic expression. This course will explore the aesthetic and mechanical aspects of light and their application in the theatre. Artistic style and viewpoint will also covered.

THETR 364 Scenic Design Studio
Fall. 3 credits. 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. Projects will employ various media to explore dramatic use of architecture, the scenic space, and elements of interior design. Experience in theatre production and graphic skills is helpful but not essential. Students are required to purchase materials which the instructor will specify (approximate cost: $50.00).

THETR 366 Costume Design Studio
Spring. 3 credits. Students are required to purchase materials which the instructor will specify (approximate cost: $50.00). 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 an understanding of 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 $20.00). C. Hatcher.
The use of sound as a medium of design for the theatre; research and creation of the theatrical sound score, digital recording and basic audio engineering techniques with projects in post production studio engineering and live recording. Emphasis is on producing viable sound designs for live theatre events.

THETR 369 Digital Audio Studio
Fall. 3 credits. Limited to 6 students. By permission of instructor only. C. Hatcher.
A project oriented course focusing on current techniques in digital audio recording, editing and processing for theatre and video production. Students will explore Digidesign's Pro Tools multitrack environment, MOTU's Digital Performer including basic MIDI operation and methods of synching audio to video. Some experience with audio recording, music or video production is helpful but not necessary.

THETR 462 Lighting Design Studio II
Spring. 4 credits. Prerequisite: THETR 362 or permission of instructor. Limited to 6 students. E. Intemann.
This course concentrates on designing lighting for different genres in various venues, developing the lighting designer as a versatile artist. Personal style and artistic commitment will be stressed.

Technology

THETR 252 Technical Production Studio I
Fall. 3 credits. Limited to 6 students. D. Hall and J. Zornow.
Stage Lighting and Sound Technology: the practical aspects of lighting and sound technology including equipment setup, engineering, electrics, organization, recording techniques, and production paperwork will be explored through projects, lectures, and class discussions. In addition to twice-weekly class meetings the course requires a laboratory commitment of fifty hours for the semester.

THETR 254 Theatrical Make-up Studio
Fall. 3 credits. Students are required to purchase make-up kits which the instructor will provide (approximate cost $50.00). Limited to 12 students. J. Johnson.
Basic techniques of make-up for the stage including corrective, old age, and fantasy; use of prosthetics, wigs, hair and hairpieces.

THETR 256 Technical Production Studio II
Spring. 3 credits. Limited to 6 students. Students are required to purchase materials, which the instructor will specify (approximate cost $25.). Prerequisite: THETR 250 or permission of instructor. Additional hands-on time in prop and paint shops required, to be discussed. T. Honesty.
Scene Painting: introduction to the basic techniques of painting scenery, including but not limited to the layout and painting of bricks, marble, stone, and wood grain for the theatre. Individual projects in scene painting and participation on paint crew for productions are included. **Stage Properties**: introduction to the processes of propmaking, including furniture construction and upholstery techniques, use of shop tools and materials, period research, and painting and finishing.

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 for the theatre. 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.
Exploration 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. 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. 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.

[THETR 358 Costume Draping Studio
Fall. 3 credits. Prerequisite: THETR 356 or permission of instructor. Not offered 1999–2000. J. Johnson.
The course will provide further experiences in the area of costume construction, particularly in the specialized area of patterning. Students will learn to make patterns by the method of draping on the form and will conclude the class by building a complete costume (from inside out) using that method of patterning.]

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, Black Box lab productions, 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, or an AUTP production 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 or permission of instructor. 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 353 complement this course.

THETR 453 Stage Management Laboratory IV
Fall and spring. 1–5 credits. May be repeated for credit. 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 CTA Proscenium Theatre. P. Lillard, S. Brookhouse, T. Honesty, J. Zornow, C. Orr Brookhouse.
This course provides practical experiences in theatrical production. Students can work on scenery, costumes, properties, lighting, or stage crew. No prerequisites or experience required.

THETR 251 Production Laboratory II
Fall and spring. 1–3 credits. Prerequisite: permission of instructor. May be repeated for credit. Orientation meeting on the first Tuesday of classes each semester at 7:30 p.m. in the CTA Proscenium Theatre. P. Lillard, S. Brookhouse, D. Hall, C. Hatcher, C. Orr Brookhouse, J. Zornow.
Practical experience in theatrical production, as a light board operator, sound board operator, sound technician, head dresser or scenery/props special project.

THETR 351 Production Laboratory III
Fall and spring. 1–3 credits. May be repeated for credit. Prerequisite: permission of instructor. P. Lillard, R. Archer, S. Brookhouse, K. Goetz, D. Hall, E. Intemann, J. Zornow, C. Hatcher, J. Johnson, C. Orr Brookhouse.
Practical experience in theatrical production as a master electrician, assistant technical director, assistant costume shop manager or assistant to a faculty or guest director or 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, R. Archer, S. Brookhouse, K. Goetz, D. Hall, C. Hatcher, J. Johnson, E. Intemann, C. Orr Brookhouse.
Practical experience in theatrical production, in the position of designer, shop manager, technical director or sound engineer.

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 which is available in 225 CTA.

THETR 485 Undergraduate Internship
Fall, spring, or summer. 1–3 credits.
To be eligible to enroll and receive credit for an internship, students must either be majors or be concentrators in the department. Students are responsible for arranging their own internships in consultation with the faculty in their area of choice *prior* to preregistration for the semester in which the internship is planned to take place. To receive credit within this course, the internship must be unpaid. Students must follow the rules and procedures stated in the departmental internship form.

THETR 495 Honors Research Tutorial
Fall or spring. 4 credits. Limited to Honors students in Theatre, Film and Dance.
This course is the first of a two-semester sequence (the second is THETR 496) for seniors engaged in an honors project.

THETR 496 Honors Research Tutorial
Fall or spring. 4 credits. Limited to Honors student in Theatre, Film and Dance.
This course is the second of a two-semester sequence (the first is THETR 495) for students engaged in an honors project.Film

Film

THETR 264 Interpreting Hitchcock (also English 263)
Fall. 4 credits. Limited to 75 students. L. Bogel.
See English 263 for complete description.

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 275 Introduction to Film Theory
Spring. 4 credits. No prerequisites, strongly recommended for film majors. Not offered 1999–2000. A. Villarejo.
This course provides an introduction to critical and theoretical approaches to film over the past century. It surveys questions of form, genre, aesthetics, narrative, spectatorship, industry, authorship, and apparatus through readings and weekly screenings of films key to these theoretical and critical formulations. The second half of the course will be devoted to the major theoretical trajectories of the past few decades in the humanities more generally and in their specific relations to cinema: structuralism and semiotics, Marxism, psychoanalysis, feminist theory, poststructuralisms, postcolonial theory and queer theory.]

[THETR 277 Video Production I
Spring, alternate years and occasionally in summer. 3 credits. Limited to 12 students. Permission of instructor. Open to sophomores, juniors, and seniors. Not offered 1999–2000. M. Rivchin.
A hands-on, beginning video production course using Super-VHS cameras and editing equipment. Students will learn camera, lighting, sound recording, editing and digital effects through a series of technical exercises. Students will develop two short, original video projects to be shown publicly at the end of the semester. A $100 equipment maintenance fee per student will be collected in class. Cost for videotape approximately $50–100.]

THETR 291 Filming Other Cultures (also Thetr 691 and Anthropology 291/691) @
Spring. 4 credits. Limited to 20 students, with preference given to those who have taken either Anthropology 102 or Theatre Arts 274. Fee for screening and maintenance, $35. R. Ascher.
THETR 291 meets simultaneously with THETR 691/ANTRO 291/691. For topics and issues addressed, please see the description under Anthropology 291. Additionally, all graduate students review widely distributed films of general interest, for example, Werner Herzog's *Where the Green Ants Dream*, and, in consultation with the instructor, review films related to their special interests and major field of study.

[THETR 329 Political Theory and Cinema (also German Studies 330, Comparative Literature 330 and Government 370)
Fall. 4 credits. Not offered 1999–2000. G. Waite.
For description, see German Studies 330.]

THETR 369 Studies in Film Analysis (also English 369)
Spring. 4 credits. L. Bogel.
Topic: Fast-Talking Dames: Hollywood Comedies. See English for complete description.

[THETR 375 History and Theory of the Commercial Narrative Film
Fall. 4 credits. Fee for screening expenses, $10 (paid in class). Offered alternate years. Prerequisite for film majors THETR 274. Not offered 1999–2000. A. Villarejo.
Consideration of the broad patterns of narration in the history of the commercial narrative film. Emphases placed upon the early articulation of a cinematic means of narration, realism as an artistic style, the nature and functions of popular film, and the modes of modernist and post-modernist "art cinema" narration.]

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. A. Villarejo.
First, the history and theory of documentary film up to the end of World War II. Second, the history and theory of the experimental and personal film forms in Europe and the United States.

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) with priority given to film majors. Prerequisite: THETR 274 (or higher-level film studies course) and permission of instructor. Equipment fee, $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 creative development of filmic ideas through critical discussion. Students may explore narrative, experimental, documentary, animation, and abstract genres, producing short exercises and a final sound film project (8–12 minutes) to 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. Next offered spring 2001. D. Fredericksen.
An intensive treatment of two distinct periods of radical innovation in film theory and history. Emphasis on the animated relationship between theory and filmmaking during these two decades. Major figures include Eisenstein, Pudovkin, Vertov, Kuleshov, Dovzhenko, and Room, in the Soviet 1920's; Godard, Truffaut, Resnais, Rohmer, Tati, Rouch, Bresson and Bazin in the French 1960's.]

THETR 379 Modern Documentary Film
Spring. 4 credits. Prerequisite: THETR 376 is strongly recommended but not required. Fee for screening expenses, $10 (this fee is paid in class). Offered alternate spring semesters; offered spring 2000. D. Fredericksen.
An intensive consideration of canonical documentary films from 1945 to the present. Emphases upon the documentary film as an artistic form with a distinct history and set of theoretical questions, as a sociopolitical force, as an ethnographic medium within and without a filmmaker's culture, and as a televised medium of persuasion and expression.

[THETR 383 Screenwriting
Spring. 3 credits. Prerequisites: THETR 274 and 377, and permission of instructor. Limited to 12 students. Not offered 1999–2000. Staff.
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 386 Third Cinema
Spring. 4 credits. Prerequisite: previous course in film history or analysis helpful, though not mandatory. Offered alternate years; offered 1999–2000. A. Villarejo.
This course explores postcolonial film and video through the rubric of "third cinema." We will investigate the diverse historical, national, political and generic commitments of films from Africa, South Asia, Latin America, the US and UK (Sembene, Ray, Brocka, etc.). Readings in film and postcolonial theory will guide our critical analyses of the films.

THETR 391 Media Arts Studio I (also ART 391, ARCH 391, MUSIC 391)
Fall. 3 credits. Prerequisite: permission of instructor and junior-level standing required, minimum THETR 377 or 277, or dance studio courses. $50 equipment fee (to be paid in class). Participating faculty include: M. Rivchin and B. Suber, THETR; S. Taft and S. Bowman, ART; K. Hubbell, J. Zissovice and G. Wilcox, ARCH; D. Borden, MUSIC.
A collaborative interdisciplinary studio course in a variety of digital and electronic media, including art, architecture, music, dance, film and video. Group projects and discussions will also investigate the artistic and interactive potential of a high-speed intranet connecting arts spaces on campus, including virtual and performative events.

THETR 392 Media Arts Studio II (also ART 392, ARCH 392, MUSIC 392)
Spring. 3 credits. Preference given to those who completed Media Arts Studio I. See THETR 391 for prerequisites. $50 equipment fee (to be paid in class). Participating faculty include: M. Rivchin and B. Suber, THETR; S. Taft and S. Bowman, ART; K. Hubbell, J. Zissovice and G. Wilcox, ARCH; D. Borden, MUSIC.
A continuation of Media Arts Studio I. A collaborative interdisciplinary studio course in a variety of digital and electronic media, including art, architecture, music, dance, film and video. Group projects and discussions will also investigate the artistic and interactive potential of a high-speed intranet connecting arts spaces on campus, including virtual and performative events.

[THETR 395 Video: Art, Theory, Politics (also English 395)
Fall. 4 credits. Not offered 1999–2000. 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. Not offered 1999–2000. D. Bathrick.
This course will explore German film from the Weimar and Nazi periods to the present in relation to the cultural and sociopolitical context of which it was a part. Readings and lectures will be devoted to formal and cultural developments historically as well as interpretive analysis of selected individual 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 instructors. Limited to 12 students. $50 maintenance fee to be collected in class. Not offered 1999–2000. M. Rivchin and faculty.]

[THETR 473 Film and Spiritual Questions (also Religious Studies 473 and College Scholar Seminar)
Spring. 4 credits. Limited to 20 students. Offered alternate spring semesters; next offered spring 2001. D. Fredericksen.
The use of film as a medium for the expression of spiritual questions has a long and rich history, although little attention is given to this fact in contemporary film studies. This seminar will examine films and writings by filmmakers who are so inclined. Special attention will be given to the work of Andrey Tarkovsky, the Russian film director and theorist.]

THETR 474 Jung, Film, and the Process of Self-knowledge (also College Scholar Seminar)
Fall. 4 credits. Limited to 20 students. Offered alternate spring semesters; offered 1999–2000. D. Fredericksen.
"Know thyself" is one of the oldest and most enduring imperatives of the human spirit, and a *raison d'etre* for liberal studies. This seminar will trace the Jungian approach to this imperative and test its critical capacities with respect to films by Fellini (*8 1/2*), Bergman (*Persona*), and Roeg (*Walkabout*).

[THETR 475 Seminar in the Cinema I
Fall. 4 credits. Limited to 20 students. Offered alternate years. Prerequisite: some analytic studies in film analysis. Not offered 1999–2000. D. Fredericksen.
Topic for fall 1999: the films of Ingmar Bergman. An intensive consideration of Bergman's corpus, with emphasis upon the films of the middle and end of his career. As well, close attention will be given to the nature of the critical act and its relationship to biography, film history, and film theory.]

[THETR 476 Seminar in the Cinema II
Spring. 4 credits. Limited to twenty students. Not offered 1999–2000. Faculty.]

THETR 477 Intermediate Film and Video Projects
Fall. 4 credits. Limited to 8 students. Prerequisites: THETR 377 or 277 as minimum; preference given to those who have taken THETR 383 (screenwriting), 398 (directing), or 413 (acting and directing for the camera), and permission of instructor. Equipment fee: $100 to be collected in class. Film projects costs: $300–1000; video $50–150. M. Rivchin.
16mm filmmaking and video skills course designed to increase the student's knowledge and practice of: cinematography, lighting, sync-sound filming and editing techniques; working with labs and sound houses; S-VHS and digital video camera; and both analog and non-linear (AVID) editing. Each student will write, direct, shoot and edit one original short, sync-sound scene and one experimental project.

THETR 493 Advanced Film and Video Projects
Spring. 4 credits. Limited to 4–6 students, those selected to the Advanced Undergraduate Film Program by application in December. Prerequisite: THETR 377 or 277, and 477; recommended: 383 (screenwriting) and 398 (Directing 1). Equipment fee: $100. Project costs: $500–2000. M. Rivchin.
This is a third-level film production course for those students who have already written and proposed a dramatic narrative script, a documentary treatment, or an experimental or animation storyboard. Working in two production crews rotating as directors, cinematographers, and sound recordists' students may shoot in sync-sound, film, or video. Students will edit the films they write and direct, and will be individually responsible for editing and all completion costs of their projects, which will be screened publicly at the end of the semester.

THETR 653 Myth onto Film
4 credits. R. Ascher.
For description, see ANTHR 653.

THETR 661 Cinematic Desire (also English 660 and Comp Lit. 662)
Fall. 4 credits E. Hanson.
See English for complete description.

THETR 674 Introduction to Film Analysis: Meaning and Value
Fall. 4 credits. Limited to 10 graduate 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. Graduate students who intend to teach film at the undergraduate level are especially welcome. In addition to full participation in the work of THETR 274, graduate students will read and discuss in tutorials Bordwell's *Making Meaning: Inference and Rhetoric in the Interpretation of Cinema.*

THETR 691 Filming Other Cultures (also Theatre 291 and Anthro 291/691)
Spring. 4 credits. Fee for film screening and maintenance, $35. R. Ascher.
THETR 691 meets simultaneously with THETR 291/ANTRO 291/691. For topics and issues addressed, please see the description under Anthropology 291. Additionally, all graduate students review widely distributed films of general interest, for example, Werner Herzog's *Where the Green Ants Dream,* and, in consultation with the instructor, review films related to their special interests and major field of study.

[THETR 699 German Film Theory (also German Studies 699 and Comparative Literature 699)
Fall. 4 credits. Offered every fourth year. Not offered 1999–2000. D. Bathrick.
This course examines critically major German film theories from the Weimar period to the present. Works by Balazs, Arnhelm, Kracauer, Benjamin, Adorno, Horkheimer, Kluge, Syberberg, Koch, Elsaesser, and others will be discussed in relation to the context in which they emerge as well as current debates in film theory.]

Dance

Classes in Dance Technique (THETR 122, 231, 232, 303, 304, 306, 308, 309), Explorations (THETR 233), and the movement sections of Indian Dance (THETR 307, 317) are co-listed in the Department of Physical Education (PE) and the Department of Theatre, Film & Dance (THETR). Students may register for these classes either through PE in order to satisfy the university's physical education requirement *or* through THETR for 0 or 1 academic credit, *with a limit of 1 credit per semester and 8 credits total.* Students may not get THETR and PE credit simultaneously for the same course.

Technique

These courses may be used to fulfill the technique class corequisite for THETR 201, 210, 310, 311, 410, 411. Students who wish to enroll in a non-introductory level technique course (THETR 231, 232, 303, 304, 308, 309) must attend a placement class; pre-enrollment is not allowed. Placement classes are held the next to last Wednesday and Thursday of each semester; please contact the department registrar for more information.

THETR 122 Dance Technique I (also Physical Education 424)
Fall and spring. 0 to 1 credit. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. Fall: J. Chu, J. Kovar, and B. Suber; spring: J. Chu and J. Kovar.
Entry level class. The fundamentals of elementary dance training. Movement sequences focusing on rhythm, placement, an vitality of performance through an anatomically sound dance technique.

THETR 231 Dance Technique II/ Ballet (also Physical Education 431)
Spring. 0 to 1 credit. By placement only; no pre-enrollment. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. Staff.
Beginning Ballet technique intended for students with some dance training. Includes all basic barre and centre work focusing on presence and presentation.

THETR 232 Dance Technique II/Modern (also Physical Education 432)
Fall and spring. 0 to 1 credit. By placement only; no pre-enrollment. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. J. Morgenroth.
Beginning Modern technique intended for students with some dance training. Material covered includes specific spinal and center work with attention to rhythm, design, and movement expression.

THETR 303 Dance Technique Workshop (also Physical Education 422)
Fall and spring. 0 to 1 credit. By placement only; no pre-enrollment. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. J. Self.
This class goes beyond the conventional modern dance class and looks into the very nature of technical training for dancers by studying and investigating a variety of movement forms including yoga, improvisation, classical and modern western dance. It is open to level III and IV dance technique students.

THETR 304 Dance Technique III/Ballet (also Physical Education 434)
Fall. 0 to 1 credit. By placement only; no pre-enrollment. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. B. Suber.
Intermediate Ballet technique. Work is done on strengthening the body through a movement technique emphasizing presence and musicality based on harmonic muscular control.

THETR 306 Dance Technique III/Modern (also Physical Education 436)
Fall and spring. 0 to 1 credit. By placement only; no pre-enrollment. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. Fall, J. Morgenroth; spring, J. Chu.
Intermediate modern technique focusing on rhythm, placement, and phrasing for students who are prepared to refine the skills of dancing. Students will be challenged by complex phrases and musicality.

THETR 308 Dance Technique IV/Modern (also Physical Education 438)
Fall and spring. 0 to 1 credit. By placement only; no pre-enrollment. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. Fall, J. Chu; spring, J. Self.
Advanced and pre-professional Modern technique. A continuation of and supplement to THETR 306.

THETR 309 Dance Technique IV/Ballet (also Physical Education 439)
Spring. 0 to 1 credit. By placement only; no pre-enrollment. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. Staff.
Advanced and pre-professional Ballet technique. A continuation of and supplement to THETR 304.

Composition, Improvisation, and Performance

THETR 155 Rehearsal and Performance
Fall and/or spring. 1–2 credits. 1 credit per production experience per semester up to 2 credits per semester. Students must register for the course in the term in which the 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 may add this course only after they have been assigned roles. S-U grades only.
The study, development, and performance of roles in departmental dance productions.

[THETR 201 Dance Improvisation
Fall. 3 credits. Limited to 12 students. Concurrent enrollment in a dance technique class at the appropriate level is required. Attendance at dance concerts is required. Not offered 1999–2000. J. Morgenroth.
When the body knows when, where, and how to move without prior direction, we call that improvisation. This course offers the possibility of "training" one's movement instincts to respond with focus, humor, and spontaneity. Live musical accomp. Includes some dance history.]

THETR 210 Beginning Dance Composition
Fall and spring. 3 credits. Concurrent enrollment in THETR 212 and a dance technique class at the appropriate level is required. Attendance at dance concerts is required. Fall, J. Chu; spring, J. Self.
Weekly assignments in basic elements of choreography. Students compose and present short studies that are discussed and reworked. Problems are defined and explored through class improvisations. Informal showing at end of semester.

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 212 Music Resources for Dance Composition
Fall and spring. 1 credit. MUSIC 105 is recommended as a prerequisite but not required. Students may register in successive semesters, for a maximum of 4 credits. Attendance at dance concerts and music concerts is required. A. Fogelsanger.
Intended to expand choreographers' music vocabulary and skills through a survey of contemporary music for dance, the study of music and dance collaborations, and rhythm studies. Includes discussing and writing about concerts, recordings, and videotapes. May include rehearsing and performing music or dance. Syllabus varies depending on the students' experience.

THETR 233 Explorations in Movement and Performance (also Physical Education 440)
Fall. 0 or 1 credit. Limited to 16 students. Satisfies PE requirement if taken as PE. Attendance at dance concerts is required. J. Self.
A physically demanding exploration into various movement realms. Specific subjects covered are genderized movement, erotic power, spiritual power, 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 310 Intermediate Dance Composition I
Fall and spring. 3 credits. Prerequisite: THETR 210. Concurrent enrollment in THETR 212 and a technique class at the appropriate level is required. Fall, J. Self; spring, staff.
Intermediate choreographic projects will be critiqued in progress by faculty and peers. Consideration of design problems in costuming and lighting.

THETR 311 Intermediate Dance Composition II
Fall and spring. 3 credits. Prerequisite: THETR 310. Attendance at dance concerts is required. Concurrent enrollment in THETR 212 and a dance technique class at the appropriate level is required. Fall, J. Self; spring, staff.
A continuation of THETR 310.

THETR 410 Advanced Dance Composition I
Fall and spring. 3 credits. Prerequisite: THETR 311. Concurrent enrollment in THETR 212 and in a technique class at the appropriate level. Attendance at dance concerts is required. Fall, J. Self; spring, staff.
Students work on advanced choreographic problems, to be presented in performance. Work in progress will be critiqued by faculty on a regular basis.

THETR 411 Advanced Dance Composition II
Fall and spring. 3 credits. Prerequisite: THETR 410. Concurrent enrollment in THETR 212 and in a technique class at the appropriate level. Attendance at dance concerts is required. Fall, J. Self; spring, staff.
A continuation of THETR 410.

THETR 491 Senior Project in Dance
Fall or spring. 4 credits. Prerequisite: THETR 410 or permission. This course is limited to senior dance majors only.
Students who take this course will create a project in choreography and performance, dance film or video, dance pedagogy, or other appropriate area agreed upon with a member of the dance faculty. Senior projects that are to be performed, must be presented within one of the three regularly scheduled department concerts.

History, Criticism, and Theory

THETR 307 Asian Dance and Dance Drama (also Physical Education 427) @
Sec. 01. Indian Dance. Fall, D. Bor. Sec. 02. Japanese Noh Theatre. Not offered 1999–2000. Sec. 03. Indonesian Dance Theatre. Not offered 1999–2000.
This course is designed to give the student a practical working knowledge of Indian classical dance, specifically in the indigenous style of Orissa known as Odissi. The technique strengthens the body and develops grace, rhythmic expression, and dexterity that can benefit all forms of dance.

THETR 312 Physical Analysis of Movement
Fall. 3 credits. J. Morgenroth.
This course is an examination of human movement with particular attention to dance movement. Readings in texts on human anatomy, physiology, and kinesiology and in Sweigard's *Human Movement Potential*. Guest lectures by experts in anatomy and health areas. Practical and laboratory work. Demonstration of dissection.

THETR 314 Western Dance History I: 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 defining elements of classicism and determining why ballet is defined as classical. Texts, videotapes, and through live performance, the class will explore how ballet has perpetuated or confronted social issues of race, class, gender, sexuality, the body, and abuse.

THETR 315 Western Dance History II: History of Modern Dance
Spring. 4 credits. Attendance at dance concerts is required. J. Chu.
This class will study the course of modern dance in the twentieth-century United States. We will examine each generation of dancers, starting with Isadora Duncan and ending with performers emerging today. Issues of gender, cultural identity, elitism, and democracy will be discussed.

[THETR 317 Asian Dance II
0, 1 or 3 credits. Prerequisite: THETR 307 or previous training in Odissi Classical Dance. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. Not offered 1999–2000.
The continuation of THETR 307, Odissi Classical Dance. Emphasis is mainly on choreography as well as continuing to refine and perfect the basic movements learned in the preliminary course. Meets twice weekly for movement classes; an extra class will be arranged to learn the art of makeup.]

[THETR 319 Music, Dance, and Light
Fall. 3 credits. Attendance at dance concerts and music concerts is required. Not offered 1999–2000. E. Intemann, A. Fogelsanger, J. Morgenroth.
Artistic values, parameters, and concerns of music (sound design), dance, and lighting design are compared and contrasted, and the combination of design elements is analyzed in contemporary dance. Includes writing in response to readings, audio and video recordings, and performances. Some classes devoted to creating sound, movement, and lighting.]

[THETR 418 Seminar in History of Dance @
Spring. 4 credits. Attendance at dance performances is required. Not offered 1999–2000. B. Suber.
Topic for 1999: Digital Dance.]

THETR 490 Senior Paper in Dance
Spring. 4 credits. Prerequisite: THETR 418, senior standing. Attendance at dance concerts is required.
Under faculty direction, the student will write a senior paper in dance history, criticism, or theory.

Tracks toward admission into the advanced undergraduate theatre program

Design, Technology, and Stage Management

Recommended 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)

Recommended 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)

Recommended for costume design or costume shop management emphasis:
THETR 254 Theatrical Make-up Studio
THETR 351 Production Lab III (as Design Assistant)
THETR 356 Costume Construction Studio
THETR 366 Costume Design Studio I
Upon admission to the program: **THETR 451** Production Lab IV (at least 1 credit)

Recommended for Lighting Design or costume shop management emphasis:
THETR 252 Technical Production Studio I
THETR 351 Production Lab III (as Student Electrician)
THETR 351 Production Lab III (as Design Assistant)
THETR 362 Lighting Design Studio I
Upon admission to the program: **THETR 451** Production Lab IV (at least 1 credit)

Recommended for Sound Design emphasis:
THETR 251 Production Lab II (as Student Sound Technician)
THETR 252 Technical Production Studio I
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)

Recommended for Technical Direction emphasis:
THETR 252 Technical Production Studio I
THETR 256 Technical Production Studio II
THETR 340 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)

Recommended for Stage Management emphasis:
THETR 253 or **353** Stage Management Lab II or III—two assignments
THETR 280 Introduction to Acting
THETR 370 Stage Management Studio
THETR 398 Fundamentals of Directing I
Upon admission to the program: **THETR 453** Stage Management Lab IV

Directing

Recommended for 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

Recommended for 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
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.

UKRAINIAN

See Department of Russian.

URDU

See Department of Asian Studies.

VIETNAMESE

See Department of Asian Studies.

WELSH

See Department of Linguistics.

WOMEN'S STUDIES MAJOR

See "Special Programs and Interdisciplinary Studies."

WRITING PROGRAM

See John S. Knight Writing Program in the section, "Special Programs and Interdisciplinary Studies."

YIDDISH

See Department of Near Eastern Studies.

SPECIAL PROGRAMS AND INTERDISCIPLINARY STUDIES

Africana Studies and Research Center

J. Turner, director (255–5218); A. Adams, N. Assié-Lumumba, A. Bekerie, L. Edmondson, R. Harris, S. Hassan, A. Mazrui, A. Nanji, D. Ohadike. Offices: 310 Triphammer Road, 255–4625 or 255–4626.

The Africana Studies and Research Center is concerned with the examination of the history, culture, intellectual development, and social organization of Black people and cultures in the Americas, Africa, and the Caribbean. Its program is structured from an interdisciplinary and comparative perspective and presents a variety of subjects in focal areas of history, literature, social sciences, and African languages. African languages such as Swahili are consistently offered, while other languages, e.g., Mandinka and Yoruba are occasionally offered. African languages are also taught during summer/winter session.

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 (Swahili), 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 cetificate are a minimum of 18

credit hours, including the core courses. Students interested in the certificate program must contact Professor Adams (the center's undergraduate faculty representative) who will register them in the program and assign them a faculty adviser from their own college. The faculty adviser will be responsible for determining completion of the certificate requirements.

Honors. The honors program offers students the opportunity to complete a library research thesis, a field project in conjunction with a report on the field experience, or a project or experiment designed by the student. The requirements for admission to the honors program for all students—regular majors, joint majors, and double majors—are a B- cumulative average in all courses and a B+ cumulative average in the center's courses. Each student accepted into the honors program will have an honors faculty committee consisting of the student's adviser and one additional faculty member, which is responsible for final evaluation of the student's work. The honors committee must approve the thesis or project before May 1 of the student's junior year. The completed thesis or project should be filed with the student's faculty committee by May 10 of the senior year.

Language Requirement

Courses in Swahili may be used to satisfy the College of Arts and Sciences language requirement. In Swahili, successful completion of AS&RC 131, 132, 133, and 134 provides qualification, and the addition of 202 provides proficiency. AS&RC majors are not required to take an African language, but the center recommends the study of Swahili to complete the language requirement.

AS&RC 131 Swahili
Fall. 4 credits. Laboratory time to be arranged. A. Nanji.
Beginner's Swahili. Part 1—Grammar for speaking, reading, and writing. Requires no knowledge of language. Swahili is spoken in East and Central parts of Africa.

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 are invariably used in this course to help develop the student's comprehension of the language. Swahili tapes are highly utilized during all of these sequences.

AS&RC 133 Swahili
Fall. 4 credits. Prerequisites: Swahili 131 and 132. Language laboratory time to be arranged. 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. Faculty.
This course provides an examination of the evolution of the Black family from its roots in Africa, the evolution of family forms, the impact of social policy, and a consideration of the literature stressing family and child well-being. Among the major topics considered will be male/female relationships, childbearing and parental roles, the extended family, economic and health issues. The component of the course focusing on youth will primarily cover child and adolescent development.

AS&RC 172 The Education of Black Americans: Historical and Contemporary Issues
Spring. 3 credits. Faculty.
This course will be devoted to the history of educating Black Americans. Considerable attention will be given to contemporary issues. The major topics of focus will include an examination of the debates concerning the type of the education needed, public and private schooling efforts, the Africana Studies movement, community control issues, busing, affirmative action, re-segregation debates and new initiatives in education including vouchers, and charter schools.

AS&RC 191 Africa: The Continent and Its People @
Fall. 3 credits. L. Edmondson.
An introductory interdisciplinary course focusing on Africa's geographical, ecological, and demographic characteristics; indigenous institutions and values; the triple cultural heritage of Africanity, Islam, and Western civilization; main historical developments and transitions; contemporary political, economic, social, and cultural change. Africa's ties with the United States (from trans-Atlantic slavery to the present), its impact on the emerging world order, and its contribution to world civilization will also be explored.

AS&RC 202 Swahili Literature @
Fall. 4 credits. Prerequisite: Swahili 134. A. Nanji.
Students gain mastery over spoken Swahili and are introduced to the predominant Swahili literary forms.

AS&RC 204 History and Politics of Racialisation: A Comparative Study
Spring. 4 credits. A. Bekerie.
The primary focus of this course will be on the historical and contemporary significance of racialisation in the United States and South Africa with regard to societal development and inter-relations. It will include an analysis of the historical development of racialised barriers as an instrument of power and privilege. The ways with which racialisation is used as an instrument of ideology to social status, cultural hierarchy and economic positions will also be examined. Particular emphasis will be given to the development and perpetuation of scientific racism in both places. The apparent success against Jim Crow form of racism in the United States and apartheid in South Africa appears to transform racism into subtle and 'scientific' sphere. This transformation and its continued impact in perpetuating social inequality will be further analyzed.

AS&RC 205 African Cultures and Civilizations # @
Spring. 3 credits. D. Ohadike.
This course is concerned with the peoples of Africa and the development of African cultures and civilizations from the earliest times to the present day. It focuses on the near modern civilizations of Africa south of the Sahara, and the ancient civilizations of Egypt and the Nile Valley, together with their contributions to the development of the major world civilizations. The course also deals with the socio-political organization of African societies, their kinship systems, cross-cutting ties, rites of passage, gender relations, arts (including music, dance, folklore, architecture, sculpture, painting, and body decoration).

AS&RC 210 Major Works of Black World Writing
Fall. 3 credits. A. Adams.
This course surveys classic texts by African American, Caribbean, and African writers. The focus is on literary texts by authors such as Langston Hughes, Toni Morrison, James Baldwin, Maryse Conde, and Chinua Achebe, with a view toward analyzing common experiences, references, themes, and literary strategies across the Black world. The works of fiction, poetry, and drama that constitute the central material of the course are supplemented by essays and biographies from other authors who have influenced the creative vision and the movement of the peoples of Africa and the Diaspora, e.g., W.E.B. DuBois and Marcus Garvey, Nelson 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 political philosophy and historical significance of Malcolm X, and the work and movement of Marcus Garvey, as the prime movers of nationalism and pan-Africanism among Black people in this century. Such themes as slave resistance, nationalism, Pan-Africanism, emigration, anti-imperialism, socialism and internal colonialism, and the political and social views of Black women will be discussed. Black political thought will be viewed in its development as responses to concrete conditions of oppression and expression.

[AS&RC 265 African American Literature in the 20th Century
Fall. 3 credits. Not offered fall 1999. Faculty.
This course provides an overview to major works in African American literature from 1900 to the 1980s. Focusing on significant moments in the tradition, the readings highlight literary movements, their advocates, and their detractors. Divided into four units, the literary works come from the Post-Reconstruction period, Harlem Renaissance, Socialism, Realism, and Modernists of the 1930s and 1940s, the Black Arts Movement of the 1960s and 1970s, and the Womanist critiques from the mid 1970s through the 1980s. In addition to a range of periods and styles, this course includes a range of genres, such as the autobiography, poetry, essay, short story, drama, and novel.]

AS&RC 271 Introduction to African Development (also CRP and Government 271) @
For description, see CRP 271.

[AS&RC 280 Race, Power, and Privilege in the United States (formerly Racism in American Society)
Fall. 3 credits. Not offered fall 1999.
D. Barr and J. Turner.
This course will be a topical treatment of the history and theory of racism in the United States. The course will begin with an examination of basic concepts and theories of racism. From there we will examine the history of racial groups in America—African-Americans, Native Americans, Asian Americans, and the Hispanic groups. Particular attention will be paid to the political economy of racism and the sociological and the psychological aspects of race relations in America, with specific reference to the differences and intersections of race, class, gender, and ethnicity.]

AS&RC 283 History of Resistance Movements in Africa and the Diaspora @
Fall. 3 credits. D. Ohadike.
This course deals with the history of resistance and liberation movements in Africa, Brazil, the Caribbean, and the United States. It is concerned with the dialectical relationships between European domination and Black resistance. It examines the methods, strength, and complexity of Black resistance and liberation, together with the rise of revolutionary classes in Africa and the Diaspora. It draws attention to the importance of unity and organization in resistance and then shows similarities, connections, and continuities in Black resistance. Finally, it demonstrates that African background helped to shape the nature of struggles for independence and civil liberties in the Caribbean, Brazil, and the United States.

AS&RC 290 The Sociology of the African-American Experience
Fall. 3 credits. J. Turner.
This is an introductory course to the field of Africana Studies. It assumes a historical/sociological approach to the examination of the African-American experience. The course surveys the African beginnings of human kind and the classical role of Black people in world civilization and the making of early culture. The course treats issues in the humanities, social sciences, and history. This course is required for all undergraduate students majoring at the Africana Center.

AS&RC 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 sociocultural 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, quiltmaking, 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 "improvisation," "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, ritual, and cosmology. 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. A. Mazrui.
Power and political participation in Africa. The colonial background and its political consequences. The pre-colonial continuities in the post-colonial politics. Ethnicity and allegiance in the African polity. The monarchical tendency in African political culture. From the warrior tradition to the military coup in the post-colonial era. From the elder tradition to presidential gerontocracy. From the sage tradition to intellectual meritocracy. Class *versus* ethnicity in African politics. The one-party *versus* the multiparty state. Socio-cultural *versus* socio-economic ideologies. The gender question in African politics. The soldier and the state. The African political experience in a global context.

AS&RC 352 Pan-Africanism and International Politics
Spring. 3 credits. L. Edmondson.
Pan-Africanism addresses the shared experiences and aspirations of African people around the world, focused on a search for greater linkages and unifying measures. Informed by an exploration of the racial factor in international relations, this course will examine Pan-African theories, ideologies, and movements, past and present, in their political, socio-economic, and cultural manifestations, focusing mainly on the African continent, the Caribbean, and Black America.

AS&RC 362 Global Perspectives on Gender
Spring. 4 credits. N. Assie-Lumumba.
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 member 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.

AS&RC 380 African History: Earliest Times to 1800 # @
Fall. 3 credits. A. Bekerie.
As the second largest continent with vast and varying geographical and sociocultural conditions combined with recently established fact as an original home of human species, Africa provides rich and diverse oral and written early history. The course covers some of the major historical signposts from the origins of human species to 1800. Among the topics for discussion are: Historical Perspectives and Sources, The Nile River Cultural Complex, Berber, Carthage and Maghreb of North Africa, Upper Guinea and Western Sudan of West Africa, Cities of the East African Coast, and Great Zimbabwe and other sites of Southern Africa.

AS&RC 381 African History, 1800–Present @
Spring. 3 credits. D. Ohadike.
This is a survey of African history in the nineteenth and twentieth centuries. It deals with African revolutions in the nineteenth century; the ending of the slave trade and the politics of the abolition; European scramble and partition of Africa; resistance to European colonial conquest; African societies in the colonial period; the politics of decolonization; Neo-colonialism; the rise and decline of military regimes; African debt crisis; and conflict and reconciliation in Africa.

AS&RC 404 Afrocentricity: Paradigm and Critical Readings
Fall. 4 credits. A. Bekerie.
What is Afrocentricity? It is a theoretical framework designed to study and interpret the histories and cultures of peoples of Africa and African descent by locating them at the center of their experiences. In other words, it is a method of knowing the life experiences of African peoples from the inside out. The course will examine—through the writings of Asante, Keto, Clarke, Jean, Myers, Amin, Mazrui, Gates, Appiah, Richards, Schlesinger and T'hiongo—the conception and depth of the paradigm, its relevance in the production and utilization of knowledge, particularly emancipatory knowledge, the history of the paradigm, and the debate it generates among a wide range of thinkers and scholars.

AS&RC 410 African American Politics
Spring. 4 credits. J. Turner.
The central thesis of African American politics has been its movements for political change and democratic access and human rights. This development since the seventeenth century is a complex political legacy. This course will conduct a close study of African American political practice and theoretical analysis of the American political system. Implications of the political systems for prospects and limitations to participation by Black people will be analyzed. Critical historical stages in the process of Black politics will be examined. The development of electoral offices in federal and statewide politics, and the significant urban political power bases giving rise to African American mayoralty politics in critical industrial centers, as well as rural hamlets will center the course. Presidential politics—the Jesse Jackson campaigns—and new political formations including Black Republicans/conservatives will constitute the emphasis on contemporary events. The course will review the development of the literature in African American politics.

AS&RC 420 Public Policy and the African American Urban Community
Spring. 4 credits. J. Turner.
The socioeconomic conditions of the African American urban community will be the central focus of the course. Community development models will be explored in relationship to the social needs of the African American population. The changing configuration of internal organization of the African American community nationally will be examined.

AS&RC 422 African Literature @
Spring. 4 credits. 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 this course will be approached in terms of these issues of "African development" and "the universal human experience."

[AS&RC 425 African American Performance Genres and Traditions
Spring. 4 credits. Not offered spring 2000. Faculty.
This course introduces students to the various genres in African American verbal performance practices, including poetry, rap, sermons, drama, and the performance of self in every day life. Students will perform as well as observe, read, and write critical commentary on contemporary black performance. Performance is broadly defined to include performance of the self in every day life as well as formally staged productions. Thus, students will have the opportunity to observe performance of identity in a range of black social settings. Blending analysis and practice, we begin with everyday life performances and end with staged presentations of scenes from the African American theatrical repertoire.]

AS&RC 435 African Cinema (also Society for the Humanities 435) @
Spring. 4 credits. S. Hassan.
This course offers an overview of African cinema and filmmaking. 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. The course offers a unique opportunity of looking at African culture and society, and at issues of social change, gender, class, tradition, and modernization through African eyes.

AS&RC 451 Politics and Social Change in the Caribbean @
Fall. 4 credits. L. Edmondson.
A study of the historical, geostrategic, political, economic, and social (including racial and cultural) forces bearing on the domestic and international experiences of Caribbean societies. Special attention will be given to conflicting definitions and perceptions of the Caribbean; contending theories of Caribbean social structure and models of development; the continuing salience of struggles for change and transformation; prospects of regional integration; and Caribbean challenges to the global system, especially with regard to the region's relations with the United States and the region's position in the Third World in the context of the North-South cleavage.

AS&RC 455 Caribbean Literature @
Fall. 4 credits. A. Adams.
This course will examine the prose literature of the Caribbean islands. Through the reading of several novels and short stories from the various languages and cultural strains that comprise the Caribbean societies, students will study the points of commonality and the diversity within this body of literature. The recurrence of certain historical, social, and cultural issues that have formed the multi-ethnic Caribbean peoples will be analyzed in their varying manifestations across the linguistic and other boundaries to uncover the underlying shared experience.

AS&RC 459 Education in Africa and the Diaspora @
Fall. 4 credits. N. Assié-Lumumba.
This course deals with educational innovations geared to promoting equal opportunity based on gender, race and class, in Africa and the African diaspora. After an introduction on the concepts of education and innovations and the states of innovation as planned change, the course will focus on concrete historical and contemporary cases of educational innovations. The case studies in the United States include the creation and expansion of historically black institutions such as Lincoln University, Spelman College, Tuskegee Institute (now Tuskegee University), and other schools in the South, and the Westside Preparatory School in Chicago. The African cases to be studied include African languages for instruction with a focus on a Nigerian case, Ujamaa and education for self-reliance in Tanzania, and the case of Cote d'Ivoire which adopted television as a medium of instruction.

AS&RC 468–469 Honors Thesis
Hours to be arranged. 468, fall; 469, spring. Africana Center faculty.
For senior Africana Studies majors working on honors theses, with selected reading, research projects, etc., under the supervision of a member of the Africana Studies and Research Center faculty. Permission of the AS&RC director of undergraduate studies is required.

AS&RC 475 Black Leaders and Movements in African-American History
Fall. 4 credits. R. Harris.
Analyzes the personalities, ideas, and activities central to the struggle for African-American liberation from the eighteenth-century to the present. Examines theories of leadership and the structure of protest movements with the goal of understanding current leadership needs and trends among African Americans.

AS&RC 478 Family and Society in Africa @
Fall. 4 credits. N. Assié-Lumumba.
The family as a social institution is structured according to socio-economic, historical, political, and cultural specificities. This is the frame in which the family in Africa and the African diaspora must be analyzed. The topics to be discussed in this course include the concepts of nuclear and extended family, the place and role of different age groups and generations in the family, marriage and its related issues, parenthood, childrearing, gender roles, class differences, and "family planning." This course also deals with the impact of westernization, urbanization, and modern economy on the structure of the family in Africa as well as the legacy of African family values in the African diaspora with a focus on the African American case.

AS&RC 479 Women and Gender Issues in Africa @
Spring. 4 credits. N. Assié-Lumumba.
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/pre-colonial societies; the impact of colonial policies on the status of women; gender and access to schooling, participation in the economy and politics; women and the law; women and health issues; gender issues in southern Africa; womanism and feminism; the United Nations Decade of Women and the four World Conferences on Women (Mexico 1975, Copenhagen 1986, Nairobi 1985, and Beijing 1995).

AS&RC 483 History of African Political Thought @ #
Fall. 4 credits. D. Ohadike.
The purpose of this course is to provide students with a thorough knowledge of the history of African political thought and ideologies, from ancient times to the present.

This course is divided into two broad sections. The first section looks at the history of African political thought and institutions in ancient and near modern times and explains the functioning of African communalism. It then goes on to show how western political thought in the nineteenth and early twentieth centuries instigated the revival of such ideas as Uhuru, Negritude and African Humanism.

The second section examines the history of anti-colonial political thought. It explains why the colonial intelligentsia and radical African nationalists developed such political ideologies as African socialism, Lumumbism, and Nkrumaism. The course also looks at socio-political thought in African literature, and explores the contributions of African religious thought (like Kimbanguism and Tokoism) to the development of African political culture. Among the works of the major African political thinkers to be studied are those of Casely Hayford, Leopold Sédar Senghor, Simon Kimbangu, Amilcar Cabral, Frantz Fanon, Kwame Nkrumah, Patrice Lumumba, Nnamdi Azikiwe, Julius Nyerere, Jomo Kenyatta, Nelson Mandela, and Steve Biko.

AS&RC 484 Politics and Social Change in Southern Africa @
Spring. 4 credits. L. Edmondson.
This course focuses on the legacies of apartheid and the challenges of transformation toward a post-apartheid society in South Africa. Topical emphases include: the rise and decline of apartheid; the historical continuity of Black resistance against racism; women under, against, and after apartheid;

South Africa's relations with its neighbors; geo-political, economic, and racial dimensions of the American connection; politics of negotiation and transition to majority rule; prospects for stability, democracy and equality; South Africa's new role in the African continental and global arenas. Instructor's lectures will be supplemented by films and class discussions.

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 @
Spring. 4 credits. A. Mazrui.
This seminar will address two diasporas in the Black experience. The *diaspora of enslavement* concerns slaves and descendants of slaves in both the Western and Eastern Diaspora. The *diaspora of colonization* concerns demographic dispersal as a result of colonialism. African-Americans are in their majority part of the Diaspora of Enslavement. Recent Algerian immigrants into France are part of the Diaspora of Colonization. Jamaicans and Trinidadians in Britain are part of a *double diaspora*—products of both enslavement and colonialism. The course will address these areas of Black comparison: Comparative Slavery—A Triple Heritage; Race and Race Mixture in Four Traditions; Comparative Emancipation from Slavery; Comparative Liberation from Colonialism; Comparative Struggle for Civil Rights; The Gender Question in Global Africa; Comparative Quest for Global Equality.

AS&RC 502 Education and Development in Africa @
Spring. 4 credits. N. Assié-Lumumba.
In the 1950s and 1960s, the human capital theory that emphasizes the importance of formal education for achievement of full productive potential of individuals and countries enjoyed a renewed popularity. African countries promoted educational expansion with the expectation that it would lead to socio-economic development. The initial euphoria, however was followed by skepticism and then disillusion. Education began to be perceived even as a hindrance to development. This course examines the relationship between formal education and individual and national development. In this seminar, different paradigms of development including modernization and dependency theories and Third World Forum are presented with an emphasis on the perceived and actual roles of education in individual and national development.

AS&RC 503 African Aesthetics @
Fall. 4 credits. S. Hassan.
The goal of this course is to investigate in depth the principles of aesthetics and philosophy of African visual arts. The course will offer a critical survey of the different writings and the growing body of research on this relatively new area of inquiry. The objectives 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.

AS&RC 504 Political Change in Africa
Fall. 4 credits. A. Mazrui.
The study of Africa can be approached either dialectically (focusing on the tension between opposing forces) or thematically (focusing on themes as chapters of experience). This course will borrow from both those approaches. In their class assignments and examinations students are free to use either approach.

The first approach will explore the dialetic between continuity and change; tradition and modernity; dependency and liberation; foreign and indigenous influences; anarchy and order; political decay and political development; democracy and authoritarianism; socialism and capitalism. The thematic approach will examine African Nationalism; race consciousness and Pan-Africanism; political parties and interest groups; executive power; ethnicity in politics; class-formation; civil-military relations; economic and cultural dependency; sub-regional and continental Pan-Africanism; crisis of the African state; and Africa in World Politics.

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.
Studies the way Black historians in particular have explained the African-American past. Examines the development of writing African-American history during the twentieth century. Seeks to determine the principles for interpreting African-American history. Acquaints participants with the methodologies and sources central to understanding the African-American experience.

AS&RC 530 Womanist Writing in Africa and the Caribbean @
Spring. 4 credits. A. Adams.
Theoretical essays on the nature, relevance, and articulation of feminist thought from African and Caribbean writers will complement literary texts. Gender issues, as manifested both at home and in emigrant situations abroad will be examined in texts by such writers as Sistren, Conde, Dangarembga, Aidoo, Warner-Vieyra, Ba, Emecheta, Kincaid, W. Mandela. (Francophone works may be read in the original by individuals who so desire.)

AS&RC 598–599 Independent Study
598–fall; 599–spring. Variable credit. For all graduate students.

AS&RC 601–602 Africana Studies Graduate Seminar
601, fall; 602, spring. 4 credits. Africana Studies faculty.
This course, which will be conducted as a seminar, is designed for first-year AS&RC graduate students. It will be coordinated and supervised by one professor but team-taught by three or four faculty per semester. Each participating faculty will be responsible for a topical *segment* of the course related to her/his areas of specialization or an area of interest pertaining to theory and methodology of Africana Studies.

AS&RC 698–699 Thesis
698, fall; 699, spring. Limited to Africana Studies and Research Center graduate students.

Agriculture, Food, and Society Concentration

A. G. Power, coordinator; G. Altschuler, M. M. Devine, emeritus; M. J. Esman, J. Fessenden MacDonald, C. C. Geisler, A. Gillespie, B. Ginsberg, D. J. Greenwood, S. L. Kaplan, D. R. Lee, T. J. Lowi, T. A. Lyson, P. L. Marcus, P. McMichael, V. Nee, D. I. Owen, D. Pimentel, N. T. Uphoff, D. Usner. Office: 275 Clark Hall, 255–6042.

Agriculture, Food, and Society is an interdisciplinary concentration that is designed to introduce students to the study of agricultural and food issues from diverse perspectives within the liberal arts. The 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.

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 B&Soc/BioG/S&TS 469, Food, Agriculture, 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 sciences) distribution sequence requirements in the College of Arts and Sciences.

It is recommended (but not required) that students in the Agriculture, Food, and Society concentration elect one or more freshman

writing seminars with agriculturally related content to meet basic college requirements for graduation. 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 six of the 15 credits may be earned in 100-level courses.

In addition, students are required to take the senior seminar, B&Soc/BioG/S&TS 469, Food, Agriculture 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.

American Studies

R. L. Moore, director; G. Altschuler, P. Becker, R. Bensel, S. Blumin, T. Borstelmann, J. Brumberg, P. Caban, J. E. Gainor, M. C. Garcia, J. Goldsby, M. Kammen, I. Kramnick, T. J. Lowi, B. Maxwell, D. E. McCall, L. L. Meixner, M. B. Norton, R. Polenberg, J. Porte, J. Rabkin, N. Salvatore, S. Samuels, M. E. Sanders, V. Santiago-Irizarry, M. Shefter, J. H. Silbey, H. Spillers, D. Usner, M. Washington, S. Wong.

Affiliated faculty: J. E. Bernstock, H. Gottfried, M. Hatch, L. Herrin, J. Jennings, P. McClelland, J. Peraino, P. Sawyer, M. Woods.

The Major

The major in American Studies, appropriate for a wide array of future professions, began as a program of coordinated study in the history, literature, and politics of the United States. These remain the core elements, but American Studies aims to be inclusive in its subject matter. Given the nation's diverse population and cultures, the program wants its majors to examine American experience in broad terms, drawing on the materials and methods of a variety of disciplines.

The prerequisites are two courses from the following: American Studies 101, American Studies 102, English 262, English 265, English 275, English 268, Government 111, History 101, History 102, History 260, History 261. Students who contemplate becoming an American Studies major are encouraged to speak with the program director 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) chosen from the American Studies course list (these courses are usually crosslisted with another department). Their work must include courses in all of the three large periods into which the nation's development can be divided (colonial, nineteenth century, and twentieth century). Students must take no fewer than 4 courses before 1900. At least one of these courses must be in the period before 1800. Each student must also take one of American Studies 430 seminars or, with the approval of the adviser, an appropriate substitute seminar at the 400 level. (American Studies 500 taught in Washington, DC, does not fulfill the seminar requirement.) Students are given considerable freedom in creating a balanced program, but no more than five courses may be in any one department.

Beyond the basic core requirements for the major, 8 credits of work in the history or literature of a culture outside the United States are required. Students who study abroad for one semester usually satisfy this requirement.

Students may find courses relevant to American experience that they wish to take but that are not on the American Studies course list. With their adviser's approval, students may count two such courses towards fulfilling the major.

Honors

Candidates for honors must maintain an average of B+ in courses pertinent to the major. Normally, at the end of the junior year students who wish to write a senior honors essay must approach a member of the American Studies Program faculty and discuss their ideas for a project. With approval from the faculty member students may then register in the fall of their senior year for American Studies 493, the honors essay tutorial. At the end of the fall semester, honors candidates will meet with their adviser and a second member of the American Studies faculty to discuss their progress. If satisfactory, honors students will complete their honors essays in the spring by enrolling in American Studies 494.

Prerequisite Courses (see also under appropriate departments)

AM ST 101 Introduction to American Studies: American Revolution to the Beginning of the 20th Century #

Fall. 4 credits. G. Altschuler and D. McCall.

In this interdisciplinary course we will analyze American values and behavior as the intersection of culture, politics, literature, and society. We will do so by examining eight "great" or classic texts written between 1776–1900. The historical context of these texts will be explored in lecture and they will be treated as literature and historical/cultural documents. Texts include: *Common Sense* by Thomas Paine; *The Blithedale Romance* by Nathaniel Hawthorne; The Lincoln-Douglas Debates; Henry James' *The Bostonians*; Mark Twain's *Huckleberry Finn*; and William Dean Howells' *The Rise of Silas Lapham*.

AM ST 102 Introduction American Studies: Progressive Era to the Present

Spring. 4 credits. G. Altschuler and D. McCall.

In this interdisciplinary course we will analyze American values and behavior as the intersection of culture, politics, literature, and society. We will do so by examining eight "great" or classic texts written between 1900 and the present. Texts include: Ernest Hemingway's *A Farewell to Arms*; F. Scott Fitzgerald's *The Great Gatsby*; William Faulkner's *Sound and the Fury*; Richard Wright's *Black Boy*; John Updike's *Rabbit Run*; and Philip Roth's *American Pastoral*.
American Studies 101 is not a prerequisite of American Studies 102.

American Studies 430 Seminars

Section One: The Politics of the American Civil War (also Government 408)

Fall. 4 credits. R. Bensel.

The Civil War, along with the founding of the nation in the late eighteenth century, is one of the two most important influences on the course of American Political development. Arising out of intense ideological, cultural, and economic competition between the slave South and the free labor North, the conflict created two new national states: a northern Union that replaced the loose federation of the antebellum period and a southern Confederacy that perished at Appomattox. In this course, particular attention will be paid to: (1) the political economy and culture of plantation slavery in the antebellum South; (2) the apparent inevitability of collision between the slave and free states and their respective societies; (3) the military, political, and economic strategies that determined, on both sides, the course and duration of the war; (4) the limits and possibilities of reform of southern society during Reconstruction; and (5) the impact of the Civil War on the subsequent development of the United States.

Section Two: American in the Camera's Eye (also History 430)

Fall. 4 credits. R. L. Moore.

Photographs and films have become archives for historical research. From the era of Matthew Brady's Civil War images, the United States has been recorded by documentary photographers who have called attention to the country's progress and its poverty. Hollywood filmmakers have also recorded endless images of American landscape and placed against that landscape fictionalized accounts of the country's history and its social problems. What can we learn from these images? What is their relation to written texts and to other documents that tell us about the past? How truthful is documentary? How misleading is Hollywood? One key text will be James Agee's and Walker Evans' *Let Us Now Praise Famous Men*. The seminar will meet once each week for discussion and periodically during the semester to view films.

Section Three: Literature as History: The Americas (also English 430)

Spring. 4 credits. B. Maxwell.

Beginning with William Carlos Williams's *In the American Grain* (1925), this course will consider modernist innovations in the telling of history by literary means. Responding to what they felt as the "deadness" of conventional historiography, writers such as Williams, Charles Reznikoff, John Sanford, Muriel Rukeyser, Melvin Tolson, and Paul Metcalf produced imaginative American histories that made a new world of historical narration, and in the process found new objects of historical attention, one of which was the plural, transnational America of the hemispheric Americas. This reconfiguration anticipated and in some cases shaped recent revisionist critiques of the European presence on American soil (Eduardo Galeano, Leslie Marmon Silko, David Stannard, Ward Churchill, Noam Chomsky, Ana Castillo); accordingly, students will read examples, some polemical, of that later work.

Anthropology, Sociology, and Economics

[AM ST 150 Introduction to American Religion (also Sociology 150 and Religious Studies 150)
3 credits. Not offered 1999–2000. P. Becker.
For description, see SOC 150.]

[AM ST 203 Religion and Family in the U.S. (also Sociology 201, Rural Sociology 202, Religious Studies 203)
3 credits. Not offered 1999–2000. P. Becker.
For description, see SOC 201.]

[AM ST 221 Anthropological Representation: Ethnographies of Latino Culture (also Anthropology 221 and Latino Studies Program 221)
Not offered 1999–2000. V. Santiago-Irizarry.
For description, see ANTHRO 221.]

AM ST 323 American Economic History (also Economics 323) #
Spring. 4 credits. P. McClelland.
For description, see ECON 323.

AM ST 377 The United States (also Anthropology 377 and Latino Studies Program 377)
Fall. 4 credits. V. Santiago-Irizarry.
For description, see ANTHRO 377.

[AM ST 380 Gender, Ideology, and Culture (also Sociology 380 and Women's Studies 380)
Not offered 1999–2000. 4 credits. P. Becker.
For description, see SOC 380.]

[AM ST 426 History of American Enterprise (also Economics 426) #
4 credits. Not offered 1999–2000. P. McClelland.
For description, see ECON 426.]

Literature and Theatre Arts

AM ST 215 Comparative American Literature (also Comparative Literature 215)
Fall. 4 credits. B. Maxwell.
For description, see COM L 215.

AM ST 240 Survey in US Latino Literature (also English 240)
Spring. 4 credits. M. P. Brady.
For description, see ENGL 240.

AMST 260 Introduction to American Indian Literature (also English 260)
Fall. 4 credits. R. Warrior.
For description, see ENGL 260.

AM ST 262 Asian American Literature (also English 262, Asian American Studies 262)
Fall. 4 credits. S. Wong.
For description, see ENGL 262.

AM ST 265 Introduction to African American Literature (also English 265)
Fall. 4 credits. J. Goldsby.
For description, see ENGL 265.

[AM ST 267 American Literary Identities: Nineteenth Century (also English 267)
Not offered 1999–2000.]

AM ST 268 The Culture of the 1960s (also English 268)
Fall. 4 credits. P. Sawyer.
This course argues that the 1960s helps define the 1990s, but that as we look back, the 1990s helps define the 1960s. Were the sixties a time of dangerous experimentation with drugs, sex, and alternative lifestyles on the part of a pampered generation that gradually learned to straighten up and join the mainstream? Or was it a time of revolutionary hopefulness, when the civil rights movement and the Vietnam War stimulated an empassioned critique that changed American society? What can the experiences of young "boomers" contribute to a later generation, the last of the twentieth century? The course explores these and other questions by focusing on the topics of racial justice, war, the counterculture, the New Left, and the woman's movement. Texts will include *The Autobiography of Malcolm X, The Electric Kool-Aid Acid Test, Dispatches*, the poems of Allen Ginsburg and Adrienne Rich, films, music, speeches, manifestoes, and memoirs. The term paper will explore students' special interests.

AM ST 275 The American Literary Tradition (also English 275)
Fall. 4 credits. H. Spillers.
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.

[AM ST 276 Literature in the Cold War Culture (also English 276)
Not offered 1999-2000. B. Maxwell.
For description, see ENGL 276.]

AM ST 291 American 1920s: Literature and Culture (also English 291)
Fall. 4 credits. B. Maxwell.
For description, see ENGL 291.

AM ST 318 Queer Theatre (also Theatre Arts 320)
Spring. 4 credits. E. Gainor.
For description, see THETR 320.

[AM ST 334 American Drama and Theatre (also Theatre Arts 336 and English 336)
4 credits. Not offered 1999–2000. E. Gainor.
For description, see THETR 336.]

[AM ST 335 Contemporary American Theatre (also Theatre Arts 337 and English 337)
4 credits. Not offered 1999–2000. E. Gainor.
For description, see THETR 337.]

AM ST 338 American Indians and Film (also Theatre Arts 338)
Fall. 4 credits. L. Black.
For description, see THETR 338.

AM ST 361 Early American Literature (also English 361)
Spring. 4 credits. S. Samuels.
For description, see ENGL 361.

AM ST 362 The American Renaissance (also English 362)
Fall. 4 credits. J. Porte.
For description, see ENGL 362.

AM ST 363 The Age of Realism and Naturalism (also English 363)
Spring. 4 credits. J. Goldsby.
For description, see ENGL 363.

[AM ST 364 American Literature Between Wars (also English 364)
4 credits. Not offered 1999–2000.
For description, see ENGL 364.]

[AM ST 365 American Literature Since 1945 (also English 365)
4 credits. Not offered 1999–2000. B. Maxwell.
For description, see ENGL 365.]

[AM ST 366 The Nineteenth-Century American Novel (also English 366)
4 credits. Not offered 1999–2000. D. McCall.
For description, see ENGL 366.]

[AM ST 367 The Modern American Novel (also English 367)
Not offered 1999–2000.]

[AM ST 369 Survey of African American Literature to 1917 (also English 375)
4 credits. Not offered 1999–2000. J. Goldsby.
For description, ENGL 375.]

[AM ST 370 Survey in African American Literature: 1918 to Present (also English 376)
4 credits. Not offered 1999–2000. H. Spillers.
For description, see ENGL 376.]

[AM ST 371 American Poetry to 1950 (also ENGL 371)
4 credits. Not offered 1999–2000. R. Gilbert.
For description, see ENGL 371.]

AM ST 372 American Poetry Since 1950 (also English 378)
Fall. 4 credits. R. Gilbert.
For description, see ENGL 378.

[AM ST 374 19th-Century American Women Writers (also English 374 and Women's Studies 378) #
4 credits. Not offered 1999–2000. Staff.
For description, see ENGL 374.]

AM ST 394 Topics in American Indian Literature: Native Cultural Studies (also English 394)
Spring. 4 credits. Staff.
For description, see ENGL 394.

[AM ST 465 Proseminar in American Studies (also English 465)
4 credits. Not offered 1999–2000. J. Porte.
For description, see ENGL 465.]

[AM ST 467 Studies in American Fiction: 1870–1915 (also English 467)
4 credits. Not offered 1999–2000.]

AM ST 469 William Faulkner (also English 469)
Fall. 4 credits. H. Spillers.
For description, see ENGL 469.

AM ST 470 Studies in the Novel: Hemingway, Fitzgerald, Faulkner (also English 470)
Spring. 4 credits. D. McCall.
For description, see ENGL 470.

[AM ST 471 American Indian Women's Literature (also English 471)
4 credits. Not offered 1999–2000.
For description, see ENGL 471.]

[AM ST 473 American Indian Autobiography (also English 473)
4 credits. Not offered 1999–2000.
For description, see ENGL 473.]

[AM ST 474 Contemporary African American Poetry (also English 474)
4 credits. Not offered 1999–2000.
K. McClane.
For description, see ENGL 474.]

AM ST 479 Jewish-American Writing (also English 479 and Jewish Studies 478)
Fall. 4 credits. J. Porte.
For description, see ENGL 479.

[AM ST 485 American Modernist Writing (also English 485)
4 credits. Not offered 1999–2000.]

Government and Public Policy

GOVT 111 Introduction to American Government and Politics
Fall. 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.

AM ST 302 Social Movement in American Politics (also Government 302)
Spring. 4 credits. M. E. Sanders.
For description, see GOVT 302.

AM ST 305 Public Opinion and Political Participation (also Government 304)
Fall. 4 credits. J. Cowden.
For description, see GOVT 305.

AM ST 306 Latino Politics in the United States (also Government 306)
Spring. 4 credits. P. Caban.
For description, see GOVT 306.

AM ST 310 Civil Liberties in the United States (also Government 327)
Spring. 4 credits. J. Rabkin.
For description, see GOVT 327.

AM ST 315 Prisons (also Government 314)
Spring. 4 credits. M. Katzenstein.
For description, see GOVT 314.

[AM ST 316 The American Presidency (also Government 316)
4 credits. Not offered 1999–2000.
M. E. Sanders.
For description, see GOVT 316.]

AM ST 319 The American Congress (also Government 318)
Spring. 4 credits. M Shefter.
For description, see GOVT 318.

AM ST 328 Constitutional Politics: The United States Supreme Court (also Government 328)
Fall. 4 credits. J. Rabkin.
For description, see GOVT 328.

AM ST 350 Atomic Consequences: The Incorporation of Nuclear Weapons In Postwar America (also Science and Technology Studies 350, Government 305)
Spring. 4 credits. M. Dennis.
For description, see S&TS 350.

AM ST 353 Feminism Movements and the State (also Government 353, Women's Studies 353)
Fall. 4 credits. M. Katzenstein.
For description, see GOVT 353.

[AM ST 376 American Political Thought from Madison to Malcolm X (also Government 366 and History 316) #
4 credits. Not offered 1999–2000.
I. Kramnick.
For description, see GOVT 366.]

[AM ST 388 Science in the American Polity, 1800–1960 (also Science and Technology Studies 390, Government 308)
Fall. 4 credits. Not offered 1999–2000.
M. Dennis
For description, see S&TS 390.]

AM ST 389 Science in the American Polity, 1960-Now (also Science and Technology Studies 391, Government 309)
Spring. 4 credits. M. Dennis.
For description, see S&TS 391.

AM ST 409 Racial Prejudice and Political Intolerance (also Government 409)
Spring. 4 credits. J. Cowden.
For description, see GOVT 409.

AM ST 418 The Politics of Scandal (also Government 419)
Spring. 4 credits. M. Shefter and J. Rabkin.
For description, see GOVT 419.

AM ST 428 Government and Public Policy: An Introduction to Analysis and Criticism (also Government 428)
Fall. 4 credits. T. Lowi.
For description, see GOVT 428.

AM ST 429 Government and Public Policy: An Introduction to Analysis and Criticism (also Government 429)
Spring. 4 credits. T. Lowi.
For description, see GOVT 429.

History

AM ST 103 Introduction to American History (also History 101) #
Fall. 4 credits. D. Usner.
A survey of American history from the beginning through the Civil War. Topics include cultural encounters in the age of Columbus, European colonization, the American Revolution, the early republic, antebellum reform movements, and the coming of the Civil War.

AM ST 104 Introduction to American History (also History 102)
Spring. 4 credits. M. C. Garcia.
An introductory survey of the development of the United States since the Civil War.

[AM ST 201 Popular Culture in the United States, 1900–1945
Fall. Not offered 1999–2000.
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 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–Present
Spring. 4 credits. Not offered 1999–2000.
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 less powerful, seek to "control" images and themes. Topics for 202 include: The "Honeymooners" 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 204 Comparative Migration in the Americas (also History 202)
Fall. 4 credits. Not offered 1999–2000.
M.C. Garcia.
For description, see HIST 202.]

AM ST 208 Seminar: Era-Franklin D. Roosevelt (also History 208)
Fall. 4 credits. R. Polenberg.
For description, see History 208.

AM ST 214 Seminar on American Foreign Policy (also History 214)
Fall. 3 credits. Prerequisite: permission of instructor. W. LaFeber.
For description, see HIST 214.

AM ST 241 History of Childhood in the United States (also Human Development and Family Studies 241 and History 271)
Fall. 4 credits. J. Brumberg.

AM ST 251 Black Religious Traditions from Slavery to Freedom (also History 251 and Religious Studies 251)
Spring. 4 credits. M. Washington.
For description, see HIST 251.

[AM ST 258 Historical Development of Women as Professionals, 1800 to Present (also Human Development 258, History 238, Women's Studies 238)
4 credits. Not offered 1999–2000.
J. Brumberg.
For description, see HD 258.]

AM ST 259 Introduction to US Latino History, Part I (also History 260, Latino Studies Program 260)
Spring. 4 credits. M. C. Garcia.
For description, see HIST 260.

AM ST 261 Introduction to US Latino History, Part II (also History 261, Latino Studies Program 261)
Fall. 4 credits. M. C. Garcia.
For description, see HIST 261.

[AM ST 272 American Indian History, 1500–1600 (also History 276) #
4 credits. Not offered 1999–2000.
D. Usner.
For description, see HIST 276.]

AM ST 273 Women in American Society, Past and Present (also History 273) #
Spring. 4 credits. M. B. Norton.
For description, see HIST 273.

[AM ST 277 American Indian History Since 1830 (also History 277)
4 credits. Not offered 1999–2000.
D. Usner.
For description, see HIST 277.]

[AM ST 303 African-American Women in Slavery and Freedom (also History 303)
4 credits. Not offered 1999–2000.
M. Washington.
For description, see HIST 303.]

AM ST 304 American Culture in Historical Perspective, 1880–1980 (also History 304)
Spring. 4 credits. M. Kammen.
For description, see HIST 304.

[AM ST 311 Structure of American Political History (also History 311) #
4 credits. Not offered 1999–2000.
J. Silbey.
For description, see HIST 311.]

[AM ST 312 Structure of American Political History (also History 312)
4 credits. Not offered 1999–2000.
J. Silbey.
For description, see HIST 312.]

[AM ST 314 History of American Foreign Policy, 1912 to the Present (also History 314)
4 credits. Not offered 1999–2000.
T. Borstelmann.
For description, see HIST 314.]

[AM ST 317 American Constitutional Development (also History 318)
4 credits. Not offered 1999–2000.
R. Polenberg.
For description, see HIST 318.]

[AM ST 320 Understanding Work in America, 1800–1990 (also History 315)
4 credits. Not offered 1999–2000.
N. Salvatore.
This course examines both the experience and the perception of work in American life in the century framed by two fundamental formations: the emergence of a system of industrial capitalism largely nationalistic in its orientation and the development of a more international economic system in more recent times. Among the topics considered will be the effects of technological change, its impact on the experience of work across numerous occupational categories, and the changing perceptions of work as reflected in contemporary cultural expression, literature, and commentary across the century.]

[AM ST 321 Colonial North America to 1763 (also History 321) #
4 credits. Not offered 1999–2000.
M. B. Norton.
For description, see HIST 321.]

[AM ST 322 Age of the American Revolution, 1763–1815 (also History 325) #
4 credits. Not offered 1999–2000.
M. B. Norton.
For description, see HIST 325.]

[AM ST 324 Varieties of American Dissent, 1880–1990 (also History 324)
4 credits. Not offered 1999–2000.
N. Salvatore.
The idea of dissent in American society raises a variety of images. Civil rights activists, striking workers, and student radicals of the 1960s are familiar enough symbols of dissent. But might we understand a Pentecostal believer, filled with the spirit of his or her God in critiquing contemporary society, as an example of American dissent? This course will explore the varieties of economic, political, and cultural dissent in American between 1880 and 1990, and will examine how understanding dissent in its specific historical context illuminates major aspects of American life and culture.]

[AM ST 327 American Frontier History Before 1850 (also History 327) #
4 credits. Not offered 1999–2000.
D. Usner.
For description, see HIST 327.]

[AM ST 330 The Age of Jackson, 1813–1850 (also History 330) #
4 credits. Not offered 1999–2000.
For description, see HIST 330.]

[AM ST 331 American Civil War and Reconstruction, 1850–1877 (also History 331) #
4 credits. Not offered 1999–2000.
J. Silbey.
For description, see HIST 331.]

AM ST 332 The Urbanization of American Society, 1600 to 1860 (also History 332) #
Fall. 4 credits. S. Blumin.
For description, see HIST 332.

AM ST 333 The Urbanization of American Society, 1860–2000 (also History 333)
Spring. 4 credits. S. Blumin.
For description, see HIST 333.

[AM ST 336 Capitalism and Society in Developing America, 1607–1877 (also History 336) #
4 credits. Not offered 1999–2000.
S. Blumin.
For description, see HIST 336.]

[AM ST 337 Entrepreneurialism and Organization in the Age of the Corporation: Capitalism and Society in Modern America, 1840–2000 (also History 337)
4 credits. Not offered 1999–2000.
S. Blumin.
For description, see HIST 337.]

[AM ST 340 Recent American History, 1925–1960 (also History 340)
4 credits. Not offered 1999–2000.
R. Polenberg.
For description, see HIST 340.]

AM ST 341 Recent American History, 1960–Present (also History 341)
Fall. 4 credits. R. Polenberg.
For description, see HIST 341.

[AM ST 345 Intellectual/Cultural Life of Nineteenth-Century Americans (also History 345 and Religious Studies 345) #
4 credits. Not offered 1999–2000.
R. L. Moore.
For description, see HIST 345.]

AM ST 346 Modernization of the American Mind (also History 346)
Fall. 4 credits. R. L. Moore.
For description, see HIST 346.

[AM ST 359 American Families in Historical Perspective (also Human Development 359 and Women's Studies 359)
3 credits. Not offered 1999–2000.
J. Brumberg.
For description, see HD 359.]

AM ST 378 Topics in US Women's History (also History 378 and Women's Studies 378)
Fall. 4 credits. M.B. Norton.
For description, see HIST 378.

AM ST 411 Seminar: American Political History (also History 411)
Spring. 4 credits. J. Silbey.
For description, see HIST 411.

AM ST 417 History of Female Adolescence (also Human Development 417, History 458, Women's Studies 438) #
Fall. 4 credits. J. Brumberg.
For description, see HD 417.

AM ST 419 Seminar in American Social History (also History 419)
Spring. 4 credits. Taught in Washington, D.C. S. Blumin.
For description, see HIST 419.

[AM ST 421 Undergraduate Seminar in American Cultural History (also History 421)
4 credits. Not offered 1999–2000.
M. Kammen.
For description, see HIST 421.]

[AM ST 440 Undergraduate Seminar in Recent American History (also History 440)
4 credits. Not offered 1999–2000.
R. Polenberg.
For description, see HIST 440.]

[AM ST 442 Religion and Politics in American History from J. Winthrop to R. Reed (also History 442 and Religious Studies 442)
4 credits. Not offered 1999–2000.
R. L. Moore.
For description, see HIST 442.]

AM ST 486 Seminar on the 1960s (also History 486)
Fall. 4 credits. T. Borstelmann.
For description, see HIST 486.

AM ST 500 Research Seminar in American Studies (also History 500)
Fall or spring. Offered in Cornell-in-Washington Program only. S. Blumin and others.
For description, see HIST 500.

Music and Visual Studies

AM ST 105 Popular Music in America: 1850–1985 (also MUSIC 101) #
Fall. 3 credits. M. Hatch.
For description, see MUSIC 101.

AM ST 222 A Survey of Jazz (also Music 222)
Fall. 3 credits. S. Pond.
For description, see MUSIC 222.

AM ST 223 History of Rock Music (also MUSIC 221)
Spring. 3 credits. J. Peraino.
For description, see MUSIC 221.

AM ST 243 Inside Out: The American Everyday Interior (also Design and Environmental Analysis 243, Women's Studies 243)
Spring. 3 credits. J. Jennings.
For description, see DEA 243.

AM ST 282 The American Landscape (also Landscape Architecture 282)
3 credits. H. Gottfried.
For description, see LA 282.

AM ST 355 Art from 1940–1990 (also History of Art 365)
Fall. 4 credits. J. E. Bernstock.
For description, see ART H 365.

[AM ST 360 Painting and Everyday Life in Nineteenth-Century America (also History of Art 360) #
4 credits. Not offered 1999–2000.
L. L. Meixner.
For description, see ART H 360.]

AM ST 390 American Architecture and Building I (also Architecture 390)
Fall. 3 credits. Prerequisites: Architecture 181–182 or permission of instructor.
M. Woods.
For description, see ARCH 390.

AM ST 397 Special Topics in the History of Architecture and Urbanism (also Architecture 398)
Fall. 3 credits. Prerequisites: Architecture 181–182 or permission of instructor.
M. Woods.
For description, see ARCH 398.

[AM ST 462 Topics in Early Modernism (also History of Art 462) #
4 credits. Not offered 1999–2000.
L. L. Meixner.
For description, see ART H 462.]

Honors

Please see description of major for information about registration in these courses.

AM ST 493–494 Honors Essay Tutorial
493, fall; 494, spring. Up to 4 credits each semester. See R. L. Moore for appropriate advisors.

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 Graduate Studies of the Center for Applied Mathematics, 657 Frank H. T. Rhodes Hall.

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

A listing of selected graduate courses in applied mathematics can be found in the description of the center in "Interdisciplinary Centers, Programs, and Studies."

Archaeology Program

A. Ramage (history of art), program director

S. Baugher (landscape architecture), R. G. Calkins (history of art), K. M. Clinton (classics), J. E. Coleman (classics), D. Evett (English), K. L. Gleason (landscape architecture), J. S. Henderson (anthropology), K. A. R. Kennedy (ecology and systematics), P. I. Kuniholm (history of art), director of undergraduate studies, D. I. Owen (Near Eastern studies), N. Russell (anthopology), B. S. Strauss (history), T. P. Volman (anthropology).

Archaeology is an interdisciplinary field at Cornell, which is one of the few universities in the United States to offer a separate archaeology major. Program faculty members, affiliated with several departments, coordinate course offerings and help students identify opportunities for fieldwork, graduate study, and professional positions.

The Major

Prospective majors must complete Archaeology 100 or one of the basic courses as defined below before they will be admitted to the major. This initial course will not be counted toward the major requirements.

Because the major draws on the teaching and research interests of faculty from many departments to present a broad view of the archaeological process, interested students should discuss their course of study with a participating faculty member as early as possible. In some areas of specialization, intensive language training should be coordinated with other studies as early as the freshman year.

Once admitted to the major, students must take an additional 32 credits from the courses listed below, selected in consultation with a major adviser of their choosing. These courses should provide exposure to a broad range of archaeologically known cultures and the methods of revealing and interpreting them. Sixteen of the credit hours should be at the 300 level or above. At least two courses must be taken from each of categories B-E.

Courses basic to the discipline of archaeology are marked with the word "**Basic**" after the number of credit hours. It is recommended that majors who are planning to pursue graduate studies in archaeology should take at least two of the basic courses in each category. Further courses in languages and in geology are also recommended.

Honors. Honors in archaeology is awarded on the basis of the quality of an honors essay and the student's overall academic record. Prospective honors students should have a 3.5 gradepoint in the major and a 3.0 gradepoint overall. They should consult with the director of undergraduate studies before the beginning of the senior year. The honors essay is normally prepared in consultation with a faculty adviser during the senior year; students may enroll in Archaeology 481, fall; 482, spring for this purpose.

Fieldwork. Every student should gain some practical experience in archaeological fieldwork on a project authorized by his or her adviser. This requirement may be waived in exceptional circumstances. The Jacob and Hedwig Hirsch bequest provides support for a limited number of students to work at excavations sponsored by Cornell and other approved institutions.

The Concentration

Students in Cornell schools and colleges other than Arts and Sciences may elect a concentration in archaeology. To concentrate in archaeology, the student must complete five courses, all with a grade of C or better. The five courses must consist of either (1) Archaeology 100 and four other courses from categories B–D, at least three of which must be basic courses, or (2) five courses from categories B–D, at least four of which must be basic courses. Concentrators are encouraged to gain some fieldwork experience. They are eligible on the same basis as majors for Hirsch Scholarships in support of fieldwork.

First-Year Writing Seminars

For course descriptions, see the first-year writing seminar brochure.

A. Introductory Courses and Independent Study Courses

ARKEO 100 Introduction to Archaeology (also Anthropology 100) #
Fall. 3 credits. Basic. J. Henderson.
A broad introduction to archaeology—the study of material remains to answer questions about the human past. Case studies highlight the variability of ancient societies and illustrate the varied methods and interpretive frameworks archaeologists use to reconstruct them. This course can serve as a platform for both Archaeology and Anthropology undergraduate majors.

ARKEO 201 Lost Tribes and Sunken Continents (also Anthropology 201) @ #
Summer only. 3 credits. D. Evett.
An examination of popular theories about past highlights, differences among them, and the kinds of explanations offered by archaeologists. Emphasis is on the ways archaeologists interpet the past. Case studies include Atlantis, Stonehenge, Egyptian and Mexican pyramids, and the history of contacts between the Old World and the Americas.

ARKEO 300 Individual Study in Archaeology and Related Fields
Fall and spring. Credit to be arranged. Prerequisite: Archaeology 100 or permission of instructor.
Students pursue topics of particular interest with the guidance of a faculty member.

ARKEO 481–482 Honors Thesis
481, fall; 482, spring. 4 (V) credits. S-U only. Prerequisite: admission to Honors Program.
The student, under faculty direction, will prepare a senior thesis.

ARKEO 600 Special Topics in Archaeology
Fall and spring. 4 (V) credits.
Students pursue advanced topics of particular interest under the guidance of a faculty member(s).

ARKEO 681–682 Master's Thesis
681, fall; 682, spring. 4 (V) credits. 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) #
Fall. 3 credits. Basic. Limited to 50 students. Not offered 1999–2000. T. P. Volman.
For description, see ANTHR 202.]

[ARKEO 203 Early People: The Archaeological and Fossil Record (also Anthropology 203) #
Spring. 3 credits. Basic. Not offered 1999–2000. T. P. Volman.]

[ARKEO 204 Ancient Civilizations (also Anthropology 204) @ #
Fall. 3 (4) V credits. Basic. Not offered 1999–2000. J. S. Henderson.]

ARKEO 215 Stone Age Art (also Anthropology 215) @ #
Fall. 3 credits. T. P. Volman.
For description, see ANTHR 215.

[ARKEO 317 Stone Age Archaeology (also Anthropology 317)
Fall. 4 credits. Not offered 1999–2000. T. P. Volman.
For description, see ANTHR 317.]

ARKEO 409 Approaches to Archaeology (also Archaeology 609 and Anthropology 409/609)
Fall. 4 credits. Basic. Prerequisite: permission of instructor. N. Russell.
For description, see ANTHR 409.

ARKEO 494 Seminar in Archaeology: The Archaeology of Human Origins (also Anthropology 494) @ #
Fall. 4 credits. T. P. Volman.
For description, see ANTHR 494.

ARKEO 609 Approaches to Archaeology (also Archaeology 409 and Anthropology 409/609)
Fall. 4 credits. Basic. Prerequisite: permission of instructor. N. Russell.
For description, see ANTHR 409.

BIO ES 371 Human Palaeontology (also Anthropology 371)
Fall. 3 credits. K. A. R. Kennedy.
For description, see Biological Sciences/ Ecology & Systematics 371.

LA 569 Archaeology in Preservation Planning and Design (also CRP 569)
Spring. 3 credits. 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) #
3 credits. Basic. Not offered 1999–2000. J. Coleman.
For description, see CLASS 221.]

[ARKEO 233 Archaeology in Action II (also History of Art 225 and Classics 233) #
Spring. 3 credits. Prerequisite: permission of instructor. Not offered 1999–2000. P. I. Kuniholm.
For description, see ART H 225.]

ARKEO 263 Introduction to Biblical History and Archaeology (also NES 263, Jewish Studies 263, and Religious Studies 264) @ #
Spring. 3 credits. J. Zorn.
For description, see NES 263.

[ARKEO 275 Ancient Seafaring (also Jewish Studies 261 and Near Eastern Studies 261) @ #
3 credits. Not offered 1999–2000. D. I. Owen.
For description, see NES 261.]

ARKEO 321 Mycenae and Homer (also Classics 321 and History of Art 321) #
Fall. 4 credits. Prerequisite: at least one previous course in Archaeology, Classics, or History of Art. J. Coleman.
Study of the relationship between the Mycenaean period of Greece (known primarily from archaeology) and the Homeric *Iliad* and *Odyssey*. Topics include Mycenaean architecture, burial customs, kinship and military activities; the reasons for the collapse of the Bronze Age palatial economies; the archaeological evidence for society in the "Dark Ages" that followed; the writing systems of Mycenaean Greece (Linear B) and the Iron Age (the Semitic/Greek alphabet); the nature of the Homeric poems and their value as historical sources.

[ARKEO 352 The City of Athens from Theseus to Justinian (also Classics 352 and History of Art 352) #
3 credits. Not offered 1999–2000. Staff.
For description, see CLASS 352.]

ARKEO 366 The History and Archaeology of the Ancient Near East (also Jewish Studies 366 and Near Eastern Studies 366) @ #
Fall. 4 credits. D. I. Owen.
For description, see NES 366.

ARKEO 380 Introduction to the Arts of China (also History of Art 380) @ #
Fall. 4 credits. A. Pan.
For description, see ART H 380.

[ARKEO 417 Early Medieval Archaeology and Literature (also Archaeology 617, English 417 and 617)
Spring. 4 credits. Prerequisite: permission of instructor. Enrollment limited to 15 students. This course may be used as one of the three pre-1800 courses required of English majors. Not offered 1999–2000; next offered 2000–01. R. T. Farrell.
For description, see ENGL 417.]

[ARKEO 425 Seminar on the Bronze Age Architecture of Asia Minor (also Art History 425 and Classics 430)
4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. P. I. Kuniholm.]

[ARKEO 432 Sardis and the Cities of Asia Minor (History of Art 424 and Classics 432) #
4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. 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, or permission of instructor. P. I. Kuniholm.
For description, see ART H 434.

[ARKEO 435 Seminar on Roman Art and Archaeology (also Classics 435 and History of Art 427) #
Spring. 4 credits. Prerequisite: permission of instructor. Not offered 1999–2000. A. Ramage.
For description, see ART H 427.]

[ARKEO 520 Seminar in Classical Archaeology (also History of Art 520 and Classics 630)
4 credits. Not offered 1999–2000. P. I. Kuniholm.
For description, see ART H 520.]

[ARKEO 617 Early Medieval Archaeology and Literature (also Archaeology 417, English 417 and 617)
Spring. 4 credits. Not offered 1999–2000; next offered 2000–01. R. T. Farrell.
For description, see ENGL 417.]

[ARKEO 629 The Prehistoric Aegean (also Classics 629) #
4 credits. For graduate students, and advanced undergraduates with permission of instructor. Not offered 1999–2000. J. E. Coleman.
For description, see CLASS 629.]

CLASS 220 Introduction to Art History: The Classical World (also History of Art 220) #
Fall. 4 credits. A. Ramage.
For description, see CLASS 220.

[CLASS 319 Art in the Daily Life of Greece and Rome (also History of Art 319)
Spring. 4 credits. Not offered 1999–2000. A. Ramage.
For description, see ART H 319.]

[CLASS 322 Greeks and Barbarians (also History of Art 328) #
4 credits. Prerequisite: Classics 220 or 221, or permission of instructor. Not offered 1999–2000. J. Coleman.
For description, see CLASS 322.]

CLASS 329 Greek Sculpture (also History of Art 329) #
Spring. 4 credits. J. E. Coleman.
For description, see CLASS 329.

[CLASS 333 Greek and Roman Mystery Cults and Early Christianity (also Religious Studies 333) #
Fall. 4 credits. A previous course in Classics (civilization or language) or Religious Studies 101 is recommended. Not offered 1999–2000. K. Clinton.
For description, see CLASS 333.]

[ART H 322 Arts of the Roman Empire (also Classics 350)
4 credits. Not offered 1999–2000. A. Ramage.
For description, see ART H 322.]

[ART H 325 Greek Vase Painting (also Classics 325) #
4 credits. Not offered 1999–2000. A. Ramage.
For description, see ART H 325.]

ART H 327 Greek and Roman Coins (also Classics 327) #
Spring. 4 credits. A. Ramage.
For description, see ART H 327.

[LA 292 Creating a Second Nature
Spring. 3 credits. Prerequisites: none. Anthropology 100, Archaeology 100, or Classics/History of Art 220 recommended. Not offered spring 2000. K. Gleason.
For description, see LA 292.]

D. New World Archaeology

[ARKEO 355 Ancient Mexico and Central America (also Anthroplogy 355) @ #
Spring. 4 credits. Basic. Not offered 1999–2000. J. S. Henderson.
For description, see ANTHR 355.]

[ARKEO 493 Seminar in Archaeology (also Anthropology 493) @ #
Fall. 4 credits. Not offered 1999–2000.]

[ANTHR 456 Mesoamerican Religion, Science, and History @ #
Fall. 4 credits. Not offered 1999–2000.]

LA 360 Pre-Industrial Cities and Towns of North America (also CRP 360)
Fall. 3 credits. S. Baugher.
For description, see LA 360.

E. Methodology and Technology

[ARKEO 262 Laboratory in Landscape Archaeology (also Landscape Architecture 262)
Spring. 3 credits. Not offered spring 2000. S. Baugher.
For description, see LA 262.]

ARKEO 285 Art, Archaeology, and Analysis (also Art 372, Engineering 185, English 185, Geology 200, MS&E 285, History of Art 200, NS&E 285, and Physics 200)
Spring. 3 credits. 3 lecs. Does not meet liberal studies distribution requirements. Staff.
For description, see GEOL 200.

ARKEO 309 Dendrochronology of the Aegean (also History of Art 309 and Classics 309)
Fall and spring. 4 credits. Limited to 10 students. Prerequisite: permission of instructor. P. I. Kuniholm.
For description, see ART H 309.

ARKEO 361 Summer Program in Etruscan Archaeology at La Piana in Italy (also Classics 361) #
Summer only. 3 or 6 credits. Permission required. J. Whitehead.

[ARKEO 370 Environmental Archaeology (also Archaeology 670 and Anthropology 370 and 670)
Fall. 4 credits. Prerequisite: two previous courses in archaeology or permission of instructor. Not offered 1999–2000. T. P. Volman.
For description, see ANTHR 370.]

[ARKEO 405 Archaeological Research Design (also Archaeology 605 and Anthropology 405/605)
Spring. 4 credits. Basic. Prerequisite: permission of instructor. Not offered 1999–2000. J. S. Henderson, T. P. Volman.
For description, see ANTHR 405.]

ARKEO 423 Ceramics (also History of Art 423 and Classics 423)
Fall. 4 credits. Prerequisite: permission of instructor. A. Ramage.
For description, see ART H 423.

[ARKEO 458 Archaeological Analysis (also Archaeology 658 and Anthropology 458/658) @
Spring. 4 credits. Prerequisite: one course in archaeology or permission of instructor. Enrollment limited to 15 students. Not offered 1999–2000. J. S. Henderson.
For description, see ANTHR 458.]

ARKEO 463 Zooarchaeological Method (also Anthropology 463) #
Fall. 5 credits. N. Russell.
For description, see ANTHR 463.

ARKEO 464 Zooarchaeological Interpretation (also Anthropology 464) #
Spring. 4 credits. N. Russell.
For description, see ANTHR 464.

[ARKEO 466 Humans and Animals (also Archaeology 666 and Anthropology 466/666) #
Fall. 4 credits. Not offered 1999–2000.]

[ARKEO 467 Origins of Agriculture (also Anthropology 467) #
Spring. 4 credits. Not offered 1999–2000.]

[ARKEO 469 Gender and Age in Archaeology (also Archaeology 669 and Anthropology 469/669) #
Spring. 4 credits. Not offered 1999–2000.]

[ARKEO 601 Graduate Colloquium in Archaeology
4 credits. Open to graduate students and advanced undergraduates by permission of instructor. Not offered 1999–2000. 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 605 Archaeological Research Design (also Archaeology 405 and Anthropology 405/605)
Spring. 4 credits. Basic. Prerequisite: permission of instructor. Not offered 1999–2000. J. S. Henderson, T. P. Volman.
For description, see ANTHR 405.]

[ARKEO 666 Humans and Animals (also Archaeology 666 and Anthropology 466/666) #
Fall. 4 credits. Not offered 1999–2000.]

[ARKEO 669 Gender and Age in Archaeology (also Archaeology 669 and Anthrolpology 469/669) #
Spring. 4 credits. Not offered 1999–2000.]

[ARKEO 670 Environmental Archaeology (also Archaeology 370 and Anthropology 370 and 670)
Fall. 4 credits. Prerequisite: two previous courses in archaeology or permission of instructor. Not offered 1999–2000. T. P. Volman.
For description, see ANTHR 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 1999–2000. K. A. R. Kennedy.
For description, see ANTHR 371.]

[ANTHR 474 Laboratory and Field Methods in Human Biology (also Biological Sciences 474)
5 credits. Prerequisite: one year of introductory biology, Anthropology 101, or permission of instructor. Not offered 1999–2000. K. A. R. Kennedy.]

[LA 261 Urban Archaeology (also CRP 261)
Fall. 3 credits. Not offered 1999–2000. S. Baugher.
For description, see LA 261.]

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, Latino Studies, or Women's Studies*; and (c) one (1) course in East Asian, South Asian, or Southeast Asian Studies.* (*These courses 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 thirty-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 newspapers; 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 a year-long intensive study of selected themes.

Affiliated Faculty

T. Chaloemtiarana (Southeast Asia Program), B. de Bary (Asian Studies), S. Han (Sociology), V. P. Kayastha (Kroch Library), J. V. Koschmann (History), L. C. Lee (Human Development), V. Munasinghe (Anthropology), V. Nee (Sociology), R. E. Ripple (Education), N. Sakai (Asian Studies), S. Samuels (English), A. M. Smith (Government), K. W. Taylor (Asian Studies), S. Tien (Gannett Health Center), S. Wong, director (English), D. Yeh (Vice President Student/Academic Services)

Courses

AAS 110 Introduction to Asian American Studies
Spring. 3 credits. This course can be used to satisfy either a social science or humanities distribution requirement.
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
Not offered fall 1999.
For description, see HIST 213.]

AAS 303 Asians in the Americas: A Comparative Perspective (also Anthropology 303)
Fall. 4 credits.
The common perception of ethnicity is that this is a "natural" and an inevitable consequence of cultural difference. "Asians" overseas, in particular, have won repute 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.

AAS 262 Asian American Literature
For description, see ENGL 262.

AAS 412 Undergraduate Seminar in Asian American History (also History 412)
Spring. 4 credits.
For description, see HIST 412. A reading and research seminar that will cover various topics in Asian American history.

[AAS 435 Asian American Images in Film
3 credits. Prerequisite: AAS 110 or permission of instructor. Not offered 1999–2000.
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 438 Immigration and Ethnic Identity
Spring. 4 credits. Not offered 1999–2000.
For description, see SOC 438.]

AAS 467 Psycho-Social Issues in Asian American Identity
Spring. 3 credits.
For description, see HD 467.

[AAS 478 Self and Nation in Asian-American Literature (also English 478)
Not offered 1999–2000.
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 492 Twentieth Century Women Writers of Color
Spring. 4 credits. Not offered 1999–2000.
This course will explore a range of writing—novels, stories, poems, essays—by American women writers of color in the twentieth century. We will look at how these writings articulate concerns with language, home, mobility, and memory, and at how the work is informed by the specificities of gender, race, region, and class. Readings may include works by Joy Harjo, Leslie Marmon Silko, Sandra Cisneros, Gloria Anzaldua, Theresa Hak Kyung Cha, Sigrid Nunez, Jamaica Kincaid, Maxine Hong Kingston, and Gwendolyn Brooks.]

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

J. V. Reppy, 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. Bisogni, R. Boyd, T. Brenna, 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. Geisler, K. Grazier, 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, B. A. Lewis, J. Fessenden MacDonald, J. Mueller, A. Netravali, N. Noy, L. Palmer, A. Parrot, D. Pimentel, T. Pinch, A. G. Power, W. Provine, S. Robertson, E. Rodriquez, M. Rossiter, P. Schwartz, J. Shanahan, M. Small, N. Sturgeon, J. M. Stycos, V. Utermohlen, E. Wethington

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, which involves faculty from throughout the university, is offered by the Department of Science & Technology Studies. Students in the College of Arts and Sciences and the College of Human Ecology are eligible for the major. In addition, 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, 255–6047.

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: an intellectually coherent grouping of courses representative of their special interest in Biology and Society. Recommended themes in the Biology and Society major include 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 individually tailored 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 select courses that meet the foundation and core course 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.

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 before submitting 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 completed 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 upon 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. Students who are considering the major may also find it beneficial to take "S&TS 201 What is Science?" in their freshman or sophomore year. 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

No single course may satisfy more than one major requirement.

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).

   These courses must be above the 100-level, at least 3 credit hours and taken for a letter grade.

   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 each from three of the following subject 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 (BIO MI 290); Genetics and Development (BIO GD 281 or 282 or Plant Breeding 225); Neurobiology and Behavior (BIO NB 221 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 MATH 171, ILR 210, BTRY 215, AG EC 310, EDUC 353,Soc 301, Psych 350, Econ 319, OR&IE 370, BTRY 601, CRP 320.

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. Choose these courses as follows:

   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 introductory biology as a prerequisite from: ALS, AN SC, BIOSCI, ENTOM, FOOD, HD, 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 science and philosophy of science courses may be counted toward the humanities requirement for the major.

Independent Study

Projects under the direction of a biology and society faculty member are encouraged as part of the program of study in the student's theme area. Applications for research projects are accepted by individual faculty members. Students may enroll for 1–4 credits in Biology and Society 375 (Independent Study) with written permission of the faculty supervisor and may elect either the letter grade or the S-U option. 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.

The Honors Program

The honors program is designed to provide independent research opportunities for academically talented undergraduate students whose major is Biology and Society (B&SOC). Students who enroll in the honors program are expected, with faculty guidance, to do independent study and research dealing with issues in biology and society. Students who participate in the program should find the experience intellectually stimulating and rewarding whether or not they intend to pursue a research career.

Biology and Society majors are considered for entry into the honors program at the end of the spring semester before their senior year. Application forms for the honors program are available in the Biology and Society office, 275 Clark Hall. The honors program is available to Biology and Society majors from the College of Arts and Sciences. Biology and Society majors in the Colleges of Human Ecology and Agriculture and Life Sciences must be selected by an honors committee within their college. To qualify for the Biology and Society honors project, students must have an overall Cornell cumulative grade-point average not lower than 3.30, have formulated a research topic, and have found a project supervisor (with a Cornell appointment) and a Biology and Society faculty member willing to serve as their advisers. Applications will be reviewed by a committee headed by the director of undergraduate studies, who will notify students directly of the outcome. Students will be permitted to register for the honors program only by permission of the department. More information on the honors program is available in the Biology & Society office, 275 Clark Hall (255–6047).

I. First-Year Writing Seminars

B&SOC 103 In the Company of Animals
Spring. 3 credits.

B&SOC 104 Ecosystems and Ego Systems
Spring. 3 credits.

II. Foundation Courses

*A. **Ethics*** (select one)

B&SOC 205 Ethical Issues in Health and Medicine (also Science and Technology Studies 205)
Fall. 4 credits. Limited to 150 students. Open to sophomores, juniors, and seniors. Prerequisites: none. S. Hilgartner.
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)
Spring. 4 credits. Limited to 60 students. Open to all undergraduates; permission of instructor required for freshmen. Staff.
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 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.

B. Social Sciences/Humanities Foundation (2 courses, 1 from any 2 areas)

1. History of Science

BIOG 207 Evolution (also Science and Technology Studies 287 and History 287)
Fall or summer. 3 credits. (Intended for students with no background in college biology. May not be taken for credit after BIOES 278.) W. B. Provine.
For description, see BIOG 207.

[HIST 282 Science in Western Civilization (also Science and Technology Studies 282) #
Spring. 4 credits. Not offered 1999–2000. P. Dear.
For description, see HIST 282.]

S&TS 233 Agriculture, History, and Society: From Squanto to Biotechnology
Fall. 3 credits. M. Rossiter.

S&TS 283 The Sciences in the Twentieth Century
Spring. 4 credits. Pending EPC approval. M. Dennis.

S&TS 355 Computers: From Babbage to Gates
Fall. 4 credits. M. Dennis.

S&TS 390 Science in the American Polity: 1800–1960 (also GOVT 308, AMST 388)
Fall. 4 credits. M. Dennis.
For description, see S&TS 390.

[S&TS 433 Comparative History of Science
Spring. 4 credits. Not offered 1999–2000. M. Rossiter.]

S&TS 444 Historical Issues of Gender and Science (also Women's Studies 444)
Fall. 4 credits. M. Rossiter.
For description, see S&TS 444.

2. Philosophy of Science

S&TS 201 What is Science? An Introduction to the Social Studies of Science and Technology
Spring. 3 credits. T. Pinch.

PHIL 286 Science and Human Nature (also Science and Technology Studies 286)
Spring. 4 credits. May be used to meet the philosophy of science requirement *if not* used to meet the core course requirement.
For description, see PHIL 286.

PHIL 381 Philosophy of Science: Knowledge and Objectivity (also Science and Technology Studies 381)
Fall. 4 credits. Limited to 30 students. R. Boyd.
For description, see PHIL 381.

3. Sociology of Science

B&SOC 301 Biology and Society: The Social Construction of Life (also Science and Technology Studies 401)
Fall. 4 credits. Prerequisite: two semesters of social science or humanities and one year of introductory biology. Limited to 75 students. May be used to meet the sociology of science requirement if not used to meet the core course requirement. Staff.
See Core Courses for description.

B&SOC 342 Sociology of Science (also Science and Technology Studies 442 and City and Regional Planning 442)
Fall.
For description, see S&TS 442.

HSS 246 Determinants of Behavior (also PAM 201)
Fall. 3 credits.

R SOC 208 Technology and Society
Fall. 3 credits.

S&TS 201 What Is Science? An Introduction to the Social Studies of Science and Technology
Spring. 3 credits. T. Pinch.

S&TS 311 The Sociology of Medicine
Spring. 4 credits. S. Hilgartner.

4. Politics of Science

[B&SOC 406 Biotechnology and Law (also Science and Technology Studies 406)
Fall. 4 credits. Not offered 1999–2000. Staff.]

[B&SOC 407 Law, Science, and Public Values (also Government 407 and Science and Technology Studies 407)
Fall. 4 credits. Not offered 1999–2000. Staff.]

S&TS 391 Science in the American Polity: 1960-Now (also Government 309, AMST 389)
Spring. 4 credits. M. Dennis
For description, see S&TS 391.

[S&TS 427 Politics of Environmental Protection in America (also Government 427)
Fall. 4 credits.
For description, see S&TS 427. Not offered 1999–2000.]

5. Science Communication

COMM 260 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 285 Communication in the Life Sciences (also S&TS 285)
Spring. 3 credits. B. Lewenstein.

[COMM 315 Introduction to Health Communication
Fall. 3 credits. Not offered 1999–2000. C. Trumbo.]

COMM 352 Science Writing for the Mass Media (also Science and Technology Studies 352)
Fall. 3 credits. Not open to freshmen. Limited to 25 students. Prerequisite: one college writing course. B. Lewenstein.
For description, see COMM 352.

COMM 421 Communication and the Environment
Spring. 3 credits. J. Shanahan.

[COMM 466 Communication of Science and Technology
Fall. 3 credits. Not offered 1999–2000. B. Lewenstein.]

C. Biology foundation (breadth requirement): Three courses: one from three of the following subject areas:

1. Biochemistry, Molecular and Cell Biology

BIOBM 330 Principles of Biochemistry, Individual Instruction
Fall or spring. 4 credits.
For description, see BIOBM 330.

BIOBM 331 Principles of Biochemistry: Proteins and Metabolism
Fall. 3 credits. May not be taken for credit after BIOBM 330 or 333.
For description, see BIOBM 331.

NS 262 The Cell and the External World
Spring. 3 credits.

2. Ecology

BIOES 261 Ecology and the Environment
Fall or summer. 4 credits. Prerequisite: one year of introductory biology.

3. Genetics and Development

BIOGD 281 Genetics
Fall, spring, or summer. 5 credits. Not open to freshman fall semester. Limited to 200 students.

BIOGD 282 Human Genetics
Spring. 2 or 3 credits. (2 credits if taken after Biological Sciences 281.)

4. Evolutionary Biology

BIOES 278 Evolutionary Biology
Fall or spring. 3 or 4 credits. Limited to 300 students.

5. Microbiology

BIOMI 290 General Microbiology Lectures
Fall, spring, or summer. 2 or 3 credits (2 credits if taken after BIOMI 192). Recommended: concurrent registration in BIOMI 291.

6. Neurobiology and Behavior

BIONB 221 Neurobiology and Behavior I: Introduction to Behavior
Fall. 3, 4 or 5 credits (4 credits with discussion and written projects; 5 credits with 2 discussions per week). Not open to freshmen.
For description, see BIONB 221.

BIONB 222 Neurobiology and Behavior II: Introduction to Neurobiology
Spring. 3 or 4 credits. (4 credits with discussion and written projects). Not open to freshmen. Each discussion limited to 20 students.
For description, see BIONB 222.

7. Botany

BIOPL 241 Introductory Botany
Fall. 3 credits.
For description, see BIOPL 241.

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. Prerequisite: college biology (NS 115 recommended). Permission only.

*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 210 Introductory Statistics
Fall. 4 credits.

BTRY 215 Introduction to Statistical Methods
Fall. 3 credits.

BTRY 601 Statistical Methods I
Fall. 4 credits.

CRP 223 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.

ILRST 210 Statistics: Statistical Reasoning
Fall and spring. 3 credits.

PSYCH 350 Statistics and Research Design
Fall. 4 credits.

SOC 301 Evaluating Statistical Evidence
Fall. 4 credits.

III. Core Courses

B&SOC 301 Biology and Society: The Social Construction of Life (also Science and Technology Studies 401)
Fall. 4 credits. Prerequisite: two semesters of social science or humanities and one year of introductory biology or permission of instructor. Limited to 75 students. Staff.
Critical thinking about the diverse influences shaping the life sciences. Topics include evolution and natural selection, heredity and genetic determinism, biotechnology and reproductive interventions. 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.
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 intro biology as a prerequisite from: ALS, AN SC, BIOSCI, ENTOM, FOOD, HD, NS, NTRES, PL BR, PL PA, PSYCH, VTMED.

[BIOAP 214 Biological Basis of Sex Differences (also Biology and Society 214 and Women's Studies 214)
Fall. 3 credits. Not offered 1999–2000.
For description, see BIOAP 214.]

[BIOES 275 Human Biology and Evolution (also Anthropology 275 and Nutritional Sciences 275)
Fall. 3 credits. Offered alternate years. Not offered 1999–2000.]

BIOPL 247 Ethnobiology
Fall. 3 credits.

HD 266 Emotional Functions of the Brain
Fall. 3 credits.

[HD 347 Human Growth and Development: Biological and Behavioral Interactions (also Biology and Society 347 and Nutritional Sciences 347)
Spring. 3 credits. Prerequisites: Biological Sciences 101 or 109 or equivalent, and Human Development 115 or Psychology 101. Offered alternate years. Not offered 1999–2000.]

HD 370 Experimental Psychopathology
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.
For description, see NS 361.

NTRES 201 Environmental Conservation
Spring. 3 credits.

Examples of biology electives

AN SCI 300 Animal Reproduction and Development
Spring. 3 credits.

HD 366 Psychobiology of Temperament and Personality
Spring. 3 credits.

NS 331 Physiological and Biochemical Bases of Human Nutrition
Spring. 4 credits.

*B. **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

ARME 464 Economics of Agricultural Development
Spring. 3 credits.

ANTHRO 211 Nature and Culture @
Spring. 3 credits.

[BIOES 673 Human Evolution: Concepts, History, and Theory (also Anthropology 673)
Fall. 3 credits. Offered alternate years. Not offered 1999–2000.
For description, see BIOES 673.]

CRP 380 Environmental Politics
Spring. 4 credits.

[CRP 451/551 Environmental Law
Fall. 4 credits. Not offered 1999–2000.]

HD 241 History of Childhood in the United States
Fall. 3 credits.

[HD 258 The Historical Development of Women as Professionals, 1800 to the Present (also Women's Studies 238 and History 238)
Fall. 3 credits. Not offered 1999–2000.]

HSS 315 Human Sexuality (also PAM 380)
Spring. 3 credits.

[HSS 325 Health Care Services and the Consumer (also PAM 381)
Fall. 3 credits. Offered alternate years. Not offered 1999–2000.]

HSS 330 Ecology and Epidemiology of Health (also PAM 303)
Fall. 3 credits.

[HSS 335 Contemporary Issues in Women's Health (also PAM 350)
Fall. 3 credits. Not offered 1999–2000.]

HSS 634 Health Care Organization (also PAM 657)
Fall. 3 credits.

HSS 688 Long-Term Care and the Aged: Alternative Health and Social Service Delivery Systems (also PAM 668)
Fall. 3 credits.

NS 450 Public Health Nutrition
Spring. 3 credits.

NS 457 National and International Food Economics (also Economics 374)
Spring. 3 credits.

NTRES 400 International Environmental Issues
Fall. 4 credits.

PSYCH 326 Evolution of Human Behavior
Fall. 4 credits.

R SOC 201 Population Dynamics (also Sociology 202)
Spring. 3 credits.

R SOC 205 Rural Sociology and International Development (also SOC 206)
Spring. 3 credits.

R SOC 324 Environment and Society (also Science & Technology Studies 324 and Sociology 324)
Fall and summer. 3 credits.
For description, see R SOC 324.

[R SOC 490 Society and Survival
Fall. 3 credits. Not offered 1999–2000.]

Examples of humanities electives

NTRES 407 Religion, Ethics, and the Environment
Spring. 4 credits.

PHIL 241 Ethics (by petition for breadth requirement)
Spring. 4 credits.

[PHIL 368 Global Climate and Global Justice (also Government 468)
Fall. 4 credits. Not offered 1999–2000.]

PHIL 681 Philosophy of Science (also Science & Technology Studies 681)
Spring. 4 credits.
For description, see PHIL 681.

C. Senior Seminars

BIO G 467 Seminar in the History of Biology (also Biology & Society 447, History 415, and Science & Technology Studies 447)
Summer (6-week session). 4 credits. Limited to 18 students.
For description, see BIO G 467.

[BIO G 469 Food, Agriculture, and Society (also Biology & Society 469 and Science & Technology Studies 469)
Spring. 3 credits. Limited to 20 students. Not offered 1999–2000.
For description, see BioG 469.]

BIOES 661 Environmental Policy (also Biology & Society 461 and Agriculture and Life Sciences 661)
Fall or spring. 3 credits each term. Limited to 12 students. (Students must register for 6 credits each term since an "R" grade is given at the end of the fall term).
For description, see BIOES 661.

CEH 444 Housing for the Elderly (also PAM 375)
Spring. 3 credits.

HD 366 Psychobiology of Temperament and Personality
Fall. 3 credits.

HD 610 Processes in Human Development
Fall. 3 credits.

HD 660 Social Development
Spring. 3 credits. Permission of instructor required for undergraduates.

[HSS 335 Contemporary Issues in Women's Health (also PAM 350)
Fall. 3 credits. Not offered 1999–2000.]

HSS 625 Health Care Services: Consumer and Ethical Perspectives (also PAM 652)
Fall. 3–4 credits.
Permission of instructor required. If using this course as a senior seminar, B&SOC majors must take it for 4 credits by writing a major paper. Enrollment limited—preference given to HSS students.

HSS 631 Managed Health Delivery Systems: Primary-Ambulatory Care (also PAM 656)
Spring. 3 credits.

HSS 655 Leadership in Human Service Organizations (also PAM 680)
Fall. 3 credits.

[R SOC 408 Human Fertility in Developing Nations (also Biology & Society 404)
Spring. 3 credits. Not offered 1999–2000.
For description, see R SOC 408.]

R SOC 410 Population and Environment
Spring. 3 credits.

[R SOC 418 Population Policy (also Biology & Society 414)
Spring. 3 credits. Not offered 1999–2000.
For description, see R SOC 418.]

[S&TS 406 Biotechnology and the Law (also Biology & Society 406)
Fall. 4 credits. Not offered 1999–2000. Staff.
For description, see S&TS 406.]

[S&TS 427 Politics of Environmental Protection in America (also Biology & Society 427 and Government 427)
Fall. 4 credits. Not offered 1999–2000. Staff.
For description, see S&TS 427.]

S&TS 490 Integrity of Scientific Practice
Fall. 4 credits. S. Hilgartner.

[S&TS 645 Genetic Engineering: Politics and Society in Comparative Perspective (also Government 634)
Spring. 4 credits. S. Hilgartner. Not offered 1999–2000.
For description, see S&TS 645.]

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 and society supplement issued at the beginning of each semester.

B&SOC 499 Honors Project
Fall and spring. 3–5 credits each term. Open only to Biology and Society students in their senior year.
Students who are admitted to the honors program are required to complete two semesters of honors project research and to write an honors thesis. The project must include substantial research and the completed work should be of wider scope and greater originality than is normal for an upper-level course.
Students may take 3–5 credits per semester up to a maximum of 8 credits in B&SOC 499, Honors Project. Students should note that B&SOC 499 is to be taken in addition to those courses that meet the regular major requirements. The student and the project supervisor must reach clear agreement at the outset as to what sort of work will need to be completed during the first semester. Minimally, an honors thesis outline and bibliography should be accomplished. At the end of the first semester, a letter grade will be assigned and the advisers, in consultation with the Director of Undergraduate Studies, will evaluate whether or not the student should continue working on an honors project. Students who do continue in the honors program for the second semester 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.

Applications and information are available in the Biology and Society office, 275 Clark Hall.

Cognitive Studies Program

J. Halpern (computer science), R. Hoy (neurobiology and behavior), co-directors. C. Cardie, R. Constable, B. Donald, J. Halpern, D. Huttenlocher, L. Lee, R. Rubinfeld, B. Selman, R. Zabih (computer science); A. Hedge (design and environmental analysis); J. Dunn, R. Ripple, D. Schrader (education); R. Canfield, S. Ceci, B. Koslowski, B. Lust, S. Robertson, E. Wethington (human development); K. O'Connor, R. Peterson, J. Russo (Johnson Graduate School of Management); J. Bowers, A. Cohn, M. Diesing, J. Gair, W. Harbert, A. Jongman, S. McConnell-Ginet, C. Rosen, Y. Shirai, M. Suner, H. Tao, L. Waugh, J. Whitman, D. Zec, A. Zucchi (linguistics); A. Nerode, R. Shore (mathematics); D. Easley, L. Blume, K. Basu (economics); H. Howland (neurobiology and behavior); R. Boyd, C. Ginet, H. Hodes, S. Shoemaker, J. Stanley, Z. Szabó, (philosophy); J. Cutting, R. Darlington, T. DeVoogd, D. Dunning, D. Field, B. Finlay, T. Gilovich, B. Halpern, A. Isen, R. Johnson, C. Krumhansl, U. Neisser, M. Owren, J. Sereno, M. Spivey (psychology); M. Macy, V. Nee (sociology). G. Babbes, S. Hertz (associate members).

Cognitive studies is comprised of a number of disciplines that are linked 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, Modern Languages, Philosophy, Psychology, Economics and Sociology. Elsewhere in the university they are represented in the Department of Human Development and Design and Analysis (College of Human Ecology), the Section of Neurobiology and Behavior (Division of Biological Sciences), the Department of Education (College of Agriculture and Life Sciences), and the Johnson Graduate School of Management.

The issues addressed in cognitive studies arise at several levels. At the broadest level are problems of characterizing such basic notions as "mind," "knowledge," "information," and "meaning." At a more specific level are questions regarding the abstract operating principles of individual components of the

mind, such as those underlying visual perception, language ability, and understanding of concepts. These principles concern the organization and behavior of the components and how they are biologically represented in the brain. 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

An interdisciplinary undergraduate concentration in Cognitive Studies is available to Cornell University undergraduates in the College of Arts and Sciences. Students from other colleges who seek such a concentration should discuss such possibilities with the Cognitive Studies office, which will provide information and contacts concerning such concentrations.

The undergraduate concentration in Cognitive Studies is designed to enable students to engage in a structured program directly related to the scientific study of cognition and the mind. The concentration provides a framework for the design of structured, supervised programs of study in this growing interdisciplinary field. Such programs of study serve as complements to coursework in a single discipline as represented by an individual department. It is considered crucial that students gain a strong background in their major, independent of their work in the concentration. Independent majors and college scholars may also apply. Colleges vary in their procedures for formal recognition of this concentration (contact the Cognitive Studies office for details). The Cognitive Studies Program faculty have designed five structured "tracks" that offer students different ways of satisfying the concentration. In addition, students are always able to construct their own programs of study subject to approval by their concentration advisor. The courses listed under each track are program suggestions. The student should consult with his/her Cognitive Studies adviser to develop a more customized curriculum. In some cases, students may want to combine or cross tracks.

In general, it is expected that students in the concentration will take COGST 101, a lab course such as COGST 201, and three courses at the 300 or 400 level in at least two departments. Even though only five courses are required to complete the concentration, we expect that students interested in cognitive studies will often end up taking more, and we encourage them to do an independent research project (COGST 470) and a research workshop such as COGST 471.

The five tracks are as follows. The first track involves a particular approach to the study of cognition. The other four tracks are structured around specific content domains and consist of sets of suggested course clusters. Please note that many of these courses have substantial prerequisites.

1. Cognitive Studies in Context: The Workplace, the Classroom, and Everyday Life

   Foundational issues in cognitive science are intimately relevant to real world settings. The Cognitive Studies in Context track offers students the opportunity to learn and independently explore how theory and research on the mind can help us better understand how we use information in much of our daily activities, whether it be the workplace, the classroom, or any other aspect of everyday life. Students will come to better understand the cognitive ergonomics of such diverse settings as an aircraft cockpit, a quality control station an assembly line, or an anesthesia station in a surgical suite. They will come to better understand the perceptual constraints that help tailor the nature of visual communication systems, or the linguistic constraints that help tailor text-based communication. They will come to see how the functional architecture of human memory guides the presentation and use of information in a wide array of settings. They will also learn how design constraints on computer hardware and software interact with human capacities and biases.

   COGST 101/COM S 101, LING 170/PHIL 191/PSYCH 102, Introduction to Cognitive Science
   COGST 201/COM S 201/PSYCH 201, Cognitive Science in Context Laboratory

   In addition, three more upper-level approved courses in Cognitive Studies areas will normally be expected.

2. Perception and Cognition

   This track focuses on psychological, computational, and neurobiological approaches to the interface between perception and cognition. Students will develop a grasp of the continuum between sensory impressions and complex thought.

   COGST 101/COM S 101, LING 170/PHIL 191/PSYCH 102, Introduction to Cognitive Science
   COGST 201/COM S 201/PSYCH 201, Cognitive Science in Context Laboratory
   COGST 450/LING 450/PSYCH 437, Lab Course: Language Development
   COM S 462, Robotics and Machine Vision
   BIONB 326, The Visual System
   PSYCH 305, Visual Perception
   PSYCH 309, Development of Perception and Representation
   PSYCH 316, Auditory Perception
   PSYCH 418, Psychology of Music
   PSYCH 342, Human Perception: Applications to Computer Graphics, Art and Visual Display
   PSYCH 412, Laboratory in Cognition and Perception
   PSYCH 416, Modeling Perception and Cognition
   PSYCH 419, Neural Networks Laboratory

3. Language and Cognition

   This track focuses on the representation, processing, and acquisition and learning of language, as well as its role in cognition and culture. Students will acquire skills and knowledge in formal and applied linguistic theory, psycholinguistic experimentation, and computational modeling techniques.

   COGST 101/COM S 101, LING 170/PHIL 191/PSYCH 102, Introduction to Cognitive Science
   COGST 201/COM S 201/PSYCH 201, Cognitive Science in Context Laboratory
   COGST 450/LING 450/PSYCH 437, Lab Course: Language Development
   COM S 411, Programming Languages and Logic
   LING 203, Introduction to Syntax and Semantics
   LING/PHIL/COGST 270, Truth and Interpretation
   LING 301–302, Phonology I & II
   LING 303–304, Syntax I & II
   LING 309–310, Morphology I & II
   LING 319–320, Phonetics I & II
   LING 325, Pragmatics
   LING 350/COG ST 350, Representing Language: Knowledge Taught and Untaught
   LING 403, Introduction to Applied Linguistics
   LING 409, Psycholinguistics of Second Language Reading
   LING 421–422, Semantics I & II
   PHIL 332, Philosophy of Language
   PSYCH 215/LING 215, Psychology of Language
   PSYCH 370/LING 370, Language and Cognition
   PSYCH 415, Concepts, Categories, and Word Meanings
   PSYCH 416, Modeling Perception and Cognition
   PSYCH 436/LING 436/HD 436/COGST 436, Language Development

4. Cognition and Information Processing

   This track focuses on how the mind (or a computer) can encode, represent, and store information. Students will develop an understanding of concepts, categories, memory, and the nature of information itself.

   COGST 101/COM S 101, LING 170/PHIL 191/PSYCH 102, Introduction to Cognitive Science
   COGST 201/COM S 201/PSYCH 201, Cognitive Science in Context Laboratory
   COGST 450/LING 450/PSYCH 437, Lab Course: Language Development
   COM S 211, Computers and Programming
   COM S 212, Structure and Interpretation of Computer Programs
   COM S 472, Foundations of Artificial Intelligence
   COM S 473, Practicum in Artificial Intelligence
   PHIL 262, Philosophy of Mind
   PHIL 362, Philosophy of Mind
   PSYCH 309, Development of Perception and Representation
   PSYCH 311, Introduction to Human Memory
   PSYCH 412, Laboratory in Cognition and Perception
   PSYCH 413, Information Processing: Conscious and Non-conscious
   PSYCH 414, Comparative Cognition
   PSYCH 415, Concepts, Categories, and Word Meanings
   PSYCH 416, Modeling Perception and Cognition
   PSYCH 417, The Origins of Thought and Knowledge

5. Cognitive Neuroscience

   This track focuses on neurobiological and computational approaches to understanding how perception and cognition emerge in the human brain. Students will acquire knowledge of what neural structures subserve what perceptual/cognitive processes, and how they interact.

   COGST 101/COM S 101, LING 170/PHIL 191/PSYCH 102, Introduction to Cognitive Science
   COGST 201/COM S 201/PSYCH 201, Cognitive Science in Context Laboratory
   COM S 410, Data Structures
   COM S 401, Programming Languages and Software Engineering
   PSYCH 328, Biopsychology of Learning and Memory
   PSYCH 396, Introduction to Sensory Systems
   PSYCH 416, Modeling Perception and Cognition
   PSYCH 419, Neural Networks Laboratory
   PSYCH 425, Cognitive Neuroscience
   PSYCH 440, The Brain and Sleep

A Cognitive Studies undergraduate laboratory and computer facility is available for all students in a Cognitive Studies concentration. This facility will help link resources from different laboratories across the Cornell campus as well as providing a central location for developing and conducting experimental research in cognitive studies.

Students who complete the concentration requirements will have their concentration in Cognitive Studies officially represented on their transcript. In addition, students who have made very substantial progress towards completing the requirements for the concentration will be eligible for enrollment in the Graduate Proseminar in Cognitive Studies during their senior year (COGST 773–774).

Concentration Application Procedures. Initial inquiries concerning the undergraduate concentration should be made to the Cognitive Studies Program coordinator, Mary Wright, cogst@cornell.edu. 255–6431, who will provide application materials and set up a meeting with a relevant member of the Undergraduate Concentration Committee. This Committee will assist the student with selection of a concentration adviser with expertise in the student's main area of interest.

To formally initiate the concentration in Cognitive Studies, a student must gain approval for a selection of courses from a concentration adviser (one of the program faculty). The courses selected must form a coherent cluster that makes sense to both the adviser and the student. To be admitted to the concentration, the student must submit this plan of study to the Cognitive Studies undergraduate faculty committee for final approval.

In addition to assisting in and approving the student's selection of courses, the concentration adviser serves as a general source of information about the field of cognitive studies, relevant resources around the university, and job and graduate school opportunities. Often, the adviser can help the student develop independent research experience.

Independent Research. The concentration encourages each student to be involved in independent research that bears on research issues in cognitive studies, if possible. COGST 470 is available for this purpose. It is recommended that students report on their research activities in an annual undergraduate forum. The Undergraduate Concentration Committee is committed to helping students find an appropriate research placement when needed.

The Committee for Undergraduate Concentration in Cognitive Studies consists of: Bart Selman, computer science, 5–5643, 4144 Upson Hall, selman@cs.cornell.edu; Draga Zec, linguistics, 5–0728, 217 Morrill Hall, DZ17@cornell.edu; Jason Stanley, philosophy, 5–6829, 216 Goldwin Smith, JCS27@cornell.edu; Michael Owren, psychology, 5–3835, 224 Uris Hall, MJO9@cornell.edu. The current Director of Undergraduate Studies is Draga Zec.

Graduate Minor

For information, consult the program office (235 Uris Hall, 255–6431, cogst@cornell.edu or the director of graduate studies, Carol Rosen 255–0722, cgr1@cornell.edu).

Courses

Cognitive Studies

COGST 101 Introduction to Cognitive Science (also COM S 101, LING 170, PHIL 191, PSYCH 102)

Fall. 3 credits. M. Spivey.

This course surveys the study of how the mind/brain works. We will examine how intelligent information processing can arise from biological and artificial systems. The course draws primarily from five disciplines that make major contributions to cognitive science: philosophy, psychology, neuroscience, linguistics, and computer science. The first part of the course will introduce the roles played by these disciplines in cognitive science. The second part of the course will focus on how each of these disciplines contributes to the study of five topics in cognitive science: language, vision, learning and memory, action, and artificial intelligence.

COGST 201 Cognitive Science in Context Laboratory (also Cognitive Studies, Computer Science, Psychology)

Fall or spring. 4 credits. Prior completion of "Introduction to Cognitive Science" PSYCH 102/COGST 101/COM S 101/LING170/PHIL 191 or equivalent is recommended. Knowledge of programming languages is neither assumed nor required. Limited to 24 students. Disc and demos, M W 11:15–12:05; lab, M W 1:25–3:25, plus additional hours to be arranged. Fall, B. Halpern and staff. Spring, D. Field and staff.

A laboratory course that explores the theories of cognitive science and provides direct experience with the techniques of cognitive science, in relation to the full range of both present and anticipated-future activities in the workplace, the classroom, and in everyday life. Discussions of laboratory exercise results, supplementation of laboratory topics, and analyses of challenging primary research literature are done in meetings of the entire class. Laboratory exercises, which are done on an individual or small group basis, include both pre-planned investigations and student-developed experiments. Use of digital computers as well as the Internet, electronic mail, and Web sites are integral components of the course.

State of the art computing, display (visual, auditory, and other perceptual/sensory systems), digital communication, and simulation approaches are used to apply cognitive science principles and concepts to the analysis, exploration, and direct testing of human-machine interfaces. The focus is on human-computer interactions that are intended to permit effective and efficient exchange of information and control of functions or operations. This approach is applied to real life settings such as interactions with touch screen displays, effects of very brief sensory inputs on subsequent decisions, computer-based natural language recognition and processing, use of 'neural networks,' and personal and group transportation vehicles and systems. Students are expected to come to each discussion meeting having read and thought about assigned materials, and to come to scheduled laboratory meetings fully prepared to perform the laboratory exercises. Laboratory facilities will be available to students at all times so that statistical analysis of data, preparation of laboratory reports, and collection of experimental data will be facilitated.

COGST 450 Lab Course: Language Development (also LING 450 and PSYCH 437) (in conjunction with HD/PSYCH/LING 436, Language Development)

Spring. 2 credits. B. Lust.

This laboratory course will provide undergraduates with an introduction to hands-on research experience in the Cognitive Studies Research Labs. This course is partially funded by a new National Science Foundation grant to Cornell's Cognitive Studies program, "Interdisciplinary Approaches to the Scientific Study of Language Knowledge and Acquisition." This project is intended to involve undergraduates in active research and to coordinate related subfields of several disciplines in a unified, laboratory-supported curriculum.

The course will include several structured modules dealing with topics covered in the survey course, HD/LING/PSYCH 436, Language Development. They will include training in how to study and analyze original child language data, including the use of selected portions of a large database of child language data from many languages in the Cornell Language Acquisition Lab (CLAL), and training necessary to the collection and analysis of new child language data. Emphasis will be placed on developing research methods to test hypotheses.

The lab course will meet once a week in group format. In addition, students will be given access to a research lab environment for independent work on assigned modules, and independent research, throughout the week, and throughout the term.

COGST 470 Undergraduate Research in Cognitive Studies

Fall or spring. 1–4 credits. S-U grades optional. Prerequisite: permission of major adviser; written 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.

COGST 471 Cognitive Studies Research Workshop
Fall or spring. Credits variable. Prerequisites: student must be enrolled in an independent research course (either in Cognitive Studies, e.g., COGST 470, or in a related department), or in honors thesis research in one of the departments relevant to Cognitive Studies. Staff. (Interdisciplinary faculty from Cognitive Studies Program).
This course will provide a research workshop in which undergraduate students who are engaged in research in a particular area relevant to cognitive science can meet across disciplines to learn and practice the essentials of research, using interdisciplinary approaches. In this workshop, students critique and discuss the existing literature in a field of inquiry, individual students present their research designs, methods and results from their independent research studies, debate the interpretation of their research results, and participate in the generation of new research hypotheses and designs, in a peer group of other undergraduate students involved in related research.

[LING 270 Truth and Interpretation (also COGST 270 and PHIL 270)
Spring. 4 credits. Not offered 1999–2000. J. Stanley and M. Diesing.
In this course, with the use of classic papers in the philosophy of language and linguistics, we will motivate and introduce the basic concepts behind the project of giving a rigorous theory of meaning for natural language. Our goal will be to understand how philosophers and linguists have used concepts such as reference and truth to explain linguistic content. We will also discuss how issues of learnability and language processing raise constraints for this project.]

LING 350 Representing Language: Knowledge Taught and Untaught (also COGST 350)
Fall. 4 credits. J. Gair.
This course will deal with some of the discoveries 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.

HD 436 Language Development (also COGST 436, LING 436 and PSYCH 436)
Spring. 4 credits. Open to undergraduate and graduate students. Graduate students should also enroll in HD 633, LING 700, or PSYCH 600, a supplemental graduate seminar. Prerequisite: at least one course in developmental psychology, cognitive psychology, cognitive development, or linguistics. S-U grades optional. B. Lust.
This course surveys basic issues, methods, and research in the study of first-language acquisition. Major theoretical positions in the field are considered in the light of experimental studies in first-language acquisition of phonology, syntax, and semantics from infancy on. The fundamental issues of relationships between language and thought are discussed, as are the fundamental linguistic issues of Universal Grammar and the biological foundations for language acquisition. The acquisition of communication systems in nonhuman species such as chimpanzees is addressed, but major emphasis is on the child. An optional lab course supplement is available (see COGST 450/LING 450/PSYCH 437).

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 280 Discrete Structures
Fall or spring. 4 credits.

COM S 381 (or 481) Introduction to Theory of Computing
Fall. 3 or 4 credits.

COM S 410 Data Structures
Fall or spring. 4 credits.

COM S 411 Programming Languages and Logics
Fall. 4 credits. Not offered every year.

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 MATH 486)
Fall or spring. 4 credits.

Education (College of Agriculture and Life Sciences)

EDUC 210 Psychology of Learning and Memory
Fall. 3 credits.

EDUC 212 Psychological Foundations of Education
Spring. 2–3 credits.

EDUC 311 Educational Psychology
Fall. 3 credits.

Human Development (College of Human Ecology)

HD 115 Human Development
Fall or summer. 3 credits.

HD 266 Emotional Functions of the Brain
Fall. 3 credits. R. A. Depue.

[HD 334 The Growth of the Mind
Spring. 4 credits. Not offered 1999–2000.]

HD 344 Infant Behavior and Development
Fall. 3 credits.

HD 347 Human Growth and Development: Biological and Behavioral Interactions
Spring. 3 credits.

HD 362 Human Bonding
Fall. 3 credits. C. Hazan.

HD 436 Language Development (also PSYCH 436, COGST 436 and LING 436)
Spring. 4 credits.

HD 438 Thinking and Reasoning
Fall. 3 credits.

HD 439 Cognitive Development: Infancy through Adolescence
Spring. 3 credits. B. Koslowski.

Linguistics

LING 101 Theory and Practice of Linguistics
Fall, spring or summer. 4 credits.

LING 170 Introduction to Cognitive Science (also COGST 101 and PSYCH 102)
Fall. 3 credits.

LING 201 Introduction to Phonetics and Phonology
Spring. 4 credits.

LING 203 Introduction to Syntax and Semantics
Fall. 4 credits.

[LING 212 Language and Culture
Spring. 3 credits. Not offered 1999–2000.]

LING 264 Language, Mind, and Brain
Fall. 4 credits.

LING 270 Truth and Interpretation (also COGST 270 and PHIL 270)
Spring. 4 credits.

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 Morphology I
Spring. 4 credits. Not offered 1999–2000.]

[LING 310 Morphology II
Fall. 4 credits. Not offered 1999–2000.]

LING 319 Phonetics I
Fall. 4 credits

LING 320 Phonetics II
Spring. 4 credits.

LING 325 Pragmatics
Fall. 4 credits.

LING 350 Representing Language: Knowledge Taught and Untaught (also COGST 350)
Fall. 4 credits.

[LING 401 Approaches to Language Typology I
Fall. 4 credits. Not offered 1999–2000.]

LING 402 Approaches to Language Typology II
Spring. 4 credits.

LING 421 Semantics I
Spring. 4 credits.

LING 422 Semantics II
Fall. 4 credits.

LING 436 Language Development (also COGST 436, PSYCH 436 and HD 436)
Spring. 4 credits.

LING 450 Lab Course: Language Development (also COGST 450 and PSYCH 437)
Spring. 2 credits.

Mathematics

MATH 281 Deductive Logic (also PHIL 331)
Fall. 4 credits.

MATH 481 Mathematical Logic (also PHIL 431)
Spring. 4 credits.

MATH 482 Topics in Logic (also PHIL 432)
Spring. 4 credits.

[MATH 483 Intensional Logics and Alternatives to Classical Logics (also PHIL 436)
Fall. 4 credits. Not offered 1999–2000.]

MATH 486 Applied Logic (also COM S 486)
Spring. 4 credits.

Modern Languages

LANG 414 Second Language Acquisition I
Fall. 4 credits.

LANG 425 Corpora and Applied Linguistics
Fall. 4 credits.

Neurobiology and Behavior (Division of Biological Sciences)

BIONB 221 Neurobiology and Behavior I: Introduction to Behavior
Fall. 3, 4, or 5 credits.

BIONB 222 Neurobiology and Behavior II: Introduction to Neurobiology
Spring. 3 or 4 credits.

[BIONB 326 The Visual System
Spring. 4 credits. Not offered 1999–2000.]

BIONB 328 Biopsychology of Learning and Memory (also PSYCH 332)
Spring. 3 credits.

BIONB 396 Introduction to Sensory Systems (also PSYCH 396)
Spring. 3 or 4 credits.

BIONB 421 Effects of Aging on Sensory and Perceptual Systems (also PSYCH 431 and 631)
Fall. 3 or 4 credits.

[BIONB 424 Neuroethology (also PSYCH 424)
Spring. 3 credits. Not offered 1999–2000.]

BIONB 492 Sensory Function (also PSYCH 492)
Spring. 3 or 4 credits.

[BIONB 496 Bioacoustic Signals in Animals and Man
Spring. 3 credits. Not offered 1999–2000.]

Philosophy

PHIL 231 Introduction to Deductive Logic
Fall. 4 credits.

PHIL 261 Knowledge and Reality
Spring. 4 credits.

[PHIL 262 Philosophy of Mind
Fall. 4 credits. Not offered 1999–2000.]

[PHIL 270 Truth and Interpretation (also COGST 270 and LING 270)
Spring. 4 credits. Not offered 1999–2000.]

PHIL 286 Science and Human Nature (also S&TS 286)
Spring. 4 credits.

[PHIL 318 Twentieth-Century Philosophy
Spring. 4 credits. Not offered 1999–2000.]

PHIL 331 Deductive Logic (also MATH 281)
Fall. 4 credits.

PHIL 332 Philosophy of Language
Spring. 4 credits.

PHIL 361 Metaphysics and Epistemology
Spring. 4 credits.

PHIL 381 Philosophy of Science: Knowledge and Objectivity (also S&TS 381)
Fall. 4 credits.

[PHIL 382 Philosophy and Psychology
4 credits. Not offered 1999–2000.]

[PHIL 389 Philosophy of Science: Evidence and Explanation
4 credits. Not offered 1999–2000.]

[PHIL 431 Mathematical Logic (also MATH 481)
4 credits. Not offered 1999–2000.]

PHIL 432 Topics in Logic (also MATH 482)
Spring. 4 credits.

[PHIL 433 Philosophy of Logic
4 credits. Not offered 1999–2000.]

[PHIL 436 Intensional Logic (also MATH 483)
Fall. 4 credits. Not offered 1999–2000.]

[PHIL 437 Problems in the Philosophy of Language
Spring. 4 credits. Not offered 1999–2000.]

[PHIL 461 Metaphysics
Spring. 4 credits. Not offered 1999–2000.]

Psychology

PSYCH 205 Perception
Spring. 3 credits.

[PSYCH 209 Development
Spring. 4 credits. Not offered 1999–2000.]

PSYCH 214 Issues in Cognitive Psychology
Fall. 3 credits.

PSYCH 215 Psychology of Language
Spring. 3 or 4 credits.

PSYCH 305 Visual Perception
Fall. 4 credits.

[PSYCH 311 Introduction to Human Memory
Spring. 3 credits. Not offered 1999–2000.]

PSYCH 316 Auditory Perception
Fall. 3 or 4 credits.

PSYCH 326 Evolution of Human Behavior
Fall. 4 credits.

PSYCH 332 Biopsychology of Learning and Memory (also BIONB 328)
Spring. 3 credits.

PSYCH 342 Human Perception: Applications to Computer Graphics, Art, and Visual Display
Fall. 3 credits.

PSYCH 361 Biopsychology of Normal and Abnormal Behavior (also NS 361)
Fall. 3 credits.

[PSYCH 396 Introduction to Sensory Systems (also BIONB 396)
Spring. 3 or 4 credits. Not offered 1999–2000.]

[PSYCH 412 Laboratory in Cognition and Perception
Spring. 4 credits. Not offered 1999–2000.]

PSYCH 413 Information Processing: Conscious and Non-conscious
Spring. 4 credits.

PSYCH 414 Comparative Cognition
Spring. 3 credits.

[PSYCH 415 Concepts, Categories, and Word Meanings
Fall. 4 credits. Not offered 1999–2000.]

[PSYCH 416 Modeling Perception and Cognition
Spring. 3 credits. Not offered 1999–2000.]

[PSYCH 417 The Origins of Thought and Knowledge
Fall. 4 credits. Not offered 1999–2000.]

PSYCH 418 Psychology of Music
Spring. 3 or 4 credits.

[PSYCH 425 Cognitive Neuroscience
Fall. 4 credits. Not offered 1999–2000.]

PSYCH 436 Language Development (also COGST 436, HD 436 and LING 436)
Spring. 4 credits.

PSYCH 492 Sensory Function (also BIONB 492)
Spring. 4 credits.

Sociology

SOC 480 Simulating Social Dilemmas (also SOC 580)
Fall. 4 credits.

Graduate Courses and Seminars

The following courses and seminars are generally for graduate students only. However, some may be appropriate for advanced undergraduates. The director of the concentration must approve an undergraduate's use of any of these for satisfying the concentration requirements.

COGST 773–774 Proseminar in Cognitive Studies I and II (also Com S 773/774, Ling 773/774, Phil 773/774, Psych 773/774)
Fall: R grade; spring: S-U only. 4 credits. T 1:25–2:40. Staff.

The Cognitive Studies Proseminar consists of two semesters of meetings with the graduate faculty in the field of Cognitive Studies. The proseminar will provide a general introduction to the field of Cognitive Studies including an introduction to each of the major disciplines that comprise the minor: i.e., computer science, linguistics, philosophy, and psychology. In each of these disciplines, faculty from the field will introduce 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, and current issues of interdisciplinary interest.

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-U grade will only be assigned in the spring semester.

COM S 674 Natural Language Processing
Spring. 4 credits. Prerequisite: COM S 472 recommended.

COM S 676 Reasoning About Knowledge
Fall. 4 credits. Prerequisites: mathematical maturity and an acquaintance with propositional logic. Not offered every year. J. Y. Halpern.

COM S 677 Reasoning About Uncertainty
Fall. 4 credits. Prerequisites: mathematical maturity and an acquaintance with propositional logic. Not offered every year; next offered fall 1999. J. Y. Halpern.

COM S 775 Seminar in Natural Language Understanding
Fall and spring. 2 credits.

EDUC 611 Educational Psychology
Fall. 3 credits. Undergraduates admitted with permission from instructor. R. Ripple.

EDUC 614 Epistemological Development and Reflective Thought
Fall. 3 credits.

EDUC 714 Moral Development and Education
Spring. 3 credits.

HD 600/700 Graduate Seminars

LING 700 Graduate Seminars

MATH 581 Logic

MATH 655 Mathematical Foundations of Computer Modeling and Simulation

MATH 684 Recursion Theory

MATH 688 Automated Theorem Proving

LANG 700 Seminar (Grammaticization and Second Language Acquisition)
Spring. 4 credits.

PHIL 700 Graduate Seminars

PSYCH 601 Computational Models of Language
Spring. 4 credits. Prerequisite: consent of instructor. M. Spivey.

PSYCH 676 Topics in Emotion
Spring. 4 credits. M. Owren and C. Krumhansl.

College Scholar Program

L. Abel, director, 172 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. 1–8 credits; a maximum of 8 credits may be earned for honors research. Prerequisite: permission of program director. Each participant must submit a brief proposal approved by the honors committee.

East Asia Program

140 Uris Hall

V. B. Shue, director; J. Whitman, associate director, T. Bestor, D. Boucher, K. W. Brazell, M. Brinton, R. Bullock, P. Button, P. Chi, J. Choi, S. G. Cochran, B. de Bary, C. d'Orban, G. Fields, E. M. Gunn, P. J. Katzenstein, J. V. Koschmann, F. Kotas, J. M. Law, L. C. Lee, T. P. Lyons, T. L. Mei, V. Nee, A. Pan, Y. Park, C. A. Peterson, J. R. Piggott, N. Sakai, P. S. Sangren, Y. Shirai, R. J. Sukle, H. Tao, K. W. Taylor, S. Tian, H. Wan, S. Wen. Emeritus; K. Biggerstaff, E. H. Jorden, J. McCoy, R. J. Smith, M. W. Young

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 language and culture of one East Asian country, while graduate students may work toward an M.A. in East Asian studies, a dual M.B.A./M.A. degree, or an M.A./Ph.D. degree in a discipline such as agricultural economics, anthropology, city and regional planning, government, history, history of art, linguistics, literature, rural sociology, or sociology. A variety of fellowships, travel grants, awards, and assistantships are available for graduate students concentrating on East Asia.

The formal program of study is enriched by a variety of extracurricular activities, including a Japanese and Chinese language house, film series, workshops, art exhibits, and numerous lectures, symposia and performances related to East Asia. The Wason Collection in Olin Library is a comprehensive collection of books on East Asia in Western languages, Japanese, Chinese, and Korean. The Mary Rockwell Galleries of the Herbert F. Johnson Museum of Art have an excellent collection of East Asian art.

First-Year Writing Seminars

For information about the requirements for first-year 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, 127 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 (nutritional sciences), P. W. Nathanielsz (physiology), D. L. Pelletier (nutritional sciences), W. Provine (ecology and systematics/history), R. Robertshaw (physiology), S. Robertson (human development), R. Savin-Williams (human development), M. Small (anthropology)

Human biology integrates the methods and theories of many disciplines, such as biological anthropology, nutrition, neurobiology, physiology, psychology, demography, ecology, genetics, and paleontology, into a comprehensive study of biological diversity in *Homo sapiens*. A central focus of this interdisciplinary approach to the study of the human organism is an understanding of evolutionary processes that explain our biological variation through space and time. The program of study seeks to educate future biological scientists to address the concerns of a society that is becoming more demanding of the scientific community to place its specialized biological knowledge in a broad context. The human biology curriculum is of particular relevance to undergraduate students in premedical and predentistry programs, biological anthropology, nutrition, human development, ecology and systematics, psychology, physiology, genetics, and the health-related sciences. It serves to bring together students with a common interest in humankind as defined from these diverse fields and to provide a forum for student-faculty interaction on various topics relating to human evolution and biological diversity. Human biology is not a major but a curriculum of study that provides majors in various departments with a program for selecting elective courses that deal with the biology of the human species. Students in their junior year may develop a program of study in human biology while majoring in a number of different departmental fields.

Basic Requirements

The requirements for a program of study in human biology are designed to ensure sufficient background in physical sciences and mathematics to enable the student to pursue a wide range of interests in the fields of modern biological sciences, anthropology, and fields related to the evolution and physical diversity of the human species. Adjustments may be made in these requirements, depending upon the student's academic background and affiliation with colleges and schools within the university.

The basic requirements are one year of introductory biology (Biological Sciences 101–103 plus 102–104 or 105–106 or Biological Sciences 107–108 offered during the eight-week Cornell Summer Session); one year of general chemistry (Chemistry 207–208 or 215–216); one year of college mathematics (Mathematics 111–112 or 105–106 or 111–105); one course in genetics (Biological Sciences 281 or 282); one course in biochemistry (Biological Sciences 330, 331, 332, or 333 or Nutritional Sciences 320). 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 should be selected that also provide sufficient exposure to the integration of basic anatomical and physiological sciences with the behavior of individuals and groups within the context of evolutionary theory and ecology. The courses listed below are representative of the offerings in human biology and are included to assist the student in organizing a curriculum of study. They are organized into three groups that reflect the three levels of integration noted above: (1) human anatomy and physiology, (2) human behavior, and (3) human evolution and ecology. Students should choose at least one course from each of these areas of integration. It is anticipated that the student will include in a program of study at least one of the laboratory courses offered. It is expected that a student will take a minimum of 15 credits from among these courses.

There is no foreign language requirement for human biology beyond what is dictated by specific departments and colleges. The requirements for the human biology curriculum are set alongside requirements of the undergraduate majors as these are defined by different departments. Students with independent majors may design their own programs of study under the guidelines provided by their college. Although a student may indicate an interest in human biology in the freshman year and be able to obtain early guidance from a faculty adviser representing the curriculum of study, it is more usual for students to establish their course programs in the first semester of the junior year. The student may request one of the faculty advisers in his or her department who is listed as faculty in human biology to be their principal adviser, or he or she may have an adviser in the department of the major and seek the advice of a human biology faculty adviser in matters pertaining to satisfaction of the requirements. In certain cases a faculty adviser may represent both the major and the curriculum of study in human biology.

Courses

Human Anatomy and Physiology

BIO AP 214 Biological Basis of Sex Differences (also Biology and Society 214 and Women's Studies 214)
Fall. 3 credits.

BIO ES 274 The Vertebrates: Structure, Function, and Evolution
Spring. 4 credits.

BIO AP 311 Introductory Animal Physiology, Lectures (also Veterinary Physiology 346)
Fall. 4 credits.

BIO AP 319 Animal Physiology Experimentation
Fall. 4 credits.

BIO AP 458 Mammalian Physiology
Spring. 3 credits.

BIO ES 474 Laboratory and Field Methods in Human Biology (also Anthropology 474)
Spring. 5 credits.

NS 115 Nutrition and Health: Concepts and Controversies
Fall. 3 credits.

NS 222 Maternal and Child Nutrition
Spring. 3 credits.

NS 315 Obesity and the Regulation of Body Weight
Fall. 3 credits.

NS 331 Physiological and Biochemical Bases of Human Nutrition
Spring. 4 credits.

NS 341 Human Anatomy and Physiology Lab
Spring. 4 credits.

NS 361 Biology of Normal and Abnormal Behavior (also Psychology 361)
Fall. 3 credits.

NS 441 Nutrition and Disease
Fall. 4 credits.

PSYCH 322 Hormones and Behavior (also Biological Sciences 322)
Spring. 3 or 4 credits.

PSYCH 425 Cognitive Neuroscience
Fall. 3 or 4 credits.

VET MI 431 Medical Parasitology
Fall. 2 credits.

Human Behavior

ANTHR 390 Primate Behavior and Ecology
Spring. 4 credits.

ANTHR 490 Primates and Evolution
Spring. 4 credits.

B&SOC 301 Biology and Society I: The Social Construction of Life (also Science and Technology Studies 401)
Fall. 4 credits.

BIO NB 421 Effects of Aging on Sensory and Perceptual Systems (also Psychology 431 and 631)
Fall. 3 or 4 credits.

BIO NB 427 Animal Social Behavior
Fall. 4 credits.

HD 344 Infant Behavior and Development
Fall. 3 credits.

PAM 380 Human Sexuality
Spring. 3 credits.

NS 245 Social Science Perspectives of Food and Nutrition
Fall. 3 credits.

NS 347 Human Growth and Development: Biological and Behavioral Interactions (also Human Development 347 and Biology and Society 347)
Spring. 3 credits.

NS 361 Biology of Normal and Abnormal Behavior
Fall. 3 credits.

PSYCH 326 Evolution of Human Behavior
Fall. 4 credits.

PSYCH 425 Cognitive Neuroscience
Fall. 3 or 4 credits.

R SOC 408 Human Fertility in Developing Nations
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 Humankind
Fall. 3 credits.

ANTHR 203 Early People: The Archaeological and Fossil Record (also Archaeology 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 (also History 287, and Science and Technology Studies 287)
Fall or summer. 3 credits.

BIO ES 261 Ecology and the Environment
Fall or summer. 4 credits.

BIO ES 272 Functional Ecology of Vertebrates
Spring. 4 credits.

BIO ES 275 Human Biology and Evolution (also Anthropology 275 and Nutritional Sciences 275)
Fall. 3 credits.

BIO ES 278 Evolutionary Biology
Fall or spring. 3 or 4 credits.

BIO ES 371 Human Paleontology (also Anthropology 371)
Fall. 4 credits.

BIO ES 461 Population and Evolutionary Ecology
Spring. 4 credits.

BIO ES 464 Macroevolution
Spring. 4 credits.

BIO ES 470 Ecological Genetics (also Entomology 470)
Spring. 4 credits.

BIO ES 471 Mammalogy
Fall. 4 credits.

BIO GD 481 Population Genetics
Fall. 4 credits.

BIO GD 482 Human Genetics and Society
Fall. 3 credits.

BIO GD 484 Molecular Evolution
Spring. 3 credits.

BIO ES 673 Human Evolution: Concepts, History and Theory (also Anthropology 673)
Fall. 3 credits.

B&SOC 447 History of Biology–Evolution (also History 447)
Fall. 4 credits.

PAM 303 Ecology and Epidemiology of Health
Spring. 3 credits.

NS 306 Nutritional Problems of Developing Nations
Fall. 3 credits.

NS 451 Epidemiology and Health of Human Communities
Fall. 3 credits.

PSYCH 326 Evolution of Human Behavior
Fall. 4 credits.

R SOC 201 Population Dynamics
Spring. 3 credits.

VET MI 431 Medical Parasitology
Fall. 2 credits.

VET CS 664 Introduction to Epidemiology
Fall. 3 credits.

Independent Major Program

L. Abel, director, 172 Goldwin Smith Hall, 255–3386.

The Independent Major Program is described in the introductory section of Arts and Sciences.

IM 351 Independent Study
Fall or spring. 1–4 credits. Prerequisite: permission of the program office.

IM 499 Honors Research
Fall or spring. 1–8 credits; a maximum of 8 credits may be earned for honors research. Prerequisite: permission of program director. Each participant must submit a brief proposal approved by the honors committee.

International Relations Concentration

Matthew Evangelista, director (mae10@cornell.edu)

Integral to international relations is a focus on global issues and processes and an understanding of their impact on particular countries or geographic regions. Cornell's several undergraduate colleges and many departments offer courses that provide a strong grounding in the field as well as an opportunity to study more than 60 languages.

The concentration in international relations provides a curricular structure for undergraduate students with an interest in international law, economics, agriculture, trade, banking, organizations, and government service, and in cross-cultural affairs or education. Students can major in just about anything and in addition "concentrate" in international relations. They can major in a field that the concentration in international relations closely complements (for example, history, government, economics, or anthropology) or they can major in some very different subject, including the sciences, and use the concentration to develop a separate expertise.

Course Requirements:

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 eight 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, 3, and 4
- One elective from Groups 1, 2, 3, and 4

Option B:

- One core course from Groups 1, 2, 3, and 4
- One elective from either Group 1 or Group 2
- One elective from Group 3 and Group 4, and one additional elective from either Group 3 or Group 4

Students should take note that some courses have prerequisites. **The list of courses here (for fall 1999 only) is representative but not exhaustive**. Many other courses throughout the university can qualify for the IR Concentration. For further information, contact the administrative coordinator or the director of the IRC (address below).

Course List Fall 1999

(For Course List Spring 2000, contact IRC program in fall of 1999)

Group 1: International Economics and Development

Core:

ECON 361	International Trade Theory (prerequisites: Econ 101–102–313)

Electives:

ECON 324	American Economic History
ECON 425	Economic History of Latin America
ECON 457/ WOMNS 446	Women in the Economy
ECON 460/ ILRLE 642	Economic Analysis of Welfare State
ECON 471	Economy of Former USSR & Central Europe
ECON 472	Comparative Economic System: East & West
ECON 475	Economic Problems of India
GOVT 338	Comparative Political Economy
GOVT 433	Politics of Economic Liberalization in the Developing World
ILRIC 333/ 533	Western Europe, US, and Japan
ILRIC 632	Labor Movements: Comparative Perspectives
ILRIC 637	Labor Relations in Asia
ILRHR 656	International Human Resource Management

Group 2: World Politics and Foreign Policy

Core:

GOVT 385	American Foreign Policy

Electives:

AS&RC 311/ 504	Government and Politics in Africa
AS&RC 380	African History: Early Times to 1800
AS&RC 451	Political and Social Change in Caribbean
GOVT 351	India
GOVT 358/ NES 294/ JWST 294	Modern History of the Near East
GOVT 380	Politics of Modern Germany
GOVT 393/ SOC 393	Introduction to Peace Studies
GOVT 432	Model European Union II
HIST 191	Introduction to Modern Asian History
HIST 214	SEM American Foreign Policy (permission of instructor)
HIST 293	History of China Up to Modern Times
HIST 295	Colonial Latin America
HIST 384	Europe, 1945–1968
HIST 414	Motivations of US Foreign Policy (permission of instructor)
HIST 464	Murder, War, & State, Violence in Europe (permission of instructor)
HIST 467	SEM Modern European Political History

Group 3: Transnational Processes and Policies

Core:

GOVT 393/ SOC 393	Introduction to Peace Studies

Electives:

B& SOC 461/ ALS 661/ BIOES 661	Environmental Policy (a year-long course)
CRP 477/ CRP 677	SEM Issues in African Development
GOVT 400	US Sovereignty and International Law (by permission only)
HIST 250/ ELE E 250/ ENGRG 250	Technology in Society
INTAG 300	Perspectives in International Agricultural and Rural Development
NTRES 400	International Environmental Issues (juniors and seniors)
R SOC 438/ SOC 437	Social Demography (enrollment limited to 30)

Group 4: Cultural Studies

Core:

ANTHR 200	Cultural Diversity and Contemporary Issue
ANTHR 321/ WOMNS 321/ ANTHR 621	Sex and Gender: Cross Cultural Perspective

Electives:

ANTHR 303/ AAS 303	Asians in the Americas
ANTRR 322/ RELST 322	Magic, Myth, Science and Religion (limited to 12 students)
ANTHR 328	Conflict, Dispute Resolution, and Law in Cultural Context
ANTHR 339	Peoples/Cultures of Himalayas
ANTHR 345	Japanese Society
ANTHR 362/ 662	Democratizing Society
ASIAN 211	Introduction to Japan
ASIAN 215	Introduction to South Asian Civilization
ASIAN 490/ HIST 490	Tales of Heike
AS&RC 478/ WOMNS 478	Family and Society in Africa
COML 311/ RUSSL 311/ FRLIT 315	Modern European Literature and Culture
COML 404/ ENGL 404/ GERST 414	Nazis and the Literary Imagination
ENGL 252/ WOMNS 252/ JWST 255	Women and the Holocaust
ENGL 268/ AM ST 268	The Culture of the 1960's
ENGL 434	Electronic Art and Culture
FRLIT 220	French and Francophone Culture
FRLIT 224/ ANTHR 224	The French Experience
HIST 151	Introduction to Western Civilization
HIST 249	Race and Class in Latin American History
HIST 281/ S&TS 281	Science in Western Civilization
HIST 287/ BIO G 207/ S&TS 287	Evolution
HIST 291/ JWST 252	Modern European Jewish History: 1789–1948
HIST 326	History of the Samurai, Part II
HIST 348	History of Brazil
HIST 355	The Old Regime: France 17th and 18th Century
HIST 366/ RELST 366	Medieval Culture, 1100–1300
HIST 395	Southeast Asia to the 18th Century
HIST 428	Comparative History of Colonial North America (permission of instructor)
HIST 445/ HIST 645	Prostitutes/Patriots—Latin America (permission of instructor)
HIST 462	Pop Culture in European History
HIST 474	Topics in Modern European Intellectual History
HIST 493/ HIST 693	Problems in Modern Chinese History (permission of instructor)
NES236/ JWST 236/ COML 246	Israel: Literature and Society
NES 294/ JWST 294/ GOVT 358	Modern History of the Near East
NES 366/ JWST 366	History and Archeology: Ancient Near East
SOC 393/ GOVT 393	Sociology of War and Peace

Language Requirement

IR Concentrators 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

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. Transcripts will reflect successful completion of the requirements for the concentration. In addition, students will receive a special certificate signed by both the director of the Mario Einaudi Center for International Studies and the director of the international relations concentration. To enroll and for further information, contact Zhang Wu, the administrative coordinator, IRC, at the Mario Einaudi Center for International Studies, 156 Uris Hall, wz18@cornell/edu/254–5004 or contact the director, Prof. Mathew Evangelista (Government), (255–8672/mae10@cornell.edu).

Center for International Studies

See Interdisciplinary Centers, Programs, and Studies.

Program of Jewish Studies

D. I. Owen, director (Ancient Near Eastern and Biblical History and Archaeology), L. Adelson (German-Jewish Literature and Culture), R. Brann (Judeo-Arabic Studies), S. Burstyn (Israeli Music), V. Caron (Modern French and European-Jewish History), M. Diesing (Yiddish Language and Linguistics), N. Furman (French Holocaust Literature), K. Haines-Eitzen (New Testament and Early Christianity), Y. Halevi-Wise (Modern Hebrew Literature), R. Hoffmann (Holocaust Studies), P. Hyams (Medieval Jewish History), D. LaCapra (Holocaust Studies), M. Levine (Modern Middle Eastern History and Political Science), M. Migiel (Italian Literature), R. Polenberg (American-Jewish History), J. Porte (American-Jewish Writers), D. S. Powers (Arabic and Islamic Studies), G. Rendsburg (Biblical and Semitic Studies), E. Rosenberg (Holocaust Studies), N. Scharf (Hebrew Language), D. Schwarz (Anglo-Jewish Literature), G. Shapiro (Russian-Jewish Literature), S. Shoer (Hebrew Language), M. Steinberg (German-Jewish History and Culture), Y. Szekely (Judaica Bibliography), J. Zorn (Biblical Archeaology)

The Program of Jewish Studies was founded as an extension of the Department of Semitic Languages and Literatures, now the Department of Near Eastern Studies, in 1973 and attained status as an intercollegiate program in 1976.

The program has grown out of the conviction that Judaic civilization merits its own comprehensive and thorough treatment and that proper understanding of any culture is inconceivable without adequate knowledge of the language, literature, and history of the people that created it. Accordingly, the offerings in the areas of Jewish languages and literatures have been considerably expanded, and courses in ancient, medieval, and especially modern Jewish history and culture have been added to the program.

It is a broadly based, interdisciplinary program, bringing together faculty from various Cornell departments and colleges.

The Program of Jewish Studies supports teaching and research in the many areas of Jewish Studies. It is a secular, academic program, whose interests are diverse and cross-cultural. The program recognizes its special relationship to teaching and research in classical Judaica and Hebraica pursued by the members of the Department of Near Eastern Studies.

It presently enables students to obtain basic instruction and specialization in the fields of Semitic languages; the Hebrew Bible; medieval and modern Hebrew literature; ancient, medieval, and modern Jewish history; and Holocaust studies. In some of these fields students may take courses on both graduate and undergraduate levels. Faculty throughout the university provide breadth to the program by offering courses in related areas of study.

Courses Offered

JWST 105–106 Elementary Modern Hebrew I and II (also NES 101–102)
105 fall; 106 spring. 6 credits. S. Shoer.
For description, see NES 101–102.

JWST 123–124 Elementary Biblical Hebrew I & II (also NES 123–124, RELST 123–124)
123 fall; 124 spring. 3 credits. Y. Chen.
For description, see NES 123–124.

JWST 163 Things the Prophets Never Told You: Archaeology and the Religion of Ancient Israel (also NES 163)
Fall. 3 credits. J. Zorn.
For description, see NES 163.

JWST 201–202 Intermediate Modern Hebrew I and II (also NES 201–202) @
201, fall; 202, spring. 4 credits. N. Scharf.
For description, see NES 201–202.

JWST 223 Introduction to the Bible I (also NES 223) @ #
Fall. 3 credits. G. Rendsburg.
For description, see NES 223.

JWST 229 Introduction to the New Testament (also NES 229, RELST 229) @ #
Fall. 3 credits. K. Haines-Eitzen.
For description, see NES 229.

JWST 236 Israel: Literature and Society (also NES 236) @
Fall. 3 credits. Y. Halevi-Wise.
For description, see NES 236.

JWST 252 Modern European Jewish History, 1789–1948 (also HIST 291)
Fall. 4 credits. V. Caron.
For description, see HIST 291.

JWST 255 Women and The Holocaust (also ENGL 252, WOMNS 252)
Fall. 4 credits. M. Jacobus.
For description, see ENGL 252.

JWST 263 Introduction to Biblical History and Archeology (also RELST 264, ARKEO 263 and NES 263) @ #
Spring. 3 credits. J. Zorn.
For description, see NES 263.

JWST 271 Yiddish Linguistics (also LING 241)
Fall. 4 credits. M. Diesing.
For description, see LING 241.

JWST 294 Modern History of the Near East: Changing Politics, Society and Ideas (also NES 294, GOVT 358) @
Spring. 4 credits. M. Bloom.
For description, see GOVT 358.

JWST 295 Introduction to Christian History (also NES 295, RELST 295, HIST 299) #
Spring. 3 credits. K. Haines-Eitzen.
For description, see NES 295.

JWST 299 The Hebrew Bible and The Arabic Qur'an in Comparative Perspective (also NES 299, RELST 299, COM L 299) @ #
Spring. 3 credits. R. Brann.
For description, see NES 299.

JWST 301–302 Advanced Modern Hebrew I and II (also NES 301–302) @
301, fall; 302, spring. 4 credits. N. Scharf.
For description, see NES 301–302.

JWST 320 Women in the Hebrew Bible (also NES 320, WOMNS 322) @ #
Spring. 3 credits. G. Rendsburg.
For description, see NES 320.

JWST 323 Encounters With The Dead (also JWST 623, ITALL 323/623, COM L 323/623)
Fall. 4 credits. M. Migiel.
For description, see ITALL 323.

JWST 326 Women in the Hebrew Bible—seminar (also NES 326, WOMNS 326)
Spring. 1 credit. G. Rendsburg.
For description, see NES 326

JWST 328 Gnosticism and Early Christianity (also NES 328, RELST 330) @ #
Spring. 4 credits. K. Haines-Eitzen.
For description, see NES 328.

JWST 329 Intro to the New Testament—Seminar (also NES 329, RELST 329)
Fall. 1 credit. K. Haines-Eitzen.
For description, see NES 329.

JWST 339 Islamic Spain: Culture and Society (also NES 339/639, JWST 639, RELST 334, SPANL 339/699, COM L 334) @ #
Fall. 4 credits. R. Brann.
For description, see NES 339.

JWST 363 Society and Law in the Ancient Near East (also NES 363) @ #
Fall. 4 credits. T. Sharlach.
For description, see NES 363.

JWST 366 The History and Archaeology of the Ancient Near East (also NES 366, ARKEO 366) @ #
Fall. 4 credits. D. I. Owen.
For description, see NES 366.

JWST 400 Seminar in Advanced Hebrew (also NES 400) @
Fall. 4 credits. Enrollment limited to 15 students. N. Scharf.
For description, see NES 400.

JWST 414 History into Fiction: Nazis and the Literary Imagination (also ENGL 404, COM L 404, GERST 414)
Fall. 4 credits. E. Rosenberg.
For description, see ENGL 404.

JWST 418 Exploring the Israeli Folksong (also S HUM 418, MUSIC 418)
Spring. 4 credits. S. Burstyn.
For description, see S HUM 418.

JWST 421 Readings in Biblical Hebrew Poetry (also NES 421, RELST 421) @ #
Fall. 4 credits. G. Rendsburg.
For description, see NES 421.

JWST 458 Imagining the Holocaust (also JWST 658, ENGL 458/658, GERST 457/657)
Spring. 4 credits. D. Schwarz.
For description, see ENGL 458.

JWST 466 The Mythology and Religion of Ancient Mesopotamia and Canaan (also NES 466, RELST 466) @ #
Spring. 4 credits. T. Sharlach.
For description, see NES 466.

JWST 474 Topics in Modern European Intellectual and Cultural History (also HIST 474)
Fall. 4 credits. D. La Capra.
For description, see NES 474.

JWST 478 Jewish-American Writing (also ENGL 479, AM ST 479)
Fall. 4 credits. J. Porte.
For description, see ENGL 479.

JWST 491–492 Independent Study–Undergraduate
Fall and spring. Variable credit. Staff.

JWST 499 Independent Study–Honors
Fall and spring. Variable credit. Staff.

JWST 623 Encounters With The Dead (also JWST 323, ITALL 323/623, COML 323/623)
Fall. 4 credits. M. Migiel.
For description, see ITALL 323/623.

JWST 639 Islamic Spain: Culture and Society (also NES 339/639, JWST 339, RELST 334, SPAN L 339/699, COM L 334)
Fall. 4 credits. R. Brann.
For description, see NES 339/639.

JWST 658 Imagining the Holocaust (also JWST 458, ENGL 458/658)
Spring. 4 credits. D. Schwarz.
For description, see ENGL 458/658.

Courses Not offered 1999–2000.

JWST 197 Introduction to the Near Eastern Civilization (also NES 197 and RELST 197)

JWST 223 Introduction to the Bible (also NES 223 and RELST 223)

JWST 227 Introduction to the Prophets (also NES 227 and RELST 227)

JWST 239 Cultural History of the Jews of Spain (also COM L 239, NES 239, RELST 239, and SPAN L 239)

JWST 248 Introduction to Classical Jewish History (also RELST 248 and NES 248)

JWST 251 The Holocaust: The Destruction of European Jewry

JWST 253 From Medievalism to Modernity: The History of Jews In Early Modern Europe, 1492–1789 (also NES 245, HIST 285)

JWST 261 Ancient Seafaring (also NES 261, ARKEO 275)

JWST 290 History of Zionism and the Birth of Israel (also NES 290, HIST 267)

JWST 339 Muslims, Christians, and Jews in Islamic Spain: Literature and Society (also NES 339/639, COM L 334, RELST 334, SPANL 339/699) @#

JWST 342 Jewish Mysticism (also RELST 344 and NES 344) #

JWST 344 The History of Early Christianity (also NES 324, CLASS 344 and RELST 325)

JWST 346 Seminar in 19th-Century Jewish Intellectual History (also NES 347 and RELST 346)

JWST 347 Gender and Judaism (also WOMNS 347, RELST 343, NES 345)

JWST 352 The Transformation of European Jewry (also HIST 389)

JWST 353 History of the Holocaust (also HIST 370)

JWST 390 Modern History of the Middle East: Changing Politics, Society and Ideas (also NES 390, GOVT 358)

JWST 420 Readings in Biblical Hebrew Prose (also NES 420, RELST 420)

JWST 428 Medieval Hebrew Biblical Exegesis (also NES 428, NES 624 and RELST 428)

JWST 435–436 Aramaic I & II (also NES 435–436) @ #

JWST 442 German Jewish Culture: From the Enlightenment to the Present (also GERST 442 and S HUM 442)

JWST 446 History of Jews in Modern France (also HIST 417, FR LIT 413)

JWST 454 Anti-Semitism and the Crisis of Modernity: From the Enlightenment to the Holocaust (also HIST 435)

JWST 478 Jewish-American Writing (also ENGL 479 and AM ST 479)

JWST 494 Studies in the Novel: Reading Joyce's Ulysses (also ENGL 470)

JWST 694 Joyce's Ulysses and the Modern Tradition (also ENGL 670)

John S. Knight Writing Program

The director of the John S. Knight Writing Program is Jonathan Monroe, professor in the Department of Comparative Literature and George Elliott Reed Professor of Writing and Rhetoric. Katherine Gottschalk, senior lecturer in the Department of English, is the Walter C. Teagle Director of First-Year Writing Seminars. The program's offices are in 159 Goldwin Smith Hall, 255–4061.

M. Gilliland (Writing Workshop), K. Hjortshoj (Writing Workshop), B. LeGendre (Writing Workshop), J. Martin (Writing Workshop), J. Pierpont (Writing Workshop), E. Shapiro, (Writing Workshop).

The John S. Knight Writing Program helps to coordinate the teaching of writing for undergraduates in six of the university's schools and colleges (the School of Industrial and Labor Relations and the colleges of Agriculture and Life Sciences; Architecture, Art, and Planning; Arts and Sciences; Engineering; and Human Ecology). The program administers writing seminars for first-year and upperclass students, tutorial writing classes, and seminars in the teaching of writing. More than thirty academic departments and programs participate in the program.

Advanced Writing Seminars

For upperclass students, the program collaborates with the Department of English in offering English 288–89, "Expository Writing." This course helps students write with more confidence and skill in all disciplines, while provoking inquiry 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."

First-Year Writing Seminars

For first-year students the program offers the first-year writing seminars—more than 125 different courses in the humanities, social sciences, expressive arts, and sciences. Through introductory work in a particular field of study, seminars help students write good English expository prose—prose that, at its best, is characterized by clarity, coherence, intellectual force, and stylistic control. All seminars pursue this common aim through small classes, with a maximum of seventeen students, and adherence to a program-wide set of guidelines:

- Seminars require at least six—and at most ten—formal writing assignments on different topics, totaling a minimum of thirty pages. (Some of the 30-page total may include preparatory drafts.)
- A minimum of two of the required essays (see above) are developed through several stages of revised drafts under the instructor's guidance so that the revisions stand as substantially improved essays.
- All seminars spend ample classroom time on work directly related to writing.
- Reading assignments in the course subject are kept under 75 pages per week to permit regular, concentrated work on writing.
- All students meet in at least two individual conferences with the instructor.

Offerings change from semester to semester. Each term's first-year writing seminars are described in a brochure available from college registrars.

To ensure that students will enjoy the benefits of small writing classes, first-year 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. Students may change their writing seminars each semester at the First-Year Writing Seminar Exchange. Changes can also be made at special First-Year Writing Seminar add/drop sessions held during the first two weeks of each semester.

The colleges and the school served by the program accept first-year writing seminars in fulfillment of their individual graduation requirements in categories referred to variously as "first-year writing," "oral and written expression," and the like. The program does not decide whether students may graduate: it makes courses available. Individual colleges and schools administer their own graduation requirements.

Currently, most undergraduate students are required to take two first-year writing seminars. Architecture majors, however, need only one. Hotel students fulfill their requirement through Hotel Administration 165, which should be taken with Hotel Administration 265 during the first two semesters at Cornell. Agriculture and Life Sciences students can take first-year writing seminars or choose from among a variety of other courses to fulfill their requirement.

All students who score "4" or "5" on the Princeton Advanced Placement Examination in English receive three credits. Such credits are awarded automatically; no application to the John S. Knight Writing Program or the Department of English is necessary. How these credits may be applied to first-year writing or other distribution requirements depends on the student's college and score. All students who score "5," except Architecture majors, may apply their three credits towards 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 first-year 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 first-year writing seminars: English 270, 271, or 272.

Although there are no exemptions from college writing requirements, some students may fulfill all or part of their college's writing requirement through transfer credits or writing-course substitutions.

For work done at other institutions to be accepted as equivalent to first-year 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 first-year 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 first-year 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 first-year writing seminars and other interested instructors. Teaching Writing I, offered in the summer, is primarily a course for graduate students; the same course is offered in the fall as Teaching Writing II. The program also sponsors a summer apprenticeship program for a limited number of graduate students, and a summer seminar for faculty members interested in the teaching of writing.

WRIT 700 Teaching Writing
Summer and fall. 1 credit. S-U grade only.
Teaching Writing introduces new instructors of Cornell's First-Year Writing Seminars to the challenges of teaching writing in courses that both introduce students to particular fields of study and develop the sophisticated writing skills students will need throughout their undergraduate careers and beyond. An overview of methodologies involved in the teaching of writing within a disciplinary context is provided by readings representing a range of pedagogical theories and practices, seminar discussions, and presentations of faculty, visiting scholars in the field, and experienced TAs. Participants in the course prepare written assignments designed to prepare them for the actual work of their First-Year Writing Seminars. In addition, written critiques and explanatory rationales of those assignments provide an opportunity for reflection on the methods chosen and on the principles underlying them.

WRIT 707 Literacy, Social Organization, Consciousness, and the Information Society (also ENGL 707, LING 707, SOC 707, & PSYCH 707)
Fall. 5 credits. C. Bazerman.
This course will investigate the literate practices of contemporary academic, disciplinary, and professional cultures, which are deeply implicated in contemporary forms of social organization and consciousness. We will examine the historical emergence and elaboration of literate practices and the implications for contemporary society moving from print to electronic media. This investigation will start with considering the interaction of literacy and social organization at earlier

moments and will then consider some relevant theory to expose the ways text, social organization, and consciousness interact. We will then return to the rise and organization of academic, disciplinary, professional, and information culture. Each participant in the seminar will be responsible for developing a project examining socio-cognitive discursive practices within a classroom, disciplinary, professional, or cyber-information domain.

Writing Workshop

The John S. Knight Writing Program offers "An Introduction to Writing in the University" for first-year students (or transfer students needing writing credit) through the Writing Workshop. This course is designed for students who have had little training in composition or who have serious difficulty with writing assignments.

Writing 137 and 138 are graded S-U only, and students receiving a grade of S are 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 work on writing assignments. 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, 134 An Introduction to Writing in the University
137, fall; 138, spring; 134, summer. 3 credits each term. Each section limited to 12 students in the fall and spring, 6 students in the summer. S-U grades only. Prerequisite: permission of instructor.
This writing seminar is designed for students who need more focused attention to order to master the expectations of academic writing. The course emphasizes the analytic and argumentative writing and critical reading essential for university-level work. With small classes and with weekly student/teacher conferences, each section is shaped to respond to the needs of students in that particular class.

WRIT 139–239 Special Topics in Writing
Fall, spring. 139, undergraduate students only; 239, graduate students only. 3 credits. S-U grades only. Cannot fulfill any writing or distribution requirements. Prerequisite: permission of instructor.
These courses allow students the opportunity to resolve significant writing challenges that have interfered with their academic progress. Students must have ongoing writing projects on which to work. Instruction is in weekly tutorials. Interested students should come to 174 Rockefeller for more information.

Latin American Studies

190 Uris Hall

D. Castillo, director; M. J. Dudley, associate director; L. Benería, R. Blake, D. Block, C. Castillo-Chávez, M. L. Cook, D. Cruz de Jesus, T. Davis, E. Dozier, B. Deutsch-Lynch, G. Fields, M. A. Garcés, W. Goldsmith, J. Haas, J.-P. Habicht, J. Henderson, T. Holloway, Z. Iguina, B. J. Isbell, S. Jackson, T. Jordan, J. Kronik, S. Kyle, D. R. Lee, L. Morató, B. Olguín, J. Oliveira, J. E. Paz-Soldán, J. Piedra, T. Poleman, A. Power, E. Rodríguez, M. Roldán, J. Routier-Pucci, D. Sanjur, V. Santiago, H. Schamis, R. Sierra, M. Stycos, M. J. Stycos, M. Suñer, J. Tittler, H. Vélez, L. Williams

The Latin American Studies Program encourages and coordinates faculty and student interests in Latin America. A variety of special lectures, films, and seminars supplement the regular course offerings. Graduate students may pursue a minor in Latin American Studies, while majoring in the field of their choice.

Undergraduate Concentration

Undergraduate students may fulfill a Latin American Studies Concentration by completing a minimum of 15 credits in Latin American studies courses combined with language proficiency in Quechua, Spanish, or Portuguese. Latin American courses are offered in the College of Agriculture and Life Sciences; the College of Architecture, Art, and Planning; College of Arts and Sciences, 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.

Latin American Studies Core Courses

It is strongly recommended that undergraduate concentrators take the interdisciplinary core course **SPANL 320/LASP 301 Perspectives on Latin America**.

Particular attention is drawn to the following courses that students have taken in the past to complete requirements for the undergraduate concentration or the graduate minor.

Other courses may be substituted with the approval of the advisor.

ANTHR

204 Ancient Civilizations

305 Emotion, Gender and Culture

332 Culture and Performance and Performing Culture

333 Ethnology of the Andean Region

337 The Femenine Symbolic

432 Culture and Performance and Performing Culture

433 Andean Ethnology Thought and Culture

456 Mesoamerican Religion, Science, and History

499 The Amazonian Imagination: Reflections on the Savage State

639 The Femenine Symbolic

AS&RC

451 Politics & Social Change in the Caribbean

455 Caribbean Literature

COML

482 Latin American Woman Writers

CRP

453 Environmental Aspects of International Planning

495.3/670.3 Latin American Cities

670 Regional Planning and Development in Developing Nations

671 Seminar in International Studies and Planning

ENGL

243 Poetry & Politics in the Americas

676 Testimonio (Testimonial Narrative) in the Americas

GOVT

340 Latin American Politics

430 Democracy, Power, and Economic Reform: Cross-Regional Perspectives

638 Latin American Political Economy

H ADM

455 Ecotourism and Sustainable Development

496 Latin American Hotel Development Seminar

HIST

348 Contemporary Brazil

424 Art and Politics in Twentieth-Century Latin America

425 Family Values and Latin American History

449 Race and Class in Latin American History

470 Violence, Nation, Myth: In the Americas 1770–1940 (also ENGL451)

475 Bandits, Deviants and Rebels

445 Prostitutes and Patriots: The Urban Construction of Citizenship in Latin America

TBA History of Mexico

ILR

304 Comparative North American Labor History: Mexico, Canada, And the US in the 20th Century

332 Labor In Developing Economies

339 The Political Economy of Mexico

NS

612 Methods of Assessing Growth in Children

QUECH

300 Independent Quechua

PORT

303–304 Advanced Portuguese Composition and Conversation

SHUM

404 Trauma and Captivity from Cervantes to Gabriel Garcia Marquez

419 The Trauma of Conquest

SPAND

213 Intermediate Spanish for the Medical and Health Professions

300 Directed Studies. Extra credit for ANTHRO 333 and CRP 371

310 Advanced Spanish Conversation and Pronunciation

311 & 312 Advanced Composition and Conversation

366 Spanish in the United States

372 Nacionalismos

405 Hispanic Dialectology

407 Applied Linguistics: Spanish

408 The Grammatical Structure of Spanish

SPANL

201 Introduction to Hispanic Literature

300 Gender and Sexuality in Latin America

301 Hispanic Theater Production

315 Renaissance Hispanism: Spain and the Americas

317 Readings In Colonial Spanish-American Literature

318 Readings In Modern Spanish-American Literature

323 Readings In Latin American Civilization

333 The Spanish-American Short Story

345 Contemporary Spanish-American Novel

346 Hispanic Caribbean Culture and Literature

347 Spanish American in Black and White

376 Studies in the Spanish and Latin American Essay

381 Fin De Siglo

384 Literature and Revolution

390 The Fiction of Manual Puig

395 Modern Contemporary Andean Literature

397 Colombian Literature

398 Post-Revolutionary Mexican Novel

429–430 Honors Work in Hispanic Literature

479 Colonial Spanish-American Literature: Voices of the Colonized

483 Macondo/McOndo: Our Fin de Siglo

492 Latin American Women Writers

494 Maricoteria/Queer Theory

495 Gabriel Garcial Marquez

Latino Studies Program

434 Rockefeller Hall

The Latino Studies Program is an interdisciplinary academic program that focuses on the contributions, concerns, and welfare of those persons of Latino 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 Latino subject matters; (2) to enlarge the size of the Latino faculty at Cornell through permanent appointments and visiting appointments; and (3) to enhance the Latino academic environment on campus through support of such activities as lectures, conferences, seminars, exhibits, and research activities.

Undergraduate Concentration

The Latino Studies Program offers an undergraduate concentration in Latino Studies which consists of an interdisciplinary course of study primarily in history, sociology, anthropology, literature and language. To complete the concentration, students must take at least five courses (minimum total of 15 credits) in Latino Studies, including "Latinos in the United States" (LSP 201/SOC 265) offered each spring semester. Students are required to include at least two courses at the 300 or 400 levels. Students who are interested in the concentration must meet with the LSP advisor, senior lecturer Loretta Carrillo, and file an application with the Latino Studies Program office by the beginning of their junior year. A maximum of one independent study, which requires the approval of the LSP advisor, will be accepted to fulfill the requirements of the concentration. The FWS does not count towards fulfilling concentration requirements.

Resource Center

The Latino Studies Program Resource Center in 432 Rockefeller Hall serves Cornell students, faculty, staff, and the wider local community. The Resource Center maintains print and media material pertinent to U.S. Latino issues and also provides a meeting space for more than 25 Latino student organizations.

Courses

LSP 201 Latinos in the United States (also SOC 265)
Spring. 4 credits variable. T-TH 2:55–4:10.
H. Velez.
Exploration and analysis of the Hispanic experience in the United States. An examination of sociohistorical background and economic, psychological, and political factors that converge to shape a Latino group identity in the United States. Perspectives are suggested and developed for understanding Hispanic migrations, the plight of Latinos in urban and rural areas, and the unique problems faced by the diverse Latino groups. Groups studied include Mexican Americans, Dominicans, Cubans, and Puerto Ricans.

LSP 202 Spanish for English/Spanish Bilinguals (also SPAND 200)
Fall and spring. 3 credits. M W F 11:15–12:05. N. Maldonado-Mendez.
A course designed to expand bilingual student's knowledge of Spanish providing them with ample opportunities to develop and improve each of the basic language skills.

LSP 220 Sociology of Health and Ethnic Minorities (also RSOC 220)
Fall. 3 credits. T-TH 10:10–11:25.
P. Parra.
Discusses the health status of minorities in the United States. Specifically, it will explore intragroup diversity such as migration, economic status and the influence of culture and the environment on health status and access to health care. Although special attention is given to Latino populations, discussion encompasses other minorities who face similar problems.

[LSP 221 Anthropological Representation: Ethnographies on Latino Culture (also ANTHRO 221)
3 credits. Not offered 1999–2000.
V. Santiago-Irizarry.
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 they are embodied in anthropological texts. Issues to be explored include the relation between the ethnographer and the people he or she is studying, the contexts in which ethnographic texts are produced, and the way they may position different cultural groups within the larger national context.]

LSP 240 Survey in U.S. Latino Literature (also ENGL 240)
Spring. 4 credits. Time: TBA.
M. P. Brady.
It is estimated that by the year 2000, the Latino/a population in the United States will be the largest "minority group" in the country. This course seeks to introduce students to the growing body of literature (both fiction and poetry) by the various U.S. Latino/a communities. We will consider cultural production that results from intercultural crossings between Mexico, Cuba, Guatemala, Dominican Republic, El Salvador, and Los Angeles, New York, and Miami. How do Latina/o literatures converge and diverge as they explore issues of "race," ethnicity, gender, sexuality, class, nationality, and identity in general, at a time when the American profile is increasingly becoming "latinized." Authors examined may include Tomás Rivera, Cherrie Moraga, Jesús Colón, Miguel Pinero, Nicolasa Mohr, Cristina García, Julia Alvarez, Américo Paredes, Junot Díaz, Loida Maritza Pérez, Sandra Benítez, Martin Espada, Lorna Dee Cervantes, Frances Negrón-Muntaner, Luz María Umpierre, and Hector Tobar.

LSP 246 Contemporary Narratives by Latina Writers (also SPANL 246)
Fall. 3 credits. T-TH 1:25–2:40.
L. Carrillo.
This course offers a survey of narratives by representative Latina writers of various Latino ethnic groups in the United States including Chicana, Chilean, Cuban, Dominican, and Puerto Rican. We will investigate the parellel development of a Latina perspective on personal, social, and cultural issues alongside that of the U.S. ethnic liberation/revitalization movements of the 1960s through to contemporary feminist activism and women of color movements. We will investigate these works as artistic attempts to deal with such issues as culture, language and bilingualism, family, gender, sexuality, and domesticity. We will account for regional distictions and contributions. Readings will include works by Julia Alvarez, Gloria Anzaldúa, Elena Castedo, Ana Castillo, Denise Chávez, Sandra Cisneros, Judith Ortiz Cofer, Cristina García, Nora Glickman, Nicholasa Mohr, Cherríe Moraga, Achy Obejas, Esmeralda Santiago, Ana Lydia Vega, and Helena María Viramontes.

LSP 260 Introduction to U.S. Latino History, Part I (also HIST 260, AM ST 259)
Spring. 4 credits. T-TH 1:25–2:40.
M. C. Garcia.
This course introduces students to the history of Latinos in the United States. We will focus specifically on the history of Chicanos (Mexican Americans) and Central Americans. Part II of this course LSP/HIST/AM ST 261 focuses on the history of Puerto Ricans, Cubans, and Dominicans in the U.S. Among the topics that will be addressed are: historical immigration patterns and the "push/pull" factors that compelled migration to the

United States; the social and political events that shaped the evolution of these Latino communities; the role of cultural identity, race, class, and gender in shaping experience; the role of foreign policy in formulating immigration policy.

LSP 261 Introduction to U.S. Latino History, Part II (also HIST/AM ST 261)
Fall. 4 credits. TH 2:55–4:10.
M. C. Garcia.
This course, part II of a two-semester sequence, introduces students to the history of Latinos in the U.S. In LSP/HIST/AM ST 261 we will focus on Puerto Ricans, Cubans, and the Dominicans in the United States. (LSP/HIST 260; AM ST 259 focuses on Mexican Americans/Chicanos and Central Americans). Among the topics to be addressed are: historical immigration patterns and reasons for migration; the social and political events that shaped the evolution of these communities; the role of cultural identity, race, class and gender in shaping experience; the intersection of U.S. foreign policy and immigration policy.

LSP 280 Intercultural Ethnoscapes: Spain and America (also ANTHRO 280)
Fall. 3 credits. M W F 1:25–2:15. One-time course offering by visiting professor.
Visiting Professor M. Buxó I Rey.
At the end of each century, the West has reflexively considered its cultural achievements. The nineteenth century ended with the utopian illusion that knowledge was being transformed into industrial, scientific and social progress. The twentieth ends with the illusion of a breakthrough to a knowledge-based society that is globally and locally interconnected. Yet to be categorized a fundamental cultural change, global ubiquity, immediacy, and virtuality have to build on new meanings, designs, and actions. This course uses the past and the present link between Spain and America as an ethnographic laboratory to explore the agency and the intercultural translation of meanings, sentiments and identities through the selection and hybridization of cultural objects and visual and textual expressions, including iconography and ritual, gardens, literature, mass media and the Internet.

LSP 306 Latino Politics in the United States (also GOVT 306)
Spring. 4 credits. T-TH 10:10–11:25.
P. Cabán.
The opening section examines the evolution of Latino/a political identity and the ongoing debate on whether Latinos constitute a homogeneous ethnical/racial population with common political interests, values and aspirations. We examine the immigration experience and the socioeconomic and demographic characteristics of different Latino/a populations. The next section focuses on the changing structure of U.S. politics, at the national, state and local levels. We examine the histories of Latinos' organizing and electoral struggles to gain access to the political system, their patterns of political socialization, and the possibilities of and obstacles for coalition building with other racial/ethnic populations. Finally, the course will examine a number of case studies on Latinos' struggle for inclusion in the U.S. body politic, and look at ways in which they have challenged efforts to exclude them. We will be concerned with four recent policy issues: welfare and immigration reforms, affirmative action, bilingual education and civil rights legislation. Understanding how the decisions and actions of the legal system and courts have altered the opportunities for Latino economic and political empowerment, and the campaigns organized by these affected communities to reverse injurious legislation, will be the central themes here.

[LSP 366 Spanish in the United States (also LING 366)
4 credits. Prerequisite: some knowledge of Spanish. Not offered 1999–2000.
M. Suner.
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.]

LSP 377 The United States (also ANTHRO/AM ST 377)
Fall. 4 credits. T-TH 11:40–12:55.
V. Santiago-Irizarry.
The anthropological inquiry into one's culture is never a neutral exercise. This course will explore issues in the cultural construction of the United States as a "pluralistic" society. We will look at the ideological context for the production of a cultural profile predicated upon ideas that are intrinsic to American images of identity such as individualism, freedom, and equality and the way these are applied in practice. The course readings will include historic documents and accounts, popular writings, and recent ethnographies on the United States.

[LSP 396 Modern Latino Prose Fiction (also SPANL 396)
4 credits. Conducted in Spanish. Not offered 1999–2000. D. Castillo.
A detailed examination of representative twentieth-century fictional works (novels, short stories, plays) by Hispanic American authors. Discussion will be centered on such issues as the social and political concerns raised by the fiction and the authors' needs to struggle with a double linguistic and cultural tradition. Authors include Nicholasa Mohr, Piri Thomas, Rolando Hinojosa-Smith, Alejandro Morales, Tomás Rivera, Ron Arias, Raymond Barrio, and Luis Valdez.]

LSP 420/421 Independent Study
Fall and spring. 2–4 credits. Permission of instructor.
Guided independent study.

LSP 660 Latino Languages, Ideology, and Practice (also ANTHRO 660)
Spring. 4 credits. T 4:30–6:30.
V. Santiago-Irizarry.
Cultural identity and citizenship in the United States have often been organized around linguistic difference and the issues this raises in an English-dominant society. Drawing from anthropological theories on language, this course will look at the place of language as a signifying practice in the U.S. by focusing on the experience of Latino communities. Topics to be explored include linguistic diversity and change, accomodation and resistance, language maintenance and shift, linguistic ideologies, the production of language hierarchies, and institutional applications of language.

Law and Society

D. A. Dunning, director, 280 Uris Hall, 255–6391, dad6@cornell.edu, R. Breiger (sociology), C. Carmichael (comparative literature), D. A. Dunning (psychology), G. Hay (economics), P. Hyams (history), M. Katzenstein (government), R. Miller (philosophy), M. B. Norton (history), R. Polenberg (history), D. Powers (Near Eastern studies), J. Rabkin (government), A. Rutten (government), H. Shue (Ethics and Public Life)

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. Students who wish to graduate with a concentration in law and society should consult the director of the program or one of the advisors listed above to plan a coherent program of study. Admission to the concentration has to be approved by the director of the program. Such a program should ordinarily include at least four courses from the following list. At least two of the courses should fall outside the student's major. 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 advisor. The Law and Society Program is an activity of the Program on Ethics and Public Life. Inquiries can be directed to:
Mary Newhart, Administrative Assistant, 119 Stimson Hall, 255–8515, mjn3@cornell.edu.

AM ST 336 Capitalism and Society in Developing American, 1607–1877 (also HIST 336)

AS&RC 280 Racism in American Society (also HIST 280)

ANTHR 328 Conflict, Dispute Resolution, and Law in Cultural Context

ASIAN 338 Democracy and War (also HIST 338)

B&SOC 406 Biotechnology and Law (also S&TS 406)

B&SOC 407 Law, Science, and Public Values (also GOVT 407 and S&TS 407)

B&SOC 427 The Politics of Environmental Protection in American (also GOVT 427, S&TS 427)

COM L 326 Christianity and Judaism (also RELS 326) #

COM L 328 Literature of the Old Testament (also RELS 328) @ #

ECON 335 Public Finance and Resource Allocation

ECON 336 Public Finance: Resource Allocation and Fiscal Policy

ECON 404 Economics and the Law

GOVT 111 Introduction to American Government and Politics

GOVT 260 Social and Political Theory (also PHIL 260)

GOVT 294 Global Thinking (also PHIL 294)

GOVT 313 The Nature, Functions, and Limits of Law

GOVT 324 Legal Reasoning and Legal Adaptation

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 410 Legislatures, Courts and Public Policy

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 (also WOMNS 466)

GOVT 469 Limiting War (also PHIL 369)

GOVT 474 Community, Nation, and Morality (also PHIL 446)

GOVT 489 International Law and Regime Development

HD 234 Children and the Law

HIST 318 American Constitutional Development

HIST 336 Capitalism and Society in Developing America, 1607–1877 (also AM ST 336)

HIST 338 Democracy and War (also ASIAN 338)

HIST 368 Marriage and Sexuality in Medieval Europe (also WOMNS 368) #

HIST 372–652 Introduction to Islamic Law (also NES 351/651, RELST 350)

HIST 436 Conflict Resolution in Medieval Europe

HIST 440 Undergraduate Seminar in Recent American History

NES 351/651 Introduction to Islamic Law (also HIST 372/652, RELST 350)

NES 357 Islamic Law and Society (also RELST 356)

PHIL 145 Contemporary Moral Issues

PHIL 241 Ethics

PHIL 242 Social and Political Philosophy (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

PHIL 346 Modern Political Philosophy (also GOVT 462)

PHIL 369 Limiting War (also GOVT 469)

PHIL 444 Contemporary Legal Thought

PHIL 446 Topics in Social and Political Philosophy (also GOVT 474)

PSYCH 265 Psychology and Law

RELST 326 Christianity and Judaism (also COM L 326)

RELST 328 Literature of the Old Testament (also COM L 328)

RELST 350 Introduction to Islamic Law (also NES 357)

RELST 356 Islamic Law and Society (also NES 357)

S&TS 406 Biotechnology and Law (also B&SOC 406)

S&TS 407 Law, Science, and Public Values (also GOVT 407 and B&SOC 407)

S&TS 427 Politics of Environmental Protection in America (also B&SOC 427, GOVT 427)

SOC 310 Sociology of War and Peace

SOC 354 Law and the Social Order

WOMNS 368 Marriage and Sexuality in Medieval Europe (also HIST 368)

WOMNS 466 Feminism and Gender Discrimination (also GOVT 466)

ARME 320 Business Law I

PAM 341 Economics of Consumer Law and Protection

CRP 380 Environmental Politics

CRP 451–551 Environmental Law

HD 233 Children and the Law

HSS 280 Racism in American Society (also AS&RC 280)

ILRCB 607 Values in Law, Economics, and Industrial Relations

NTRES 401 Environmental and Natural Resources Policies

Lesbian, Bisexual and Gay Studies

E. Hanson, director, undergraduate studies, B. Martin, director, graduate studies; B. Anderson, D. Bem, S. Bem, A. Berger, J. Borneman, B. Correll, J. Culler, I. DeVault, N. Furman, J. E. Gainor, I. V. Hull, M. Jacobus, K. Jones, M. Katzenstein, K. March, S. McConnell-Ginet, T. Murray, M. B. Norton, J. Peraino, J. Piedra, R. Savin-Williams, R. Schneider, A. M. Smith, A. Villarejo, R. Weil

The field of Lesbian, Bisexual and Gay Studies is devoted to the interdisciplinary study of the social construction of sexuality. LBG Studies is founded on the premise that the social organization of sexuality is best studied from the perspectives offered by those positions that have been excluded from established cultural norms.

In addition to offering a graduate minor, the field of LBG Studies now offers an undergraduate concentration, which is administered under the auspices of the Women's Studies Program and which consists of four courses from the list below. Although most of the courses in LBG Studies (including those on men) will probably fall under the aegis of the Women's Studies Program and hence be crosslisted with it, not all of the courses in Women's Studies are sufficiently focused enough on the social construction of sexuality per se to be part of the LBG Studies concentration. In order to qualify for the concentration, courses must devote a significant portion of their time to sexuality and to questioning the cultural and historical institution of exclusive heterosexuality. Students selecting their four courses from the LBG Studies subset must identify their concentration as either LBG Studies or Women's Studies; they cannot double-count their credits and thereby use the same courses for both concentrations.

Students interested in the LBG Studies concentration should contact the Lesbian, Bisexual and Gay Studies Office in 379 Uris Hall.

Courses

ANTHR 200 Cultural Diversity and Contemporary Issues
Fall. 3 credits. Staff.
For description, see ANTHRO 200.

ANTHR 321 Sex and Gender in Cross-Cultural Perspective (also WOMNS 321)
Fall. 4 credits. K. March.
For description, see WOMNS 321.

ENGL 355 Decadence (also WOMNS 355)
Spring. 4 credits. E. Hanson.
For description, see ENGL 355.

[ENGL 377 Gay Fiction (also WOMNS 376)
Not offered 1999–2000. E. Hanson.]

[ENGL 395 Video: Art, Theory, Politics (also THETR 395)
Not offered 1999–2000. T. Murray.]

[ENGL 424 Studies in Renaissance Lyric
Not offered 1999–2000. B. Correll.]

ENGL 427 Shakespeare: Gender, Sexuality, Cultural Politics (also WOMNS 427)
Spring. 4 credits. B. Correll.
For description, see ENGL 427.

ENGL 608 Seminar in Cultural Studies: Race, Drugs and Gender
Spring. 4 credits. M. P. Brady.
For description, see ENGL 608.

[ENGL 654 Queer Theory (also WOMNS 654)
Not offered 1999–2000. E. Hanson.]

[ENGL 655 Decadence (also WOMNS 656/COM L 655)
Not offered 1999–2000. E. Hanson.]

ENGL 660 Cinematic Desire (also COM L 662 and WOMNS 661)
Fall. 4 credits. E. Hanson.
For description, see ENGL 660.

[ENGL 703 Theorizing Film: Race, Nation and Psychoanalysis (also FRLIT 695)
Not offered 1999–2000. T. Murray.]

FRLIT 493 French Feminisms (also WOMNS 493)
Fall. 4 credits. N. Furman.
For description, see FRLIT 493.

[GERST 413 The Women Around Freud (also WOMNS 413)
Not offered 1999–2000. B. Martin.]

GOVT 353 Feminist Movements and the State (also WOMNS 353)
Fall. 4 credits. M. Katzenstein.
For description, see GOVT 353.

[GOVT 362 Politics of Sexuality (also WOMNS 262)
Not offered 1999–2000. A. M. Smith.]

[GOVT 415 Race, Gender, and Organization (also WOMNS 415)
Not offered 1999–2000. M. Katzenstein and J. Reppy.]

GOVT 467 Radical Democratic Feminisms (also WOMNS 468)
Fall. 4 credits. A. M. Smith.
For description, see GOVT 467.

HD 284 Introduction to Sexual Minorities (also WOMNS 285)
Fall. 3 credits. R. Savin-Williams.
For description, see HD 284.

[HD 464 Sexual Minorities and Human Development (also WOMNS 467)
Not offered 1999–2000. R. Savin-Williams.]

[HIST 377 Gender in Early Modern Europe (also WOMNS 377)
Not offered 1999–2000. R. Weil.]

HIST 378 Topics in U.S. Women's History (also WOMNS 378)
Fall. 4 credits. M. B. Norton.
For description, see HIST 378.

[HIST 626 American Women's History (also WOMNS 626)
Not offered 1999–2000. M. B. Norton.]

LING 244 Language and Gender (also WOMNS 244)
Spring. 4 credits. S. McConnell-Ginet.
For description, see LING 244.

[PSYCH 277 Social Construction of Gender (also WOMNS 277)
Not offered 1999–2000. S. Bem.]

[PSYCH 450/650 Lenses of Gender (also WOMNS 450/650)
Not offered 1999–2000. S. Bem.]

[SPAN L 384 Literature and Revolution
Not offered 1999–2000. J. Piedra.]

[SPAN L 400 Maricoteoría/Queer Theory
Not offered 1999–2000. J. Piedra.]

THETR 320 Queer Theatre
Spring. 4 credits. J. E. Gainor and D. Matson.
For description, see THETR 320.

[THETR 336 American Drama and Theatre (also ENGL 336)
Not offered 1999–2000. J. E. Gainor.]

[THETR 339 Theories and Techniques of 20th-Century Western Theatre
Not offered 1999–2000. R. Schneider.]

[THETR 436 The Female Dramatic Tradition (also WOMNS 433)
Next offered in 2–3 years. J. E. Gainor.]

THETR 637 Seminar in Dramatic Theory
Fall. 4 credits. R. Schneider.
For description, see THETR 637.

WOMNS 211 Introduction to Feminist Theory
Fall. 4 credits. K. McCullough.
For description, see WOMNS 210.

WOMNS 405/605 Domestic Television
Spring. 4 credits. A. Villarejo.
For description, see WOMNS 405/605.

[WOMNS 441/641 Theater of Commodities: Feminism, Advertising, TV, and Performance (also THETR 439)
Not offered 1999–2000. A. Villarejo and R. Schneider.]

WOMNS 465 Feminist Theory/Lesbian Theory (also GERST 465 and COM L 465)
Fall. 4 credits. A. Villarejo.
For description, see WOMNS 465.

[WOMNS 621 Lesbian, Gay, Bisexual Studies (also GERST 621)
Not offered 1999–2000. B. Martin.]

Medieval Studies

Danuta Shanzer, director; B. B. Adams, F. M. Ahl, C. M. Arroyo, R. Brann, K. W. Brazell, C. Brittain, E. W. Browne, R. G. Calkins, R. T. Farrell, A. S. Galloway, A. B. Groos, W. E. Harbert, T. D. Hill, P. R. Hyams, J. J. John, C. V. Kaske, W. J. Kennedy, S. MacDonald, M. Migiel, J. M. Najemy, C. A. Peterson, J. R. Piggott, D. S. Powers, D. M. Randel, S. Senderovich, W. Wetherbee (emerita: A. M. Colby-Hall)

Undergraduate Study in Medieval Studies

The "middle" in "Middle Ages" comes from its position between late antiquity and the early modern period, a conception created for European and Western conditions. Our concentration, however, is more properly inclusive and treats a time span from roughly the 5th century into the 16th and ranges from Western Europe and the Mediterranean to China and Japan. To discover the vibrant state of medieval studies today, one need only look at the extraordinary range of scholarly, but accessible, Web sites that have sprung up all over the Internet. Cornell possesses a wealth of faculty and library resources to introduce students to every corner of the field.

While this concentration provides strong interdisciplinary breadth to majors in classics, any of the modern languages, history, music, philosophy, etc., and is excellent preparation for graduate study in a medieval field, it could complement a science major as well. Many students feel bound to choose their majors with an eye to future careers and earning potential. The program provides encouragement, guidance, and an avenue for intelligent enjoyment of an important part of all our pasts.

This concentration offers something different and extra. Coursework in Medieval Studies enhances the student's enjoyment and understanding of the artistic and material relics of the Middle Ages: Gregorian chant, manuscripts and stained glass windows, Gothic cathedrals, Crusader castles, and picturesque towns cramped within ancient walls. The student will discover the serious realities involved in, and shaped by, Arthurian tales of brave knights and fair ladies, dungeons, dragons, and other marvels. Students can analyze and appreciate the horrors of the Black Death, triumphs in courtly love and pitched battle, swords and scimitars, caliphs and popes, fear of demons and djinns, and the reassuring presence of angels.

The period saw many of the foundational choices that have, for good and ill, made the world what it is today. Many of our current challenges in the fields of law, human rights, attitudes toward power, authority, gender relations and sexual mores are derived from the ways in which society was formulated a millennium ago. The Medieval Studies Program houses a vital undergraduate association, Quodlibet, that arranges frequent lectures on medieval topics and an annual Medieval Reading of prose and poetry in many medieval languages.

Undergraduates who wish to undertake an independent major or concentration in Medieval Studies should consult the director of the program, 259 Goldwin Smith Hall, 255–8545, <medievalst@cornell.edu>.

The Undergraduate Concentration in Medieval Studies shall consist of five medieval courses (at the 200-level or above) in at least two different disciplines, of which up to two may also count towards the major, and one must come from our list of approved "core courses."

Medieval Languages

Medieval texts (like all others) become most lively and informative when read in the original, and Cornell fortunately offers many courses for students interested in acquiring the relevant skills: Classical Arabic, Medieval Hebrew, Medieval Latin, Classical Chinese, Historical Sino-Japanese (Kambun) 700–1300 and Historical Sino-Japanese 1300–1600, Old English, Middle English, Gothic, Old Saxon, Old High German, Middle High German, Old Norse-Icelandic, Old Irish, Middle Welsh, Old Occitan (Provençal), Old French, Medieval Spanish, Medieval Italian, Old Russian, and Old Church Slavonic.

Some medieval languages require study of a modern language (e.g., French for Old Occitan and Old French) or a classical language (Classical Latin for Medieval Latin) as background. Students interested in a concentration in Medieval Studies should begin the study of a medieval language as early as possible, so that they may be able to study texts in the original before they graduate. Students are advised to consult the sponsoring departments for information about the prerequisites for various medieval languages.

Graduate Study

The Medieval Studies Program offers both an interdisciplinary and a literary comparative Ph.D. in Medieval Studies. Disciplinary fields of concentration offered within the Field of Medieval Studies are: Medieval Archaeology, Medieval History, Medieval History of Art, Medieval Literature, Medieval Philology and Linguistics, Medieval Music, and Medieval Philosophy. Information about the graduate program in Medieval Studies is contained in the catalog of the Graduate School, in a brochure on Medieval Studies available from the field coordinator, and at "Cornucopia," the program's Web site, <http://www.arts.cornell.edu/medieval>.

Medieval Studies Courses: Graduate and Undergraduate

Courses in various aspects of Medieval Studies are offered every year in several cooperating departments, including Asian Studies, Classics, Comparative Literature, English, German Studies, History, History of Art, Linguistics, Music, Near Eastern Studies, Philosophy, Romance Studies, Russian Literature, and by the Society for the Humanities. The current year's offerings are:

***ART H 230 Monuments of Medieval Art (also RELST 230) #**
Spring. 4 credits. R. G. Calkins.

ART H 336 Prelude to the Italian Renaissance (also RELST 336) #
Fall. 4 credits. R. G. Calkins.

ART H 341 15th Century Flemish Painting (also RELST 342) #
Spring. 4 credits. R. G. Calkins.

ART H 481 The Arts of China: Art of the T'ang Dynasty (618–907) @
Fall. 4 credits. A. Pan.

***ART H 531 Problems in Medieval Art and Architecture: The Archaeology of the Book (also RELST 531)**
Fall. 4 credits. R. G. Calkins.

ASIAN 348 Indian Devotional Poetry (also RELST 348)
Fall. 4 credits. D. Gold.

CHLIT 213–214 Introduction to Classical Chinese
213, fall; 214, spring. 3 credits each term. S. Tian; T. L. Mei.

CHLIT 420 T'ang and Sung Poetry
Spring. 4 credits. T. L. Mei.

CHLIT 607 Early Medieval Poetry
Spring. 4 credits. S. Tian.

CLASS 369 Intensive Medieval Latin
Summer. 4 credits. D. Shanzer.

ENGL 201 The English Literary Tradition #
Fall. 4 credits. A. Galloway.

ENGL 212 Introduction to the Medieval Epic
Spring. 4 credits. T. Hill.

ENGL 274 Scottish Literature #
Fall. 3–4 credits. T. Hill and H. Shaw.

ENGL 310 Old English in Translation
Spring. 4 credits. T. Hill.

ENGL 311/611 Old English
Fall. 4 credits. T. Hill.

ENGL 312/612 Beowulf #
Spring. 4 credits. R. Farrell.

ENGL 319 Chaucer
Spring. 4 credits. R. Farrell.

ENGL 321 Spenser and Malory #
Fall. 4 credits. C. Kaske.

ENGL 413/614 Middle English
Fall. 4 credits. A. Galloway.

ENGL 710 Advanced Reading in Old English
Fall. 4 credits. T. Hill.

FRLIT 448 Medieval Literature #
Spring. 4 credits. A. Colby-Hall.

***HIST 263 The Earlier Middle Ages (also RELST 263) #**
Fall. 4 credits. J. J. John.

HIST 275 Authority and Resistance in Europe, 1400–1600 #
Spring. 4 credits. S. Pohl.

HIST 326 History of the Samurai II @ #
Fall. 4 credits. J. Piggott.

***HIST 366 Medieval Culture, 1100–1300 (also RELST 366) #**
Fall. 4 credits. J. J. John.

***HIST 368 Marriage and Sexuality in Medieval Europe (also RELST 368, WOMNS 368) #**
Spring. 4 credits. P. Hyams.

***HIST 436 Conflict Resolution in Medieval Europe #**
Spring. 4 credits. P. Hyams.

HIST 490 Tales of the Heike (also ASIAN 490, S HUM 489) @ #
Fall. 4 credits. J. Piggott and K. Brazell.

HIST 492 Undergraduate Seminar: Medieval Chinese History #
Fall. 4 credits. C. A. Peterson.

ITALL 220 Medieval Italy
Spring. 4 credits. W. J. Kennedy.

ITALL 323/623 Encounters with the Dead (also COM L 323/623, JWST 323)
Fall. 4 credits. M. Migiel.

LING 315–316 Old Norse
315, fall; 316, spring. 4 credits each term. E. Johannsson.

LING 441 Introduction to Germanic Linguistics
Fall. 4 credits. W. Harbert.

MUSIC 494 Love, Sex, and Song in Medieval France
Spring. 4 credits. J. Peraino.

NES 133–134 Qur'anic and Classical Arabic
133, fall; 134, spring. 4 credits each term. M. Younes.

***NES 255 Introduction to Islamic Civilization (also HIST 255, RELST 255) @ #**
Spring. 3 credits. D. Powers.

NES 339/639 Islamic Spain: Culture and Society (also COM L 334, SPANL 339/699) @ #
Fall. 4 credits. R. Brann.

***PHIL 315 Medieval Philosophy #**
Fall. 4 credits. S. MacDonald.

PHIL 410 Latin Philosophical Texts #
Fall and spring. Variable credit. S. MacDonald.

RUSSA 601 Old Church Slavonic
Fall. 4 credits. E. W. Browne.

RUSSA 602 Old Russian Texts
Spring. 4 credits. E. W. Browne.

SANSK 131–132 Elementary Sanskrit (also CLASS 131–132, LING 131–132)
131, fall; 132, spring. 4 credits each term. C. Minkowski; staff.

S HUM 402 Augustine's Confessions: Memory and the Self (also CLASS 405, COM L 400, PHIL 413)
Fall. 4 credits. C. Brittain.

S HUM 403 Augustine's Dialogues on the Soul (also CLASS 406, COM L 424, PHIL 413)
Spring. 4 credits. C. Brittain.

Approved "core courses" for the undergraduate concentration are marked with an asterisk (*). Fuller descriptions of all courses are available in this catalog under the listings for the relevant departments. Even more detailed information can be found on the Web at <http://www.arts.cornell.edu/medieval/coursedesc.html>.

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 two interdisciplinary core courses:

   Government 341/Sociology 341: Modern European Society and Politics
   Spring 2000. 4 credits. J. Pontusson and D. Schirmer.

   Comparative Literature 311/Russian Literature 311/French Literature 315: Modern European Literature and Culture
   Fall 1999. 4 credits. G. Gibian.

Under certain conditions, students may be permitted to substitute other courses for those listed above.

3) Completion of one course in modern (post-1789) European history.

4) Two additional courses in any of the three areas, which may include a senior seminar (400 level).

   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.

Only two courses may be used to satisfy requirements for both the major and the concentration. Courses satisfying the breadth and distribution requirements in the College of

Arts and Sciences, however, *may* be applied to the concentration. Students interested in completing a research project under the European Summer Research Program may apply for The Wood Fellowship in their junior year. All concentrators are encouraged to participate in the Language House Program, and to spend a semester or more in a program of study in Europe. Courses taken abroad may be applied to the concentration if they are approved for Cornell credit.

Undergraduates in the College of Arts and Sciences can major in European Studies through the Independent Major or College Scholar programs.

Departmental advisers include: J. Borneman (Anthropology); C. Otto (Architecture); L. Abel (College Scholars, Independent Majors); S. Christopherson (CRP); G. Fields (Economics); D. Schwarz (English); I. Ezergailis (German Studies); J. Pontusson (Government); J. Weiss (History); M. Suner (Linguistics); C. Rosen (Modern Languages); N. Zaslaw (Music); S. Tarrow (Romance Studies); G. Gibian (Russian Literature); S. G. Tarrow (Sociology); D. Bathrick (Theatre Arts)

For a list of relevant courses and seminars, 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, e-mail SRT2@cornell.edu).

Religious Studies

J. M. Law, director; B. Adams, C. M. Arroyo, K. Barzman, P. Becker, D. Boucher, R. Brann, R. G. Calkins, C. M. Carmichael, K. Clinton, J. Fajans, D. Fredericksen, J. W. Gair, D. Gold, S. Greene, K. Haines-Eitzen, J. S. Henderson, T. D. Hill, D. Holmberg, P. R. Hyams, J. J. John, C. V. Kaske, W. J. Kennedy, S. MacDonald, D. Mankin, K. S. March, D. McKenzie, C. Minkowski, R. L. Moore, D. I. Owen, J. R. Piggott, D. S. Powers, D. M. Randel, G. Rendsburg, J. S. Rusten, P. S. Sangren, D. R. Shanzer, M. Washington

The Religious Studies Program, an academic unit offering a major in the scholarly study of religion through the College of Arts and Sciences, offers a wide variety of courses. In addition to courses dealing with various approaches to and topics in the study of religion, we have integrated curricula within our program for in-depth studies of Judaism, Christianity, the Hindu tradition and Buddhism. We also offer an increasing number of courses on Islam.

The Religious Studies Program is designed to meet the needs of three classes of students: 1) students planning to pursue advanced degrees in the academic study of religion or allied disciplines or subdisciplines (history of religions, religion and literature, religion and psychology, ethics, theology, area studies, etc.); 2) students seeking courses on topics relating to religion to fulfill distribution requirements; and 3) those students desiring a more systematic exposure to the academic study of religion as a significant component of their liberal arts experience. To all students, our program offers an excellent opportunity to develop a deeper understanding and appreciation of the complex ways in which religious traditions, with their individual, communal, and doctrinal dimensions inform human thought and behavior. The courses offered through our program are informed by the established scholarly tradition of the study of religion as an academic, as opposed to confessional, pursuit. Religious traditions are explored in all of their complexity through comparative, contextual (in specific historical or cultural contexts) and thematic studies.

The program also hosts lecture series, conferences, symposia, and periodic social gatherings for faculty and students throughout the academic year to foster a sense of intellectual community among our students and faculty.

The Major in Religious Studies

Signing into the major: To sign into the major in Religious Studies, a student must have completed at least one course in Religious Studies prior to scheduling an appointment with the program director. Here is the process:

1) Schedule an appointment with Professor Jane-Marie Law, Director of Religious Studies; please contact her by e-mail: <jml16@cornell.edu>.

2) In addition to a copy of your current Cornell transcript (the informal one you regularly receive is acceptable), please bring to your meeting with Professor Law all of these forms, which are available in the Religious Studies office:

   a) a completed Religious Studies Major Application Form (available in Rockefeller 182)

   b) a proposed "Course of Study," which will be used as a guide in your conversation with the director and revised for formal submission to the program upon your entrance as a major

   c) a College of Arts & Sciences Advisor/Major form which will be signed by your advisor.

Advising in the Religious Studies Program: Upon entering the major in Religious Studies, a student is assigned a faculty advisor whose area of expertise most closely matches the proposed interest of the student. Students may propose a faculty member on their own, provided he or she is a current regular faculty member of the Religious Studies Program. An up-to-date advisor list is available in the Religious Studies office. Working closely with one's advisor when selecting courses is an important component of this program, enabling students to fulfill the requirements for the major while creating an integrated and coherent course of study out of our large number of multidisciplinary course offerings.

To graduate as a major in Religious Studies, a student must 1) complete with letter grades the program's two core courses, Religious Studies 101 "Understanding the Religions of the World" and Religious Studies 449 "History and Methods of the Academic Study of Religion" (these two core courses can not be waived); 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 in special cases) different religious traditions or phenomena. These courses may be at the introductory or advanced levels, though depth work at the 300 level or above is advised. For example, "Introduction to Asian Religions" (Religious Studies 250) might lead a student to take "The Religious Traditions of India" (Religious Studies 351), and then combine these with two courses on Judaism, "Introduction to Ancient Judaism" (Religious Studies 244) and "Cultural History of Jews of Spain" (Religious Studies 239).

(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 religious traditions or phenomena. In the first illustrative case described above, the student might combine "The Religious Traditions of India" with "Tantric Traditions" (Religious Studies 347) or "Indian Devotional Poetry" (Religious Studies 348) 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" (Religious Studies 357) or "Japanese Buddhism" (Religious 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. Routinely, survey courses (which are offered at the 100 and 200 levels) should be combined with tradition on geographically specific offerings at the 300 and 400 level to satisfy this aspect of the requirements.

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, Chinese or Japanese for Buddhism. Religious phenomena like shamanism or totemism, though less firmly rooted in literary traditions, have generated substantial bodies of important scholarship in French and German, and an undergraduate major concentrating in this area of Religious Studies should be equipped to make independent use of such material. Courses used to satisfy this foreign language proficiency requirement may not be applied to the course requirements described under 2a and 2b. Choice of language to fulfill this requirement is determined by the student in consultation with his or her adviser and is decided at the time the student enters the major.

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, 182 Rockefeller Hall.

Graduating with Honors in Religious Studies:

GENERAL INFORMATION

1. **Eligibility.** 3.0 cumulative average and 3.5 average inside the major with no grade in the major below B-. Program Director notifies eligible candidates over the summer between the junior and senior years of eligibility.

2. **Honors Courses.** Candidates must sign into RELST 495 (Senior Honors Essay) for up to eight credits (two courses) for two semesters. This two-semester sequence is required. After the first term, an R in the transcript indicates that this course (usually for 8 credits) is a yearlong course. When the project is completed at the end of the second semester, the grade recorded counts for all eight credits. (The eight-credit limit is the result of the conviction/belief that earning more than eight credits for a single "piece" of your undergraduate education is unwise.)

   You submit your honors proposal (with and according to the program's instruction/cover sheet) to the Religious Studies administrator before the end of the spring term of your junior year. She/he then approves your signing into the honors courses.

3. **Honors Committee—3 faculty members.** While you are required to have three faculty members on your committee at the time of the submission of the final draft, we only require that two of them be identified when you submit your proposal. The three members should be:

   a. The professor who has agreed to work closely with you over the year and to be the supervisor/grader of your project is chair of the committee.

   b. Another knowledgeable faculty member

   c. Religious Studies major advisor

   Sometimes your advisor is the supervisor/chair. If that is the case, you need two additional knowledgeable professors for your committee of three.

   You may have faculty outside the College of Arts and Sciences on your committee or as the supervisor, but non-A&S faculty have no obligation to supervise projects for students not in their own colleges, so be properly grateful.

Courses Approved for the Major Sponsored by Religious Studies

RELST 101 Understanding the Religions of the World @ #
Fall. 3 credits. Required of Religious Studies majors. J. M. Law.
This course provides a dynamic introduction to the academic study of religion as an intellectual discipline through an overview of the world's major religious traditions including Hinduism, Buddhism, Taoism, Confucianism, Shinto (in Japan), Judaism, Christianity, and Islam. The focus for the fall of 1999 will be on religion and human rights (themes change annually). For each religious system, we will focus on 1) the dynamics of founding and promulgation; 2) core rituals, myths, doctrines, and texts; 3) changing understandings of community and identity; and 4) conceptions of the human-divine relationship, and its implications for peaceful interaction within and beyond the tradition's borders. To highlight our studies throughout the semester, we will explore how these themes of religious tradition get expressed through vibrant personal narratives—both oral and written. Representatives of many of the religions will address the class to discuss their lives in relationship to their religious tradition. Course work will include readings in primary source materials in translation and hands-on ethnographic work with local religious communities.

RELST 123–124 Elementary Biblical Hebrew I and II (also NES 123–124, JWST 123–124)
123, fall; 124, spring. 3 credits. Enrollment limited to 17 students. Y. Chen.
For description, see NES 123–124.

[RELST 131 Elementary Pali (also Pali 131)
Fall. 3 credits. Not offered 1999–2000. J. Gair.]

[RELST 150 Introduction to American Religion (also SOC 150)
Fall. 3 credits. Not offered 1999–2000. P. Becker.]

RELST 190 Catholic Social Action (also NES 190)
Spring. 3 credits. D. McKenzie. (FWS)
For description, see NES 190.

[RELST 197 Introduction to Near Eastern Civilization (also NES 197, JWST 197) @ #
Fall. 3 credits. Not offered 1999–2000. D. Owen.]

RELST 201 Issues in Catholic Thought (also NES 298)
Fall. 3 credits. D. McKenzie.
For description, see NES 298.

[RELST 203 Religion and Family in the U.S. (also SOC 201, R SOC 202)
Fall. 3 credits. Not offered 1999–2000. P. Becker.]

[RELST 213 Introduction to the Qur'an (also NES 213) @ #
Spring. 3 credits. Not offered 1999–2000.]

RELST 223 Introduction to the Bible I (also NES 223, JWST 223) @ #
Fall. 3 credits. G. Rendsburg.
For description, see NES 223.

[RELST 224 Introduction to the Bible II (also NES 224, JWST 224)
Spring. 3 credits. Not offered 1999–2000. G. Rendsburg.]

[RELST 227 Introduction to the Prophets (also NES 227, JWST 227)
Fall. 3 credits. Not offered 1999–2000. G. Rendsburg.]

RELST 229 Introduction to the New Testament (also NES 229, JWST 229) @ #
Fall. 3 credits. K. Haines-Eitzen.
For description, see NES 229.

RELST 230 Monuments of Medieval Art (also ART H 230) #
Spring. 4 credits. R. G. Calkins.
For description, see ART H 230.

[RELST 231 The Quest for the Historical Jesus (also NES 230)
Spring. 3 credits. Not offered 1999–2000.]

[RELST 234 Arabs and Jews: Cultures in Confluence (also NES 234, JWST 234, COM L 234) @ #
Fall. 3 credits. Not offered 1999–2000. R. Brann.]

[RELST 239 Cultural History of Jews of Spain (also NES 239, JWST 239, SPAN L 239)
Fall. 3 credits. Not offered 1999–2000. R. Brann.]

[RELST 244 Introduction to Ancient Judaism (also NES 244, JWST 244) @ #
Spring. 3 credits. Not offered 1999–2000. G. Rendsburg.]

[RELST 248 Introduction to Classical Jewish History (also NES 248, JWST 248) @ #
Fall. 3 credits. Not offered 1999–2000.]

RELST 250 Introduction to Asian Religions (also ASIAN 250) @ #
Spring. 3 credits. D. Boucher.
For description, see ASIAN 250.

[RELST 251 Black Religious Traditions from Slavery to Freedom (also HIST 251, AM ST 251)
Fall. 4 credits. Not offered 1999–2000. M. Washington.]

[RELST 252 Introduction to Islam: Religion, Politics, and Society (also NES 251) @ #
Spring. 3 credits. Not offered 1999–2000.]

RELST 255 Introduction to Islamic Civilization I (also NES 255, HIST 253) @ #
Spring. 3 credits. D. Powers.
For description, see NES 255.

[RELST 257 Islamic History 600–1258 (also NES 257, HIST 254) @ #
Fall. 3 credits. Not offered 1999–2000. D. Powers.]

RELST 262 Religion and Reason (also PHIL 263)
Spring. 4 credits. S. MacDonald.
For description, see PHIL 263.

RELST 263 The Earlier Middle Ages (also HIST 263) @ #
Fall. 4 credits. J. J. John.
For description, see HIST 263.

RELST 264 Introduction to Biblical History and Archaeology (also NES 263, JWST 263, ARKEO 263) @ #
Spring. 3 credits. J. Zorn.
For description, see NES 263.

[RELST 265 The Middle Ages: An Introduction (also HIST 262)
Fall. 4 credits. Not offered 1999–2000. P. Hyams.]

RELST 277 Meditation in Indian Culture (also ASIAN 277)
Spring. 3 credits. D. Gold.
For description, see ASIAN 277.

RELST 290 Buddhism (also ASIAN 299)
Fall. 4 credits. D. Boucher.
For description, see ASIAN 299.

RELST 295 Introduction to Christian History (also NES 295, JWST 295, HIST 299) #
Spring. 3 credits. K. Haines-Eitzen.
For description, see NES 295.

RELST 299 The Hebrew Bible & the Arabic Qur'an in Comparative Perspective (also NES 299, COM L 299, JWST 299)
Spring. 3 credits. R. Brann.
For description, see NES 299.

[RELST 313 Classical Arabic Texts (also NES 313)
Fall. 4 credits. Not offered 1999–2000. D. Powers.]

RELST 315 Medieval Philosophy (also PHIL 315) #
Spring. 4 credits. S. MacDonald.
For description, see PHIL 315.

RELST 319 Spenser and Malory (also ENGL 321)
Fall. 4 credits. C. Kaske.
For description, see ENGL 321.

RELST 320 Myth, Ritual and Symbol (also ANTHR 320) @
Spring. 3 or 4 credits. D. Holmberg.
For description, see ANTHR 320.

RELST 321 Heresy and Orthodoxy in Early Christianity (also NES 321) @ #
Fall. 4 credits. K. Haines-Eitzen.
For description, see NES 321.

[RELST 322 Magic, Myth, Science and Religion (also ANTHR 322) @
Fall. 4 credits. Not offered 1999–2000.]

RELST 328 Literature of the Old Testament (also COM L 328) @ #
Fall. 4 credits. C. Carmichael.
For description, see COM L 328.

RELST 329 Introduction to the New Testament Seminar (also NES 329, JWST 329)
Fall. 1 credit. Prerequisite: concurrent enrollment in RELST 229 and one year of ancient Greek. K. Haines-Eitzen.
For description, see NES 329.

RELST 330 Gnosticism and Early Christianity (also NES 328, JWST 328) @ #
Spring. 4 credits. K. Haines-Eitzen.
For description, see NES 328.

RELST 331 Romanesque Art and Architecture (also ART H 344)
Fall. 4 credits. Staff.
For description, see ART H 344.

[RELST 332 Architecture in the Middle Ages (also ART H 332, ARCH 382)
Fall. 4 credits. Not offered 1999–2000. R. G. Calkins.]

[RELST 333 Greek and Roman Mystery Cults and Early Christianity (also CLASS 333, ARKEO 333) #
Spring. 4 credits. Not offered 1999–2000. K. Clinton.]

RELST 334 Islamic Spain: Culture and Society (also NES 339/639, JWST 339, COM L 334, SPAN L 339/639) @ #
Fall. 4 credits. R. Brann.
For description, see NES 339.

RELST 335 Subsistence, Polity, and Worldview in Mainland Southeast Asia (also ANTHR 335)
Spring. 4 credits. A. T. Kirsch.
For description, see ANTHR 335.

RELST 336 Prelude to the Italian Renaissance (also ART H 336)
Fall. 4 credits. R. G. Calkins.
For description, see ART H 336.

[RELST 337 The Medieval Illuminated Book (also ART H 337) #
Fall. 4 credits. Not offered 1999–2000. R. G. Calkins.]

RELST 342 Flemish Painting (also ART H 341) #
Fall. 4 credits. R. G. Calkins.
For description, see ART H 341.

[RELST 345 Intellectual and Cultural Life of 19th Century Americans (also HIST 345, AM ST 345) #
Fall. 4 credits. Not offered 1999–2000. R. L. Moore.]

[RELST 347 Tantric Traditions (also ASIAN 347) @ #
Fall. 4 credits. Not offered 1999–2000. D. Gold.]

RELST 348 Indian Devotional Poetry (also ASIAN 348)
Fall. 4 credits. D. Gold.
For description, see ASIAN 348.

[RELST 350 Introduction to Islamic Law (also NES 351/651, HIST 372/652) @ #
Fall. 4 credits. Not offered 1999–2000. D. Powers.]

[RELST 351 The Religious Traditions of India (also ASIAN 351) @ #
Spring. 4 credits. Not offered 1999–2000. D. Gold.]

[RELST 352 Art as Spectacle: The Italian Baroque (also ART H 355) #
Fall. 4 credits. Not offered 1999–2000. K. Barzman.]

[RELST 354 Indian Buddhism (also ASIAN 354) @ #
Fall. 4 credits. Not offered 1999–2000. C. Minkowski.]

[RELST 355 Japanese Religions: A Study of Practice (also ASIAN 355) @
Fall. 4 credits. Not offered 1999–2000. J. M. Law.]

RELST 356 Islamic Law & Society (also NES 357) @ #
Spring. 4 credits. D. Powers.
For description, see NES 357.

RELST 357 Chinese Buddhism (also ASIAN 358)
Fall. 4 credits. D. Boucher.
For description, see ASIAN 358.

[RELST 358 Literature and Religion: Western Mysticism (also COM L 358, ROMS 358)
Spring. 4 credits. Not offered 1999–2000. C. M. Arroyo.]

[RELST 359 Japanese Buddhism (also ASIAN 359)
Spring. 4 credits. Not offered 1999–2000. J. M. Law.]

[RELST 360 Religion and Images across the Early Modern World (also ART H 358)
Spring. 4 credits. Not offered 1999–2000. K. Barzman.]

RELST 362 The Culture of the Renaissance II (also COM L 362, ENGL 325, HIST 364, ART H 351, MUSIC 390) #
Fall. 4 credits. W. J. Kennedy.
For description, see COM L 362.

[RELST 365 Medieval Culture, 400–1150 (also HIST 365) #
Fall. 4 credits. Prerequisite: RELST 263 or permission of instructor. Not offered 1999–2000. J. J. John.]

RELST 366 Medieval Culture, 1100–1300 (also HIST 366)
Fall. 4 credits. J. J. John.
For description see HIST 366.

RELST 368 Marriage and Sexuality in Medieval Europe (also HIST 368, WOMNS 368) #
Spring. 4 credits. P. Hyams.
For description, see HIST 368.

[RELST 393 Religion and Politics in the Middle East (also NES 393)
Fall. 4 credits. Not offered 1999–2000.]

[RELST 394 Gender, Sexuality, and the Body in Early Christianity (also NES 394, WOMNS 394)
Spring. 3 credits. Not offered 1999–2000. K. Haines-Eitzen.]

[RELST 395 Classical Indian Philosophical Systems (also ASIAN 395, CLASS 395) @ #
Fall. 4 credits. Not offered 1999–2000. C. Minkowski.]

RELST 400 Tibetan Buddhism (also ASIAN 400)
Fall. 4 credits. Enrollment limited to 15 students or instructor consent. J. M. Law.
For description, see ASIAN 400.

RELST 407 Religion and Human Rights (also ASIAN 407)
Spring and summer. 4 credits. J. M. Law.
For description, see ASIAN 407.

RELST 410 Latin Philosophical Texts (also PHIL 410) #
Spring. Variable credit. Prerequisite: knowledge of Latin and permission of instructor. S. MacDonald.
For description, see PHIL 410.

[RELST 420 Readings in Biblical Hebrew Prose (also NES 420, JWST 420) @ #
Spring. 4 credits. Not offered 1999–2000. G. Rendsburg.]

RELST 421 Readings in Biblical Hebrew Poetry (also NES 421, JWST 421) @ #
Fall. 4 credits. Prerequisite: one year of Biblical or Modern Hebrew. G. Rendsburg.
For description, see NES 421.

RELST 427 Biblical Seminar (also COM L 428)
Fall. 4 credits. C. Carmichael.
For description, see COM L 428.

[RELST 441 Mahayana Buddhism (also ASIAN 441)
Spring. 4 credits. Not offered 1999–2000. D. Boucher.]

[RELST 442 Religion and Politics in American History (also HIST 442)
Fall. 4 credits. Not offered 1999–2000. R. L. Moore.]

[RELST 443 Religion and Ritual in Chinese Society and Culture (also ANTHR 443) #
Fall. 4 credits. Not offered 1999–2000. S. Sangren.]

RELST 449 History and Methods of the Academic Study of Religion (also ASIAN 449) #
Spring. 4 credits. Required of Religious Studies majors. D. Gold.
For description, see ASIAN 449.

[RELST 451 Seminar in Islamic History 600–750 (also Near Eastern Studies 451/650, History 461/650) @ #
Spring. 4 credits. Not offered 1999–2000. D. Powers.]

[RELST 459 Women, Men and the Law in Muslim Court (also NES 459/655, WOMNS 458, HIST 457/657) # @
Fall. 4 credits. Not offered 1999–2000.]

RELST 460 Indian Meditation Texts (also ASIAN 460)
Fall. 4 credits. D. Gold.
For description, see ASIAN 460.

RELST 466 The Mythology and Religion of Ancient Mesopotamia and Canaan (also NES 466, JWST 466) @ #
Spring. 4 credits. T. Sharlach.
For description, see NES 466.

[RELST 473 Film and Spiritual Questions (also THETR 473)
Spring. 4 credits. Not offered 1999–2000. D. Fredericksen.]

RELST 490–491 Directed Study
490, fall; 491, spring. 2–4 credits each term. For majors in Religious Studies; permission of director required. Staff.

RELST 494 Modern Medicine and the Catholic Tradition (also NES 494)
Spring. 4 credits. D. McKenzie.
For description, see NES 494.

RELST 495 Senior Honors Essay
Fall and spring. 8 credits. Required for honors in Religious Studies. Staff.

RELST 497 Thomas Merton: Monk and Author (also NES 497)
Fall. 4 credits. D. McKenzie.
For description, see NES 497.

RELST 531 Problems in Medieval Art and Architecture (also ART H 531) #
Fall. 4 credits. R. G. Calkins.
For description, see ART H 531.

Additional courses offered by cooperating departments may also be approved through petition for the major in Religious Studies. For details see the program director, Jane Marie Law, 125 Rockefeller Hall or e-mail her at jml16@cornell.edu.

Russian and East European Studies Major

J. Borneman (Anthropology); G. J. Staller (Economics); S. Beck (Field and International Studies Program); I. Ezergailis, D. Bathrick (German Studies); V. Bunce, M. Evangelista, S. Tarrow (Government); P. Holquist, W. M. Pintner (History); U. Bronfenbrenner (emeritus, Human Development and Family Studies); P. Carden, G. Gibian, N. Pollak, S. Senderovich, G. Shapiro (Russian Literature); W. Browne, S. Paperno (Slavic linguistics); S. Szelenyi (Sociology)

The major in Russian and East European studies has the following requirements:

1) Proficiency in Russian or an East European language with one additional advanced (300-level) language or literature course, **OR** qualification in an East European language **and** qualification in another language useful for research in the area.*

*These requirements, in the case of some languages, may require study abroad or coursework completed at another institution.

2) At least one course relating to Russia or Eastern Europe, at the 200 level or above, in four of the following five departments: Government, Economics, History, Russian Literature and Sociology. Appropriate courses offered in other departments may be substituted for one of the above courses with the consent of the major adviser.

3) At least three additional courses at the 300 level or above, all from one of the following three departments: Government, History (within the History Department courses may be at the 250 level or above), or Russian Literature. One of the three courses must be at the 400 level or above. The three courses must be approved by the major adviser in the department of concentration.

To apply for the major, students are directed to the Institute for European Studies (Slavic and East European Studies Program), 120 Uris Hall. Students should designate an adviser in the department where his or her work will be concentrated. Students are encouraged to study abroad and should discuss their plans with their advisers. For questions concerning the major or the honors program, students should consult with their major adviser or inquire at the Institute for European Studies.

Honors Program in Russian and East European Studies

I. Students entering the Russian and East European Studies Major Honors Program must have a cumulative average of at least 3.0, no grade below a B in courses connected with the major, and a cumulative average inside the major of at least 3.5. Students will form a special honors committee consisting of their major adviser and two other faculty members not necessarily from the Russian and East European area.

II. Honors candidates must complete an honors thesis project during the senior year. The topic should be developed and approved in consultation with their major adviser. Part of the research should include sources in Russian or an Eastern European language.

III. Students may earn a total of eight credits for the courses in the honors program and should register for the appropriate number in the department of their major adviser.

IV. Ordinarily, in the first term of the senior year, students who meet the prerequisites will do independent research and reading in a particular area under supervision of their major adviser.

V. In the second term of the senior year students will complete the honors project by a date set by the 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 311 Modern European Literature and Culture (also RUSS L 311 and FRLIT 315)
Spring. 4 credits.

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)
4 credits. Not offered 1999–2000.]

COM L 385 Reading Nabokov (also Russian Literature 385 and English 379)
Fall. 4 credits. Limited to 25.

[COM L 389 Contemporary Literature in Central and Eastern Europe (also Russian Literature 389)
Fall. 4 credits. Not offered 1999–2000.]

[CZECH 131–132 Elementary Czech
Not offered 1999–2000.]

[CZECH 133–134 Continuing Czech
Not offered 1999–2000.]

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 471 The Economies of Central Europe and of the Former Soviet Union: From Central Planning to Markets
Fall or spring. 4 credits.

ECON 472 Comparative Economic Systems: East and West
Fall or spring. 4 credits.

[GERST 376 Contemporary Soviet Latvian Literature
Fall. 4 credits. Taught in Latvian. Not offered 1999–2000.]

[GERST 377 Baltic Literature
Fall. 4 credits. Not offered 1999–2000.]

[GERST 381 Marxist Cultural Theory (also Comparative Literature 381 and Government 372)
4 credits. Not offered 1999–2000.]

GOVT 231 Introduction to Comparative Government and Politics
Spring. 4 credits.

[GOVT 325 Government and Politics of Eastern Europe
4 credits. Not offered 1999–2000.]

[GOVT 333 Government and Politics of the Former Soviet Union
Fall. 4 credits. Not offered 1999–2000.]

GOVT 341 Modern European Society and Politics (also SOC 341)
Fall. 4 credits.

GOVT 342 The New Europe
Spring. 4 credits.

GOVT 350 Comparative Revolutions
Spring. 4 credits.

[GOVT 376 Rethinking Marx
4 credits. Not offered 1999–2000.]

GOVT 394 Comparative Foreign Policy
Spring. 4 credits.

[GOVT 399 International Relations of the Former Soviet Union
Fall. 4 credits. Not offered 1999–2000.]

[GOVT 445 Stalinism as Civilization (also History 478)
4 credits. Not offered 1999–2000.]

GOVT 491 Conflict, Cooperation, and Norm: Ethnical Issues in International Affairs
Fall. 4 credits.

[GOVT 657 Comparative Democratization
4 credits. Not offered 1999–2000.]

GOVT 660 Social Movements and Contentious Politics
Fall. 4 credits.

[GOVT 669 Modern Social Theory I
4 credits. Not offered 1999–2000.]

GOVT 670 Modern Social Theory II
Spring. 4 credits.

[HIST 242 Europe Since 1789 #
4 credits. Not offered 1999–2000.]

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
4 credits. Not offered 1999–2000.]

[HIST 379 The First World War: Causes, Conduct and Consequences
4 credits. Not offered 1999–2000.]

HIST 383 Europe 1900–1945
Fall. 4 credits.

[HIST 384 Europe, 1945–1968
Fall. 4 credits. Not offered 1999–2000.]

HIST 385 Europe in the 20th Century: 1968–1990
Spring. 4 credits.

[HIST 410 Russia in the Age of Total War and Revolution
4 credits. Not offered 1999–2000.]

[HIST 415 The United States and Russia, 1780–1914 #
4 credits. Not offered 1999–2000.]

[HIST 478 Stalinism as Civilization (also GOVT 445)
4 credits. Not offered 1999–2000.]

HIST 490 Empire, State and Nation in Russian and Soviet History
Spring. 4 credits.

HIST 677 Seminar in Russian History
Fall. 4 credits.

HIST 678 Seminar in European Political History
Spring. 4 credits.

[HUNGR 131–132 Elementary Hungarian
3 credits. Not offered 1999–2000.]

[ILRIC 331 Comparative Industrial Relations Systems: Non-Western Countries
3 credits. Not offered 1999–2000.]

[ILRCB 606 Theories of Industrial Relations Systems
3 credits. Not offered 1999–2000.]

LING 671–672 Comparative Slavic Linguistics
671, fall; 672, spring. 4 credits each term.

POLSH 131–132 Elementary Polish
131, fall; 132, spring. 3 credits each term.

[POLSH 133–134 Continuing Polish
133, fall; 134, spring. 3 credits each term. Not offered 1999–2000.]

[ROMAN 131–132 Elementary Romanian
131, fall; 134, spring. 3 credits. Not offered 1999–2000.]

[ROMAN 133–134 Continuing Romanian
133, fall; 134, spring. 3 credits. Not offered 1999–2000.]

RUSSA 103–104 Conversation Practice
103, fall; 104, spring. 2 credits each term.

RUSSL 105 Freshman Writing Seminar: Twentieth-Century Russian Literary Masterpieces
Fall. 3 credits.

RUSSA 121–122 Elementary Russian
121, fall or summer; 122, spring or summer. 4 credits each term.

RUSSA 123 Continuing Russian
Fall. 4 credits.

RUSSL 201–202 Readings in Russian Literature #
201, fall; 202, spring. 3 credits each term. G. Shapiro.

RUSSA 203–204 Intermediate Composition and Conversation
203, fall, spring, or summer; 204, spring. 3 credits each term.

RUSSA 205–206 Reading Russian Press
205, fall; 206, spring. 2 credits each term.

RUSSA 207–208 Russian Phonetics for Beginners
207, fall; 208, spring. 2 credits.

RUSSL 207 Themes from Russian Culture I #
Not offered 1999–2000.]

[RUSSL 208 Themes from Russian Culture II
Spring. 3 credits. Not offered 1999–2000.]

[RUSSA 301–302 Advanced Russian Grammar and Reading
Not offered 1999–2000.]

RUSSA 303–304 Advanced Composition and Conversation
303, fall; 304, spring. 4 credits each term.

RUSSA 305–306 Directed Individual Study
305, fall; 306, spring. 2 credits each term.

RUSSA 309–310 Advanced Reading
309, fall; 310, spring. 4 credits.

RUSSL 200 The Russian Connection #
Spring. 4 credits.

[RUSSL 331 Introduction to Russian Poetry #
Fall. 4 credits. Not offered 1999–2000.]

[RUSSL 332 Russian Drama and Theatre (also Theatre Arts 332)
Fall. 4 credits. Not offered 1999–2000.]

[RUSSL 333 Twentieth-Century Poetry
Spring. 4 credits. Not offered 1999–2000.]

[RUSSL 334 The Russian Short Story #
Fall. 4 credits. Not offered 1999–2000.]

[RUSSL 335 Gogol #
Fall. 4 credits. Not offered 1999–2000.]

RUSSL 367 The Russian Novel #
Fall. 4 credits.

RUSSL 368 Russian Literature From 1917 to the Present
Fall. 4 credits.

[RUSSL 373 Chekhov in the Context of Contemporary European Literature and Art (also Comparative Literature 395) #
Fall. 4 credits. Not offered 1999–2000.]

[RUSSL 385 Reading Nabokov (also CompL 385 and English 379)
Spring. 4 credits. Not offered 1999–2000.]

[RUSSL 389 Contemporary Literature in Central and East Europe (also Comparative Literature 389)
Fall. 4 credits. Not offered 1999–2000.]

[RUSSL 390 The Power of Nationalism: Expressions of National Feelings in Politics, Literature, History, and the Arts (also Comparative Literature 390)
Fall. 4 credits. Not offered 1999–2000.]

[RUSSL 393 Honors Essay Tutorial
Fall and spring. 8 credits. Not offered 1999–2000.
Must be taken in two consecutive semesters in the senior year. Credit for the first semester will be awarded upon completion of the second semester. For information, please see the Director of Undergraduate Studies.]

[RUSSA 401–402 History of the Russian Language
401, fall; 402, spring. 4 credits each term. Not offered 1999–2000.]

RUSSA 403–[404] Linguistic Structure of Russian
403, fall; [404, spring]. 4 credits. 404 not offered 1999–2000.

[RUSSA 407–408 Russian Phonetics
407, fall; 408, spring. Not offered 1999–2000.]

RUSSA 409 Teaching Russian as a Foreign Language
Fall or spring. 1 credit.

[RUSSL 409 Russian Stylistics
Fall. 4 credits. Not offered 1999–2000.]

RUSSA 413–414 Advanced Conversation and Stylistics
413, fall; 414, spring. 2 credits each term.

RUSSL 430 Practice in Translation
Spring. 4 credits.

[RUSSL 431 Contemporary Russian Prose
Spring. 4 credits. Not offered 1999–2000.]

[RUSSL 432 Pushkin #
Spring. 4 credits. Not offered 1999–2000.]

RUSSL 445 Batiushkov and Pasternak
Fall. 4 credits.

RUSSL 460 Short Works of Tolstoy and Dostoevsky
Spring. 4 credits.

RUSSL 491 Reading Course: Russian Literature in the Original Language
Fall or spring. 1 credit.

RUSSL 492 Supervised Reading in Russian Literature
Fall or spring. 1–4 credits each term.

[RUSSL 498 Russian Symbolism
4 credits. Not offered 1999–2000.]

[RUSSA 601 Old Church Slavonic
Fall. 4 credits. Not offered 1999–2000.]

[RUSSA 602 Old Russian Texts
Spring. 4 credits. Not offered 1999–2000.]

[SEBCR 131–132 Elementary Serbo-Croatian
131, fall; 132, spring. 3 credits each term. Not offered 1999–2000.]

SEBCR 133–134 Continuing Serbo-Croatian
133, fall; 134, spring. 3 credits each term.

SOC 230 Knowledge and Power
3 credits.

[SOC 360 State and Society in Comparative Perspective
3 credits. Not offered 1999–2000.]

[SOC 365 Comparative Perspectives on Socialist Societies and Economics
4 credits. Not offered 1999–2000.]

[SOC 366 Transitions From State Socialism
Spring. 4 credits. Not offered 1999–2000.]

SOC 510 Comparative Societal Analysis
Fall. 4 credits.

[THETR 322 Russian Drama and Theatre (also Russian Literature 332)
4 credits. Not offered 1999–2000.]

[THETR 335 Modern and Contemporary Theatre (also Comparative Literature 337)
Spring. 4 credits. Not offered 1999–2000.]

THETR 378 Russian Films of the 1920s and French Films of the 1960s
Spring. 4 credits.

[THETR 662 Russian Drama and Theatre (also Russian Literature 632)
4 credits. Not offered 1999–2000.]

[UKRAN 131–132 Elementary Ukrainian
131, fall; 132, spring. 3 credits each term. Not offered 1999–2000.]

Science of Earth Systems

R. Allmendinger, W. Allmon, W. Bassett, J. Bird, L. Brown, L. Cathles, J. Cisne, L. Derry, C. Greene, B. Isacks, T. Jordan, S. Kay, R. Kay, D. Turcotte, W. White (Geological Sciences); P. Baveye, S. Colluci, K. Cook, W. Knapp, S. Riha, D. Wilks, M. Wysocki (Soil, Crop and Atmospheric Sciences); W. Brutsaert (Civil and Environmental Engineering); L. Hedin, R. Howarth (Ecology and Systematics); P. Gierasch (Astronomy); M. Kelley (Electrical Engineering); J.-Y. Parlange (Agricultural and Biological Engineering); J. Yavitt (Natural Resources).

The Science of Earth Systems (SES) is the study of the interactions between the atmosphere, oceans, biosphere, and solid Earth; these dynamic interactions control the global environment. The interdisciplinary approach of SES incorporates major components of geology, ocean and atmospheric sciences, terrestrial hydrology, biogeochemistry, and ecology into an integrated study of Earth as a complex system. Earth system science presents one of the outstanding intellectual challenges in modern science and is the primary foundation for the future management of our home planet.

The Major

The major in Science of Earth Systems emphasizes a rigorous, objective study of the Earth and its systems with broad preparation in basic sciences and mathematics, followed by the choice of an area of concentration for study in greater depth. The Science of Earth Systems program seeks to train students in a strong set of fundamental skills that will allow them to approach with quantitative rigor a wide range of questions about the Earth and its environment, and to adapt those skills rapidly to new areas of inquiry as they arise. The major in Science of Earth Systems is by nature interdisciplinary, and involves faculty from the College of Arts and Sciences, the College of Engineering, and the College of Agriculture and Life Sciences. In the College of Arts and Sciences the program is administered by the Department of Geological Sciences in collaboration with the Departments of Astronomy, Ecology and Evolutionary Biology.

The SES curriculum begins with a series of courses designed to provide preparation in fundamental science and mathematics necessary for a rigorous study of Earth Systems. This preparation is followed by three core courses providing breadth and integration. An additional set of four intermediate to advanced courses are selected to provide depth and a degree of specialization.

Students in the College of Arts and Sciences choosing to pursue the Science of Earth Systems major are required to take the following courses: PHYS 207–208 (or 112–213), CHEM 207–208, BIOSCI 101/103–102/104 (or 109–110), and MATH 111–112 (or 121–122, or 191–192). Three additional 3–4 credit hour courses in mathematics, physics, chemistry, or biology are required; these additional courses must require one or more of the basic courses listed above as a prerequisite. One of the courses must be either GEOL 201 or BIOES 261. Both GEOL 201 and BIOES 261 can be chosen. Mathematics at the level of MATH 221 or 293 is strongly recommended for all SES students, and those choosing areas of concentration in Atmospheric Sciences, Environmental Geophysics, or Hydrology should take MATH 222 or 294.

The four required SES core courses include the following:

SES 301 (ASTRON 331, SCAS 331) Climate Dynamics

SES 302 (GEOL 302, SCAS 332) Evolution of the Earth System

SES 321 (GEOL 321,NATRES 321) Biogeochemistry

These courses are described in the section entitled "Interdisciplinary Centers, Programs, and Studies" at the beginning of the catalog. Twelve additional credit hours selected from 300- and 400-level courses approved by the SES Committee are required. These courses will ordinarily be organized around one of the SES areas of specialization. The areas of specialization currently include the following:

Climate Dynamics, the study of physical and chemical processes producing Earth's weather and climate;

Ocean Sciences, the study of the biological, chemical, and physical processes at work in the ocean (see "Courses in Marine Sciences" on p. 163);

Hydrological Sciences, the study of the interactions of rock, water, snow, and ice on Earth's land surfaces;

Biogeochemistry, study of element cycling near Earth's surface and how organisms both mediate and benefit from these fluxes;

Environmental Geology and Geophysics, remote sensing, field and laboratory measurements of Earth's surface and subsurface applied to the study of the environment, global change, and natural hazards;

Earth in Space, Earth's ionosphere and exosphere, solar-terrestrial interactions, and earth as a planet.

Further information and applications contact B. Isacks, 255–2307, bli1@cornell.edu or R. Kay, 255–3461, rwk6@cornell.edu. Also see the SES website at ***http://www.geo.cornell.edu/geology/ses_arts.html*** for up-to-date information. Administrative offices are located at 2120 Snee Hall.

Society for the Humanities

Dominick LaCapra, Director

Fellows for 1999–2000

Charles Brittain (Cornell University)

Laura Brown (Cornell University)

Shai Burstyn (Tel-Aviv University)

Eric Cheyfitz (University of Pennsylvania)

Sandra Greene (Cornell University)

Arthur Groos (Cornell University)

Jason Hill (Southern Illinois University)

Kobena Mercer (New York University)

Frederick Neuhouser (Cornell University)

Norie Neumark (University of Technology, Sydney)

John Ricco (Texas Tech University)

Mark Sanders (Barnard College)

Daniel Usner (Cornell University)

Priscilla Wald (University of Washington)

Janet Wolff (The University of Rochester)

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 1999–2000 is: Points of Contact.

SHUM 301 Mind and Memory (also English 301, Music 372, and Theatre, Film, and Dance 301)

Spring. 4 credits. M W 2:55–4:10.
D. Ackerman.

Creativity is the attribute of the mind that enables us to make new combinations from often unfamiliar 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 physicist and 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 recent scientific research into the complex nature of the human brain, including the intimate connections with the rest of the body. Following the introduction, the course will rely on weekly guests from as many disciplines in the arts and sciences as possible, faculty members who will discuss the process underlying their research, or their work as creative or performing artists.

Members of this course are encouraged to enroll in another course or be engaged in an activity 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. This journal will serve as a continuing record of their experiences as members of the course and will become the basic resource for an essay, to be submitted at the semester's end. It will give their carefully considered assessment of the applicability of the what they have learned in this course to a second course or activity, to their own mental processes, and to the future they propose for themselves.

S HUM 402 Augustine's *Confessions*: Memory and the Self (also Classics 405, Comparative Literature 400, Religious Studies 402)

Fall. 4 credits. Limited to 15 students. Permission of instructor. T 2:30–4:25.
C. Brittain.

Augustine's *Confessions* record the strange story of his conversion to or rediscovery of God under the stimulus of the letters of Paul and the pagan philosophy of Plotinus. The *Confessions* interpret his conversion as an act of memory or self-investigation which culminates in a Platonist philosophical vision of the divine at the limits of the self; the work itself is written as a self-conscious act of memory (or self-investigation); it also contains a theoretical analysis of memory (Book X). This course will study Augustine's conception of memory as the source of the self and the bridge from the self to the divine, and its origins in Greek philosophy, Latin rhetorical theory, and individual experience.

S HUM 403 Augustine's Dialogues on the Soul (also Classics 406, Comparative Literature 424)

Spring. 4 credits. Limited to 15 students. Permission of instructor. T 2:30–4:25.
C. Brittain.

Augustine's first works after his conversion were a series of Christian philosophical dialogues, modeled on the exemplary works of Cicero. The dialogues exploit the Platonist conception of the soul Augustine found in the works of Plotinus: its immateriality (*On the quantity of the soul*), its intellectual capacities (*Against the Academics*), its immortality (*On the immortality of the soul*), and its relation to God (*The Soliloquies*). But these texts are not simple translations of Greek philosophy into the pre-existing mold of the Latin dialogue; they represent Augustine's appropriation of the 'pagan' cultures of Greece and Rome for a new intellectual vision of Christianity. This course will examine Augustine's fusion and transformation of both the philosophical sources and the literary forms which provoked these powerful and conceptually rich dialogues.

S HUM 404 The European as Other (History 443)

Fall. 4 credits. Limited to 15 students. Permission of instructor. W 2:30–4:25.
S. Greene.

Much has been written about European images of African men, African women and African cultural practices during the 18th, 19th and 20th century, but how did Africans view Europeans during these periods? How did these images influence the ways Africans saw themselves and how did these images change over time? These questions and others will be explored in this course by examining a variety of historical, literary and anthropological texts.

S HUM 405 Operatic Contacts (also Theatre, Film, and Dance 405, Music 405, Comparative Literature 408, German Studies 404)

Fall. 4 credits. Limited to 15 students. Permission of instructor. T 10:10–12:05.
A. Groos.

This seminar begins with representative contacts involving other nations, races, and cultures in operas such as Verdi's *Aida*, Bizet's *Carmen*, and Puccini's *Madama Butterfly*. It then explores their post-colonial transformations, ranging from cinematic appropriations (*Carmen*), shifts from colonizer to colonized (Sessions, *Montezuma*), the repatriation and decolonization of *Madama Butterfly* in Japanese theatre, or the mapping of sexual politics onto race (*M. Butterfly*). Discussions involve text (in English translation) and music. Ability to read music will be helpful but is not required.

S HUM 406 Subjectivity and the Other I (also Philosophy 415)

Fall. 4 credits. Limited to 15 students. Permission of instructor. M 12:20–2:15.
F. Neuhouser.

This seminar examines various forms of the idea that interactions with "the other" (i.e., with other subjects) are essentially involved in the constitution of subjectivity. It will focus on the ways in which contact with the other is essential to reason, morality, freedom, and personal identity, as well as to alienation and self-tyranny. Readings will include: Rousseau on self-love and its connection to autonomy; Hegel's account of the master-slave relation and the unhappy consciousness; Sartre's view of the other as a threat to subjectivity; and de Beauvoir's portrayal of woman as the other and her attempt to unite autonomous subjectivity with being an object for others.

S HUM 408 Contemporary Native American Literature (also English 410)

Fall. 4 credits. Limited to 15 students. Requirements: one seminar presentation, a final paper of 20–25 pages, and regular attendance. Permission of instructor.
R 12:20–2:15. E. Cheyfitz.

Contemporary Native American Literature and its Contexts: this course will look at Native American writing in the genres of fiction, poetry and non-fiction from the 1960s to the present with a particular emphasis on the social, political, and historical contexts that this writing articulates. Writers to be read will be taken from a list that, among others, includes M. Scott Momaday, Vine Deloria Jr., Janet Campbell Hale, Elizabeth Cook-Lynn, James Welch, Gerald Vizenor, Leslie Marmon Silko, Linda Hogan, Simon Ortiz, Luci Tapahonso, Louise Erdrich, Diane Glancy, Adrian Louis, Wendy Rose, Joy Harjo, Paula Gunn Allen, and Sherman Alexie.

S HUM 409 Cosmopolitanism and The Self (also Philosophy 442)

Fall. 4 credits. Limited to 15 students. Permission of instructor. T 12:20–2:15.
J. Hill.

This seminar philosophically examines the racial and ethnic tribal identities on which contemporary selves are predicated. As a plausible antidote to problems spawned by tribalism, we will examine the possibility of a moral cosmopolitan identity. Readings will be drawn from the Ancient and Enlightenment cosmopolitans as well as contemporary texts which aim to deconstruct the concept of race.

S HUM 410 Visual Studies in the Diaspora (also Comparative Literature 433, History of Art 410)

Fall. 4 credits. Limited to 15 students. Permission of instructor. W 2:30–4:25.
K. Mercer.

This course examines the formative role of visual representation in modern conceptions of 'race' and investigates diaspora-based art practices shaped by these social conditions. From 19th century colonialism through 20th century modernism, we consider the gaze, the stereotype, cultural hybridity and institutional policy in relation to the Harlem Renaissance, the Caribbean Artists Movement and contemporary debates on New Internationalism.

S HUM 415 Slavery and the Idea of Race in Early Modern England (also English 440, English 640)
Spring. 4 credits. Limited to 15 students. Permission of instructor. T 10:10–12:05. L. Brown.
This course considers the relation between the development of the modern idea of race and the economic exploitation of slavery in the first era of English imperial expansion. As an introduction to the topic, we will canvass important modern statements on the subject, including those of David Brion Davis, Ivan Hannaford, and Robin Blackburn. The readings will center on literary texts about slaves and slavery, including writings by ex-slaves in the Afro-British tradition of the late eighteenth century. But we will also explore materials from narratives of Caribbean travel and slave rebellion, anecdotes about freed slaves and slave punishments from contemporary magazines, and biological works on the classification of humans and other animals. Texts will include: Aphra Behn, *Oroonoko*; John Stedman, *Narrative of a Five Years Expedition Against the Revolted Negroes of Surinam*; Janet Schaw, *Journal of a Lady of Quality*; Olaudah Equiano, *Narratives of the Life*; Ignatius Sancho, *Letters of the Late Ignatius Sancho*; Ottobah Cugoano, *Thoughts and Sentiments on the Evil of Slavery*; Edward Long, *The History of Jamaica*; Charlottes Dacre, *Zofloya or the Moor*.

S HUM 416 Subjectivity and the Other II (also Philosophy 415)
Spring. 4 credits. Limited to 15 students. Permission of instructor. M 12:20–2:15. F. Neuhouser.
This seminar continues and expands the themes of its predecessor with special attention to the role played by the other in certain (loosely speaking) psychological theories of selfhood. Topics will include: G. H. Mead on the importance of social roles to selfhood; Nietzsche on guilt, enslavement, and resentment; Freud's theory of neuroses, narcissism, and the therapeutic relation between analyst and analysand; and Kristeva's view of the other as internal to each of us.

S HUM 417 Spanish Borderlands and French Frontiers in American History (also History 487)
Spring. 4 credits. Limited to 15 students. Permission of instructor. R 10:10–12:05. D. Usner.
This seminar will explore how non-English colonial regions of North America—places like Florida, Louisiana, and California—have been represented in American history and culture. Through a critical examination of historical and popular texts, literature, folklife studies, and films, students will trace the role played by imagery of French and Spanish provinces in the production of nationalist, regionalist, and ethnic narratives.

S HUM 418 Exploring the Israeli Folksong (Music 418)
Spring. 4 credits. Limited to 15 students. Permission of instructor. T 2:30–4:25. S. Burstyn.
The rich song repertory composed, sung and danced in Palestine/Israel between roughly 1930 and 1960 will be approached in this seminar as a multifaceted cultural phenomenon. Through listening, reading and analysis we shall explore the eclectic nature of the Israeli folksong, its canon formation, dissemination, and complex oral and printed traditions. Course requirements: one research paper.

S HUM 419 Noisy Hybrids
Spring. 4 credits. Limited to 15 students. Permission of instructor. T 2:30–4:25. N. Neumark.
This seminar explores points of contact between theory and art/practice, through theoretical and historical texts and new media and sound art works. Sound Studies is introduced as a hybrid discipline: what analyses of 'noise' does it offer and how do they inflect/distort debates on corporeality, subjectivity and translation? Questions of cultural diversity and alterity reverberate through the seminar.

S HUM 420 Testimony, Law, Literature (also English 442)
Spring. 4 credits. Limited to 15 students. Permission of instructor. M. Sanders.
In this seminar, we will explore ways in which testimony hinges literature and law, and how the study of testimony makes sense of the origins of literatures, and brings to light the cultural and aesthetic roots and boundaries of legal systems and procedures. Using slave narrative, Holocaust survivor narrative, *testimonio*, and other collaborative testimonial literature, as well as the public hearings of South Africa's Truth and Reconciliation Commission as our primary source material, we will consider such issues as: truthfulness in testimony and confession; mourning, trauma and witnessing; the ethics of testimonial collaboration and advocacy. Requirements: one research paper, one presentation, and regular attendance.

S HUM 421 Contagion, Americanism, and Social Control
Spring. 4 credits. Limited to 15 students. Permission of instructor. P. Wald.
This course will explore the language of contagion as it surfaced in fiction, journalism, medicine and sociology at the turn of the twentieth century. We will attend both to its central role in defining "Americanism" and in negotiating the changing demographics brought about by immigration, urbanization and imperialism and to the differences among the genres and disciplines in that negotiation. We will study both a cultural phenomenon (and moment) and a variety of methodologies and lines of inquiry. The object of the course is to track a set of assumptions from their origin in scientific discovery (bacteriology) through their development in changing ideas about culture and contact to their consequences for historical and contemporary understanding of and attempts to regulate social interactions. There will be a required seminar paper.

S HUM 423 Modernism and the Sociology of Art
Spring. 4 credits. Limited to 15 students. Permission of Instructor. Time TBA. J. Wolff.
The seminar will focus on art in Britain and the US in the period 1900 to 1930. The principal objective will be to address the meaning of the term "the painting of modern life" (Baudelaire and T. J. Clark)—that is, what it might mean to claim that a certain style of painting is representative of a particular social and historical moment. The assumption that modernism is the art of modernity will be challenged, or at least explored critically. At stake is the question of the possibility of a sociology of art. A major theoretical project for the seminar, therefore, will be to address the development in the past two decades of three separate but necessarily related fields: cultural studies, the sociology of art and culture, and the "new art history." The opposition of two aesthetic regimes-modernism and realism- will be examined in terms of institutions and social relations, as well as art-critical and aesthetic discourses. For example, the case of the Whitney Studio Club, and its preponderance of Aschan-style artists, will be considered in relation to the simultaneous rise of European-influenced avant-garde art in New York, and its institutional and social supports. In the case of England, the engagement in art practice inspired by Cubism and Futurism will be discussed in relation to intellectual and cultural life more generally in the 1910s and 1920s, and also in connection with the particular location and cultural production of immigrant and Jewish artists. As a conceptual and theoretical preparation for this discussion, the seminar will read texts on 'the stranger'—in general, in modern society, and in relation to ethnicity, gender, and nation-building. Consideration of the post-1950 success of modernism (and especially abstraction) will take up two later sessions, focusing particularly on the case of the artist R. B. Kitaj and the meaning of the hostile response to his 1994 retrospective at the Tate Gallery.

SHUM 450 Unbecoming Community
Spring. 4 credits. Time TBA. Limited to 15 students. Permission of instructor. J. Ricco.
This seminar will examine the work of a number of contemporary philosophers and social theorists who take community to be necessarily irresolvable, incomplete, and perhaps even impossible, and who locate its criticality in this very "failure" (Nancy, Blanchot, Agamben, Golding, Bersani, and Haver, et.al.) Unbecoming community might be what Georges Bataille meant when he spoke of "the community of those who do not have a community." Rather than force a negative or positive evaluation of this condition, we too shall treat community as an ethico-political question in its own right, and one that requires new ways of thinking about collective forms of sociality. We will consider anonymity, illegality, imperceptibility, itinerancy, proximity, and inconsolability, as some of the forces that make community unbecoming.

SHUM 489 Tales of the Heike (also Asian Studies 490 and History 490)
Fall. 4 credits. Permission of instructor. T 2:30–4:25. K. Brazell and J. Piggot.

SHUM 495 Opera, History, Politics, Gender (also History 456)
Spring. 4 credits. W 2:30–4:25. M. Steinberg and S. Stewart.

South Asia Program

C. Minkowski, director; A. Basu, K. Basu, D. Bor, D. Boucher, R. Colle, L. Derry, C. Fairbanks, S. Feldman, J. Gair, D. Gold, D. Henderson, R. Herring, D. Holmberg, R. Kanbur, M. Katzenstein, V. Kayastha, K. A. R. Kennedy, S. Kuruvilla, B. Lust, B. G. MacDougall, M. Majumdar, K. March, K. McGowan, S. Mohanty, V. Munasinghe, A. Nussbaum, S. Oja, P. Olpadwala, B. Perlus, T. Poleman, N. Sethi, D. Sisler, S. Subramanian, D. Sudan, N. Uphoff, M. Walter

The South Asia Program coordinates research, teaching, and special campus events relating to Bangladesh, India, Pakistan, Nepal, and Sri Lanka. The program faculty includes members from a variety of disciplines, including agricultural economics, agricultural engineering, anthropology, architecture, art, city and regional planning, communication, comparative religion, ecology and systematics, economics, English, government, history, history of art, human ecology, industrial and labor relations, international agriculture, linguistics, literature, rural sociology, and science, technology, and society. Undergraduates with a special interest in the region may major in Asian studies with a South Asia concentration, or complete a South Asia concentration with any other major. Graduate students may pursue the M.A. degree in Asian Studies with a concentration in South Asia. Languages offered are Bengali, Hindi, Nepali, Sinhala, Urdu, Sanskrit, and Pali. Foreign Language Area Studies Fellowships are available to Cornell graduate students who are U.S. citizens. Cornell is a class A member of the American Institute of Indian Studies (AIIS), and undergraduates as well as graduate students are eligible for AIIS intensive language program fellowships in India. For courses available in South Asian studies and details on the major, see the Department of Asian Studies listing in this volume.

Students who want further information on courses and research opportunities should direct questions to the program office, 170 Uris Hall.

Southeast Asia Program

T. Chaloemtiarana, director; B. R. Anderson, W. B. Bailey, A. C. Cohn, P. Gellert, M. F. Hatch, S. Kuruvilla, T. Loos, K. M. McGowan, A. Riedy, J. T. Siegel, E. Tagliacozzo, K. W. Taylor, E. Thorbecke, L. Williams, J. U. Wolff, D. K. Wyatt Emeritus: R. Baker, R. B. Jones, G. McT. Kahin, S. J. O'Connor, O. W. Wolters.

Southeast Asia studies at Cornell is included within the framework of the Department of Asian Studies. Seventeen core faculty members in the colleges of Arts and Sciences, Business and the Johnson Graduate School of Management, the School of Industrial and Labor Relations, and Agriculture and Life Sciences participate in an interdisciplinary program of teaching and research on the history, culture, and societies of the region stretching from Burma through the Philippines. In addition, lecturers and other faculty provide language and area instruction on Southeast Asia. Courses are offered in such fields as anthropology, Asian studies, economics, finance, government, history, history of art, labor relations, linguistics, music, and rural sociology. Instruction is also offered in a wide variety of Southeast Asian languages: Burmese, Cambodian (Khmer), Cebuano (Bisayan), Indonesian, Javanese, Tagalog, Thai, and Vietnamese, for which Foreign Language Area Studies Fellowships are available to U.S. citizens. The formal program of study at Cornell is enriched by a diverse range of extracurricular activities, including an informal weekly brown bag seminar and concerts of the Gamelan Ensemble. The George McT. Kahin Center for Advanced Research on Southeast Asia is also the site for public lectures as well as publication and outreach activities related to this area. The John M. Echols Collection on Southeast Asia, in Kroch Library, is the most comprehensive collection on this region in America.

Undergraduates may major in Asian studies with a focus on Southeast Asia and its languages, or they may elect to take a concentration in Southeast Asia studies by completing 18 credits of course work. Graduate students may work toward an M.A. degree in Southeast Asian studies or pursue a Master of Professional Studies in another school with a concentration in Southeast Asian studies. Ph.D. students specializing in Southeast Asia receive a doctorate in a discipline such as history, art history, anthropology, government, music, eocnomics, or city and regional planning.

Additional information is available on the Internet at: http://www.einaudi.cornell.edu/southeastasia. Inquires for further information should be directed to the program office, 180 Uris Hall.

Statistical Science Department

The university-wide Department of Statistical Science coordinates undergraduate and graduate study in statistics and probability. A list of suitable courses can be found in the section, "Interdisciplinary Centers, Programs, and Studies," in the front of this catalog.

Women's Studies Program

Shirley Samuels, director; J. E. Gainor, director of undergraduate studies; D. Castillo, director of graduate studies; L. Abel, K. Abrams, A. Adams, N. Assie-Lumumba, K. Barzman, P. Becker, D. Bem, S. Bem, J. Bemstock, L. Beneria, A. Berger, F. Blau, L. Bogel, M. Brinton, L. Brown, J. Brumberg, W. Burkard, D. Castillo, C. Chase, M. Clarkberg, B. Correll, E. DeLoughrey, I. DeVault, J. Farley, S. Feldman, T. Fishel, J. Fortune, S. Friedman, N. Furman, J. E. Gainor, J. Ginsburg, S. Greene, E. Hanson, K. Haines-Eitzen, N. Hirschmann, M. Hite, P. Hyams, B. J. Isbell, M. Jacobus, J. Jennings, M. Katzenstein, C. Lazzaro, U. Liebert, T. Loos, K. March, S. McConnell-Ginet, K. McCullough, M. Migiel, M. B. Norton, J. Peraino, C. Raver, J. Reppy, M. Rossiter, R. Ruggles, S. Samuels, R. Savin-Williams, R. Schneider, A. M. Smith, M. Steinberg, M. C. Vallois, A. Villerajo, M. Washington, R. Weil, B. Wejnert, J. Whiting, L. Williams.

Introduction to the Program

Women's Studies is an interdisciplinary program that seeks to deepen understanding of women's lives, culture, and history, in all their complex multiplicities. Transformative as well as additive, women's studies challenges us to re-examine much of what we think we already know by providing an intellectual—and critical—feminist framework through which to view the many interconnections among 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 as impartial, objective, or neutral as has traditionally been thought but instead emerges out of particular historical and political contexts.

Although all Women's Studies courses except writing seminars count toward the major, they do not all satisfy distribution requirements or count toward the total hours required in Arts and Sciences; if a course is not cross-listed with another Arts and Sciences department, be sure to check with college offices about whether it will satisfy distribution or our requirements for Arts and Sciences.

Program Offerings

The Women's Studies Program offers an undergraduate major, an undergraduate concentration, and a graduate minor. Undergraduate students in the College of Arts and Sciences who want to major in women's studies can apply directly to the program. 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 from within any single discipline or even from a simple combination of two or more disciplines. For that reason, the women's studies major provides students with a basic groundwork in the interdisciplinary field of women's studies and 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 for each and every student, the women's studies major gives 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 a 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 two Women's Studies courses with a grade of B- or better. Some suggested entry-level courses for 1999–2000 include: 206, 210, 211, 234, 244, 269, 273, 277, and 285. These courses would count both as prerequisites and as part of the women's studies major. First-Year writing seminars, in contrast, would count as prerequisite courses but not as part of the major.
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 major 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 director of undergraduate 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 director of undergraduate studies 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 Women's Studies 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 completed with a grade of C- or above, no more than two of which can come from a single discipline and none of which should overlap with the major. In rare cases, the DUS may allow one class from within a student's major to count toward the requirements for the concentration. Students should not assume the waiver will be granted, and they must petition the DUS with this request before the beginning of their final semester of study. Freshman writing seminars cannot be included within the four required courses. Students wishing to concentrate in Women's Studies should see the DUS.

The LBG Concentration

Women's Studies serves as home to the Lesbian, Bisexual, and Gay Studies Program, which offers an undergraduate concentration as well as a graduate minor. The LBG undergraduate concentration consists of four courses. The Women's Studies courses that may be used to fulfill the LBG concentration are 210, 244, 262, 277, 285, 321, 353, 355, 376, 377, 413, 415, 427, 433, 450/650, 441/641, 465, 467, 468, 493, 621, 626, 654, 656 and 661. For a complete listing of all courses that will fulfill this concentration please see the LBG Studies portion of this catalog.

I. First-Year Writing Seminars

[WOMNS 100.95 FWS: A Matter of Fact? History, Gender & Difference (also History 100.95)
3 credits. Not offered 1999–2000. T. Loos.]

[WOMNS 104 FWS: Whose Families? Whose Values? (also History 105)
3 credits. Not offered 1999–2000. M. B. Norton.]

WOMNS 106 FWS: Women and Writing (also English 105)
Fall and spring. 3 credits. Staff.
For description, see ENGL 105.

[WOMNS 109 FWS: Gendered Imaginations in African History and Literature (also History 109)
3 credits. Not offered 1999–2000. Next offered fall 2000–01. S. Greene.]

[WOMNS 113 Nudity/Nakedness: The Sexed Body in Western Art (also History of Art 112.03)
3 credits. Not offered 1999–2000. K. Barzman.]

[WOMNS 155 FWS: Fiddler on the Roof in Anthropological Guise: Tradition, Gender, and the Politics of Culture (also Anthropology 155)
3 credits. Not offered 1999–2000. S. Friedman.]

[WOMNS 157 FWS: Close Encounters: Race and Sex in Anthropology and Science Fiction (also Anthropology 157)
3 credits. Not offered 1999–2000. T. Fishel.]

WOMNS 178 FWS: Desire (also English 178 and Theatre Arts 178)
Spring. 3 credits. E. Hanson.
For description, see ENGL 178.

II. Courses

WOMNS 203 Work and Family (also Sociology 206)
Spring. 3 credits. W. Burkard.
For description, see SOC 203.

WOMNS 206 Gender and Society (also Rural Sociology 206)
Spring. 3 credits. B. Wejnert.
For description, see R SOC 206.

[WOMNS 210 Introduction to Feminist Theory
4 credits. Not offered 1999–2000. A. Villarejo.
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 211 Introduction to Women's Studies
Fall. 3 credits. K. McCollough.
Introduction to Women's Studies is a multidisciplinary approach to understanding the experiences, historical conditions, and concerns of women, both in the present and the past. As the academic manifestation of feminism, women's studies offers a range of perspectives (from liberal to radical) but focuses, in general, on understanding the sources of women's oppression in order to eliminate these sources.

[WOMNS 214 Biological Basis of Sex Differences (also Biological Sciences 214 and Biology and Society 214)
3 credits. Not offered 1999–2000. J. Fortune.]

[WOMNS 234/434 Gender in Early Modern Europe (also History 234/434) #
4 credits. Not offered 1999–2000. R. Weil.]

[WOMNS 238 The Historical Development of Women as Professionals, 1800–Present (also Human Development and Family Studies 258, American Studies 258, and History 238) #
3 credits. Not offered 1999–2000; next offered fall 2000–01. J. Brumberg.]

[WOMNS 243 Inside-Out: The American Everyday Interior (also Design and Environmental Analysis 243)
3 credits. Not offered 1999–2000; next offered spring 2000–01. J. Jennings.]

WOMNS 244 Language and Gender Relations (also Linguistics 244)
Spring. 4 credits. S. McConnell-Ginet.
For description, see LING 244.

WOMNS 249 Feminism and Philosophy (also Philosophy 249)
Fall. 4 credits. J. Whiting.
For description, see PHIL 249.

[WOMNS 251 Twentieth-Century Women Novelists (also English 251)
4 credits. Not offered 1999–2000. S. Samuels.]

WOMNS 252 Women and the Holocaust (also English 252 and Jewish Studies 255)
Fall. 4 credits. M. Jacobus.
For description, see ENGL 252.

[WOMNS 263 Interpreting Melodrama and the Woman's Film (also English 263)
4 credits. Not offered 1999–2000. L. Bogel.]

WOMNS 269 Introduction to Feminist Political Thought (also Government 369)
Fall. 4 credits. N. Hirschmann.
For description, see GOVT 369.

WOMNS 273 Women in American Society, Past and Present (also History 273) #
Spring. 4 credits. M. B. Norton.
For description, see HIST 273.

[WOMNS 277 Social Construction of Gender (also Psychology 277)
3 credits. Not offered 1999–2000. S. Bem.]

WOMNS 285 Introduction to Sexual Minorities (also Human Development 284)
Fall. 3 credits. R. Savin-Williams.
For description, see HD 284.

[WOMNS 305 Emotion, Gender, and Culture (also Anthropology 305) @
4 credits. Not offered 1999–2000. B. J. Isbell.]

[WOMNS 307 African-American Women in Slavery and Freedom (also History 303 and Africana Studies 307) #
4 credits. Not offered 1999–2000. M. Washington.]

[WOMNS 309/509 The Sociology of Marriage (also Sociology 309/509)
3 credits. Not offered 1999–2000. M. Clarkberg.]

[WOMNS 314/514 Gender and Work (also Sociology 314/514)
4 credits. Not offered 1999–2000. Next offered fall 2000–01. M. Brinton.]

WOMNS 320 Queer Theater (also Theatre Arts 320)
Spring. 4 credits. J. E. Gainor.
For description, see THETR 320.

WOMNS 321/631 Sex and Gender in Cross-Cultural Perspective (also Anthropology 321/621) @
Fall. 4 credits. K. March.
For description, see ANTHR 321/621.

WOMNS 348 Studies in Women's Fiction (also English 348)
Fall. 4 credits. L. Brown.
For description, see ENGL 348.

[WOMNS 349 Readings in Feminist Literary Theory (also English 349)
4 credits. Not offered 1999–2000. M. Hite.]

[WOMNS 350 Women and Patronage in Islam (also Near Eastern Studies 350)
4 credits. Not offered 1999–2000. D. Ruggles.]

WOMNS 353 Feminism: State and Public Policy (also Government 353)
Fall. 4 credits. M. Katzenstein.
For description, see GOVT 353.

WOMNS 355 Decadence (also English 355 and Comparative Literature 355) #
Spring. 4 credits. E. Hanson.
For description, see ENGL 355.

[WOMNS 357 American Families in Historical Perspective (also History 359, American Studies 359 and Human Development 359)
3 credits. Not offered 1999–2000; next offered spring 2000–01. J. Brumberg.]

[WOMNS 358 20th-Century Experimental Fiction by Women (also Enlgish 358)
4 credits. Not offered 1999–2000. M. Hite.]

[WOMNS 362 Global Perspectives on Gender (also Africana 362) @
4 credits. Not offered 1999–2000; next offered spring 2000–01. N. Assie-Lumumba.
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.]

[WOMNS 363 Representations of Women in Ancient Greece and Rome (also Classics 363 and History 367) #
4 credits. Not offered 1999–2000. J. Ginsburg, L. Abel.]

WOMNS 365 Topics in Social and Personality Development: The Psychological Development of Women (also Human Development 365)
Fall. 3 credits. C. Raver.
For description, see HD 365.

WOMNS 366 Women at Work (also Industrial and Labor Relations: Human Resources 366)
Spring. 3 or 4 credits. J. Farley.
For description, see ILRHR 366.

WOMNS 368 Marriage and Sexuality in Medieval Europe (also History 368 and Religious Studies)
Spring. 4 credits. P. Hyams.
For description, see HIST 368.

[WOMNS 370 19th-Century Novel (also English 370) #
4 credits. Not offered 1999–2000. E. Hanson.]

WOMNS 378 Topics in U.S. Women's History (also History 378 and American Studies 378)
Fall. 4 credits. M. B. Norton.
For description, see HIST 378.

[WOMNS 380 Gender, Ideology, and Culture (also Sociology 380)
4 credits. Not offered 1999–2000. P. Becker.]

[WOMNS 381 19th Century French Women Writers (also French Literature 381) #
4 credits. Not offered 1999–2000. A. Berger.]

[WOMNS 384 History of Women and Unions (also Industrial & Labor Relations: Collective Bargaining 384)
4 credits. Not offered 1999–2000; next offered spring 2001–02. I. DeVault.]

[WOMNS 394 Gender and Sexuality in Early Christianity (also Near Eastern Studies 394 and Religious Studies 394)
4 credits. Not offered 1999–2000. K. Haines-Eitzen.]

WOMNS 400 Senior Honors Thesis
Fall and spring. 2–8 credits. For Women's Studies seniors only. Permission of Women's Studies faculty member required. Student must carry a GPA of 3.0 in all subjects and a 3.3 in Women's Studies. Staff.
Both the form of theses, and the nature and extent of contact between student and adviser, 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 first 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 403 Love, Sex, and Song in the Middle Ages (also Music 403)
Spring. 4 credits. J. Peraino.
For description, see MUSIC 403.

[WOMNS 404 Women Artists (also History of Art 466) #
4 credits. Not offered 1999–2000. J. Bernstock.]

WOMNS 405/605 Domestic Television
Spring. 4 credits. A. Villarejo.
This course is a seminar on television as technology and cultural form, focusing on the "domestic" as a synonym for gendered value-coding, an axis of the international division of labor (and questions of television's dissemination and circulation), and a site for historical exploration. The course balances readings in television and cultural theory (Spigel, Dienst, Merck, Williams, Feuer, Modleski, Mellencamp, Shattuc, Spivak and others) with close analysis of television as information, entertainment, furniture, technology, text, genre, flow, channel, and circuit of production of the commodity audience. Students may enroll in either undergraduate or graduate level with graduate students submitting a longer paper and doing supplementary readings.

[WOMNS 406 The Culture of Lives (also Anthropology 406) @
4 credits. Not offered 1999–2000. K. March.]

[WOMNS 408 Gender Symbolism (also Anthropology 408)
4 credits. Not offered 1999–2000.
K. March.]

[WOMNS 409/609 Misogyny and Its Readers (also Italian 409/609 and Comparative Literature 449/649)
4 credits. Not offered 1999–2000.
M. Migiel.]

[WOMNS 415 Race, Gender and Organization (also Government 415)
4 credits. Not offered 1999–2000.
M. Katzenstein and J. Reppy.]

WOMNS 416 Gender and Sex in South East Asia (also History 416)
Fall. 4 credits. T. Loos.
For description, see HIST 416.

[WOMNS 427 Shakespeare: Gender, Sexuality, Cultural Politics (also English 427 and Theater Arts 427) #
4 credits. Not offered 1999–2000.
B. Correll.]

[WOMNS 432/632 Gender Politics and Welfare Policies in Europe and the U.S. (also Government 442/655)
4 credits. Not offered 1999–2000.
U. Liebert.]

[WOMNS 433 The Female Dramatic Tradition (also Theatre Arts 436)
4 credits. Not offered 1999–2000. Offered every 3 years. J. E. Gainor.]

WOMNS 438 Female Adolescence in Historical Perspective, 1815–1960 (also Human Development 417, History 458 and American Studies 417) #
Fall. 3 credits. J. Brumberg.
For description, see HD 417.

[WOMNS 441/641 Theatre of Commodities: Feminism, Advertising, T.V., and Performance (also Theatre Arts 439)
4 credits. Not offered 1999–2000.
A. Villarejo and R. Schneider.]

[WOMNS 443 The Novels of George Eliot (also English 444)
4 credits. Not offered 1999–2000.
C. Chase.]

[WOMNS 444 Historical Issues of Gender and Science (also Science and Technology Studies 444)
Spring. 4 credits. Not offered 1999–2000.
M. Rossiter.
For description, see S&TS 444.]

[WOMNS 448/648 Boccaccio: Gender, Power, and the Medieval Text (also Italian Literature 445/645 and Comparative Literature 456) #
4 credits. Not offered 1999–2000.
M. Migiel.]

[WOMNS 450/650 The Lenses of Gender (also Psychology 450/650)
4 credits. Not offered 1999–2000. S. Bem.]

[WOMNS 451 Women in Italian Renaissance Art (also Art History 450) #
4 credits. Not offered 1999–2000.
C. Lazzaro.]

WOMNS 454 Opera, History, Politics, Gender (also History 456, Society for the Humanities 459, Comparative Literature 459, and Italian 456)
Spring. 4 credits. M. Steinberg, S. Stewart.
For description, see HIST 456.

[WOMNS 457 The Sexed Body in Western Art (also History of Art 457)
4 credits. Not offered 1999–2000.
K. Barzman.]

WOMNS 459 Education in Africa and the Diaspora (also Africana 459) @
Fall. 4 credits. N. Assié-Lumumba.
For description, see AS&RC 459.

[WOMNS 464 Gender and Politics in the Roman World (also Classics 463 and History 463)
4 credits. Not offered 1999–2000.
J. Ginsburg.]

WOMNS 465 Feminist Theory/Lesbian Theory (also Comparative Literature 465 and German Studies 465)
Fall. 4 credits. A. Villarejo.
This seminar will explore developments in feminist theory, primarily in the United States from the 1950's through the mid 1990's. We will also trace the changing status of "lesbianism" in feminist theories over that same time period and examine its status in current constructions of "queer theory." What happens to the relationship between feminist theory and lesbian thought when "queer theory" emerges? The purpose of the course is to encourage critical, historically informed readings of what could be considered canonical texts and crucial junctures in Second Wave feminist thought, many of which remain unfamiliar even to Women's Studies students.

[WOMNS 466 Feminism and Gender Discrimination (also Government 466 and Law 648)
4 credits. Not offered 1999–2000.
K. Abrams.]

WOMNS 467 Sexual Minorities and Human Development (also Human Development 464)
Spring. 3 credits. R. Savin-Williams.
For description, see HD 464.

[WOMNS 468 Radical Democratic Feminisms (also Government 467)
4 credits. Not offered 1999–2000.
A. M. Smith.]

[WOMNS 471 American Indian Women's Literature (also English 471 and American Studies 471)
4 credits. Not offered 1999–2000. Staff.]

WOMNS 476 Global Women's Literature: (En) Gendering Space (also English 476)
Fall. 4 credits. E. DeLoughrey.
For description, see ENGL 476.

[WOMNS 477 Gender and Sexuality (also History 434)
4 credits. Not offered 1999–2000.
S. Greene.]

WOMNS 478 Family and Society in Africa (also Africana 478) @
Fall. 4 credits. N. Assié-Lumumba.
For description, see AS&RC 478.

WOMNS 479 Women and Gender Issues in Africa (also Africana 479) @
Spring. 4 credits. N. Assié-Lumumba.
For description, see AS&RC 479.

WOMNS 481 Latin American Women Writers (also Spanish 492 and Comparative Literature 482) @
Spring. 4 credits. D. Castillo.
For description, see SPLIT 492.

[WOMNS 485 Encountering Women's Studies: Perspectives from the Disciplines
Fall. Not offered 1999–2000. S. Samuels.
What impact has women's studies had on pre-existing ways of thinking and knowing in such disciplines as history, psychology, sociology, linguistics? Readings and discussions will analyze the role of women's studies as it has challenged the disciplines and has in turn been challenged by scholars and non-scholars alike.]

WOMNS 488/688 Beliefs, Attitudes, and Ideologies (also Psychology 489/689)
Spring. 4 credits. D. Bem.
For description, see PSYCH 489.

WOMNS 493 French Feminisms (also French 493)
Fall. 4 credits. A. Berger.
For description, see FRLI 493.

[WOMNS 496 Women and Music (also Music 493)
4 credits. Not offered 1999–2000.
J. Peraino.]

[WOMNS 494 Music and Queer Identity (also Music 492)
4 credits. Not offered 1999–2000.
J. Peraino.]

WOMNS 499 Directed Study
Fall and spring. Variable credit. Prerequisites: one course in women's studies and permission of a faculty member of the Women's Studies Program Board. Staff.

WOMNS 502 Education and Development in Africa (also Africana 502)
Spring. 4 credits. N. Assié-Lumumba.
For description, see AS&RC 502.

[WOMNS 530 Womanist Writing in Africa and the Caribbean (also Africana 530) @
4 credits. Not offered 1999–2000.
A. Adams.]

WOMNS 600 Special Topics in Feminist Theory: An Interdisciplinary Graduate Course in Women's Studies
Fall. 4 credits. This course is open to graduate students and undergraduate seniors who have obtained permission of instructor. Staff.
The purpose of this course is to expose graduate students to interdisciplinary approaches in Women's Studies and feminist theory to a variety of topics or questions. While many of our graduate courses train students in highly specialized areas of feminist theory, this course aims to teach students how to find common intellectual ground around a single topic from interdisciplinary perspectives without sacrificing the complexity of any disciplinary approach. The course is designed for graduate minors in Women's Studies and students with a specialized interest in feminist theory. Although it is not required, the course is strongly recommended for students obtaining a graduate minor in Women's Studies.

[WOMNS 608 African-American Women (also History 608)
4 credits. Not offered 1999–2000.
M. Washington.]

[WOMNS 612 Population and Development in Asia (also Rural Sociology 612)
3 credits. Not offered 1999–2000.
L. Williams.]

[WOMNS 613 The Political Economy of Gender and Work (also City and Regional Planning 613)
3 credits. Not offered 1999–2000.
L. Beneria.]

WOMNS 614 Gender and International Development (also City and Regional Planning 614)
Fall. 3 credits. L. Beneria.
For description, see CRP 614.

[WOMNS 626 Graduate Seminar in the History of American Women (also History 626)
4 credits. Not offered 1999–2000.
M. B. Norton.]

[WOMNS 636 Comparative History of Women and Work (also Industrial and Labor Relations: Collective Bargaining 636)
4 credits. Not offered 1999–2000; next offered spring 2001–02. I. DeVault.]

[WOMNS 639 The Feminine Symbolic (also Anthropology 639)
4 credits. Not offered 1999–2000.
B. J. Isbell.]

[WOMNS 644 Topics in the History of Women in Science (also Science and Technology Studies 644)
4 credits. Not offered 1999–2000.
M. Rossiter.]

[WOMNS 654 Queer Theory (also English 654 and Comparative Literature 654)
4 credits. Not offered 1999–2000.
E. Hanson.]

WOMNS 656 Decadence (also English 655 and Comparative Literature 655)
Spring. 4 credits. E. Hanson.
For description, see ENGL 655.

WOMNS 661 Cinematic Desire (also English 660 and American Studies 662)
Fall. 4 credits. E. Hanson.
For description, see ENGL 660.

WOMNS 670 Feminist Political Theory (Graduate Seminar) (also Government 671)
Fall. 4 credits. N. Hirschmann.
For description, see GOVT 671.

[WOMNS 671 Feminist Methods (also Rural Sociology 671)
4 credits. Not offered 1999–2000.
S. Feldman.]

[WOMNS 692 Hispanic Feminisms (also Spanish Literature 690)
4 credits. Not offered 1999–2000.
D. Castillo.]

WOMNS 699 Topics in Women's Studies
Fall and spring. Variable credits. Staff.
Independent reading course for graduate students on topics not covered in regularly scheduled courses. Students develop a course of readings in consultation with a faculty member in the field of Women's Studies who has agreed to supervise the course work.

[WOMNS 733 Literary Anti-Feminism (also English 733)
4 credits. Not offered 1999–2000.
L. Brown.]

FACULTY ROSTER

FOR ARTS AND SCIENCES BIOLOGY FACULTY SEE UNDER "BIOLOGICAL SCIENCES"

Abrams, Meyer H., Ph.D., Harvard U. Class of 1916 Professor of English Emeritus, English
Abruña, Hector D., Ph.D., U. of North Carolina at Chapel Hill. Emile M. Chamot Professor of Chemistry, Chemistry and Chemical Biology
Adams, Anne, Ph.D., U. of Michigan. Assoc. Prof., Africana Studies and Research Center
Adams, Barry B., Ph.D., U. of North Carolina. Prof., English
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