Graduate School of Arts and Sciences

Programs and Policies

2003–2004

BULLETIN OF YALE UNIVERSITY

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Contents

The President and Fellows of Yale University

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Richard Charles Levin, B.A., B.LITT., PH.D.

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His Excellency the Governor of Connecticut, *ex officio.*
Her Honor the Lieutenant Governor of Connecticut, *ex officio.*
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Jeffrey Powell Koplan, B.A.,M.D.,M.P.H., *Atlanta, Georgia (June 2009).*
Maya Ying Lin, B.A., M.ARCH.,D.F.A., *New York, New York (June 2008).*
Linda Anne Mason, B.A.,M.B.A., *Belmont, Massachusetts (June 2004).*
The Rt. Rev. Victoria Matthews, B.A., M.DIV., TH.M., *Edmonton, Alberta, Canada.*
Indra Nooyi, B.S., M.B.A., M.P.P.M., *Greenwich, Connecticut.*
Barrington Daniel Parker, Jr., B.A., LL.B., *Stamford, Connecticut.*
John Ennis Pepper, Jr., B.A., M.A., *Cincinnati, Ohio.*
Theodore Ping Shen, B.A.,M.B.A., *Brooklyn Heights, New York (June 2007).*
Janet Louise Yellen, B.A., PH.D., *Berkeley, California (June 2006).*

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Martin Klein, PH.D., M.P.H., *Associate Dean of the Graduate School*
Pamela Schirmeister, PH.D., *Associate Dean of the Graduate School*
Richard Sleight, PH.D., *Associate Dean of the Graduate School*
Thomas Burns, PH.D., *Assistant Dean of the Graduate School*
Liza Cariaga-Lo, ED.D., *Assistant Dean of the Graduate School and Director, Office for Diversity and Equal Opportunity*
TBA, *Assistant Dean of the Graduate School*
Lisa Brandes, PH.D., *Assistant Dean for Student Affairs and Director, Student Life, McDougal Graduate Student Center*
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Judith Dozier Hackman, PH.D., *Director, Teaching Fellow Program*
Mary Johnson, PH.D., *Director, Graduate Career Services, McDougal Center and Dean's Adviser on Career Education*
Barry S. Kane, M.S.W., *Registrar, Faculty of Arts and Sciences*
Alice Oliver, *Director, Finance and Administration*
William C. Rando, PH.D., *Director, Graduate Teaching Center, McDougal Center and Dean's Adviser on Teaching and Learning*
Timothy Stumph, B.A., *Assistant Director of Admissions*

Calendar*

FALL 2003

August 25	Monday	New student orientation begins
August 27	Wednesday	Matriculation ceremony
August 28	Thursday	SPEAK test for new international students in Ph.D. programs
August 29	Friday	Registration and orientation in departments for *all* new students begins
September 2	Tuesday	Registration and fall ID validation for returning students begins Orientation for all new teaching fellows
September 3	*Wednesday*	*Fall-term classes begin, 8.30 A.M.*
September 17	Wednesday	Registration ends, 4.30 P.M.
October 24	Friday	Midterm
November 22	Saturday	Fall recess begins, 9 P.M.
December 1	Monday	Classes resume, 8.30 A.M.
December 20	*Saturday*	*Fall term ends* Winter recess begins

SPRING 2004

January 12	Monday	Spring-term registration begins *Spring-term classes begin, 8.30 A.M.*
March 5	Friday	Midterm Spring recess begins, 5.20 P.M.
March 22	Monday	Classes resume, 8.30 A.M.
May 11	*Tuesday*	*Spring term ends*
May 23	Sunday	Graduate School Convocation
May 24	Monday	University Commencement

*A more extensive Schedule of Academic Dates and Deadlines is presented on pages 438–41.

A Message from the Dean

It is with enormous pride and pleasure that I serve as the eighteenth dean of the Graduate School of Arts and Sciences at Yale University, the oldest graduate school in North America. This book, *Programs and Policies,* reveals the breadth of opportunities for graduate study at Yale. As you peruse it, you likely will discover that the challenges and rewards of graduate study differ from those of your undergraduate years. Graduate school represents a time to explore a field in depth, master an area of inquiry, and learn to disseminate knowledge through classroom teaching. Graduate education culminates in a creative and original contribution in one's field of study representing the ability to participate in the advancement of human knowledge.

Much of a student's intellectual and social life in graduate school revolves around the department or program in which one is enrolled. These communities of scholars share a common interest in advancing a particular discipline, and graduate students gain immeasurably from collaborating with these distinguished members of the faculty and their fellow students. Excellent laboratory facilities, unique museum collections, and tremendous library holdings all enrich the experience of a Yale University graduate education.

The Graduate School of Arts and Sciences also provides its students with additional sources of intellectual and social community. Through interdisciplinary programs and institutes and, especially, the McDougal Graduate Student Center, graduate students discover like-minded individuals who share their commitment to careers in teaching, research, and an array of potential leadership opportunities.

I encourage you to use *Programs and Policies* as a guide throughout your graduate study at Yale. It includes practical information about registration, financial aid, teaching experiences, University resources available to you, and the full range of services provided by the Graduate School. The entire staff of the Graduate School wishes you good fortune as you pursue a graduate education, and we hope that you would not hesitate to contact us if we can be of assistance to you along the way. I found the opportunity to study as a graduate student at Yale exhilarating and life-changing; I suspect you will as well.

Peter Salovey
Dean, Graduate School of Arts and Sciences
Chris Argyris Professor of Psychology
Professor of Epidemiology and Public Health

The Graduate School of Arts and Sciences

The Yale Graduate School of Arts and Sciences is one of twelve schools composing Yale University and the only one that awards the degrees of Doctor of Philosophy, Master of Philosophy, Master of Arts, Master of Science, and Master of Engineering. The work of the Graduate School is carried on in the divisions of the Humanities, Social Sciences, and Biological and Physical Sciences. The divisions encompass seventy-four departments and programs, fifty-six of which offer courses of study leading to the Ph.D. degree. There are twenty-two programs that terminate with the master's degree.

Yale began to offer graduate education in 1847, and in 1861 it conferred the first Ph.D. degrees in North America. In 1876 Yale became the first American university to award the Ph.D. to an African American. The Graduate School of Arts and Sciences was formally established in 1892, when the first dean was appointed. It was in that same year that women were first admitted as candidates for the doctorate.

The Graduate School community has grown vigorously since the early twentieth century; today it comprises 2,300 graduate students and a faculty of 900 who are among the world's most distinguished teachers and scholars. Admission to the Graduate School is highly competitive; currently each entering class is made up of about 500 students.

The Graduate School's purpose is to educate students in research, scholarship, and teaching in the arts and sciences. Under the guidance of the faculty, graduate students engage in advanced study of a discipline and then proceed to generate new knowledge and ideas through research. They learn to disseminate this knowledge in scholarly publications and teaching. Yale's graduate students have built careers in colleges and universities, research laboratories, government, the nonprofit sector, and private industry. Their education equips them for leadership roles in all these callings.

Yale's standing as a great international research university is based on the strength and attractiveness of its graduate programs. The pursuit of advanced learning and new knowledge takes place in the departments and programs of the Graduate School. Thus it is the Graduate School that makes Yale a university. Furthermore, graduate students as scholars in training and apprentice teachers engage with undergraduates and the faculty. A shared sense of common purpose makes Yale a community of scholars, and a place for an unusually intimate exchange of ideas.

RESOURCES FOR RESEARCH AND STUDY

Yale's outstanding facilities for research and study include a university library system of nearly eleven million volumes, the Beinecke Rare Book and Manuscript Library, the Yale University Art Gallery, the Yale Center for British Art, the Office of Information Technology Services, departmental libraries and collections, and the extensive resources of the professional schools. The collections and services of the Research Libraries Group, which consists of Columbia, Harvard, and Yale universities and the New York Public Library, are also available to students.

Special research facilities for the sciences include the Bass Center for Molecular and Structural Biology, Josiah Willard Gibbs Research Laboratories, Kline Geology Laboratory, Sterling Chemistry Laboratory, Kline Biology Tower, Becton Engineering and Applied Science Center, the Class of 1954 Environmental Science Center, the Peabody Museum of Natural History, the Arthur W. Wright Nuclear Structure Laboratory, Arthur K. Watson Hall for computer science, the Boyer Center for Molecular Medicine, and the many other science laboratories throughout the campus.

THE DEAN

Peter Salovey, 112 HGS, 432.2733, grad.dean@yale.edu
The dean of the Graduate School is appointed by the president of the University and is responsible for the educational mission of the Graduate School, its faculty, the quality of its programs, and the welfare of graduate students.

THE ASSOCIATE DEANS

The associate deans of the Graduate School are responsible for the administration of graduate programs, normally in consultation with the directors of graduate studies, and for the academic and personal well-being of students. They participate in decisions regarding admissions, financial aid, academic performance, and the application of the regulations and policies of the Graduate School. Their current responsibilities are as follows:

Martin Klein, 114 HGS, 432.8093, m.klein@yale.edu
Dean Klein oversees Student and Administrative Services, including the offices of Admissions, Finance and Administration, Graduate Career Services, Student Life, and the Graduate Teaching Center. He serves as a liaison to the registrar and Office of Public Affairs, and assists in planning and program development.

Pamela Schirmeister, 136 HGS, 432.7598, pamela.schirmeister@yale.edu
Dean Schirmeister oversees Ph.D. and terminal master's programs in African American Studies; African Studies; American Studies; Archaeological Studies; Classics; Comparative Literature; East Asian Languages and Literatures; East Asian Studies; Economic History; Economics; English Language and Literature; Film Studies; French; Germanic Languages and Literatures; History; History of Art; History of Medicine and Science; International and Development Economics; International Relations; Italian Language and Literature; Management; Medieval Studies; Music; Near Eastern Languages and Civilizations; Philosophy; Political Science; Religious Studies; Renaissance Studies; Russian and East European Studies; Slavic Languages and Literatures; Sociology; and Spanish and Portuguese

Richard G. Sleight, 132 HGS, 432.2744, richard.sleight@yale.edu
Dean Sleight oversees Ph.D. and terminal master's programs in Anthropology; Applied Mathematics; Astronomy; Biological and Biomedical Sciences; Biostatistics;

Cell Biology; Cellular and Molecular Physiology; Chemistry; Computational Biology and Bioinformatics; Computer Science; Ecology and Evolutionary Biology; Engineering and Applied Science (Applied Physics, Biomedical Engineering, Chemical Engineering, Electrical Engineering, Environmental Engineering, Mechanical Engineering); Epidemiology and Public Health; Experimental Pathology; Forestry & Environmental Studies; Genetics; Geology and Geophysics; Immunobiology; Investigative Medicine; Linguistics; Mathematics; M.D./Ph.D. Program; Microbiology; Molecular Biophysics and Biochemistry; Molecular, Cellular, and Developmental Biology; Neurobiology; Neuroscience; Pharmacology; Physics; Psychology; and Statistics

THE ASSISTANT DEANS

The assistant deans help the associate deans fulfill all their duties and responsibilities.

TBA, Assistant Dean, Humanities and Social Sciences, 135 HGS, 436.2628

Thomas Burns, Assistant Dean, Sciences, 133 HGS, 432.1884, thomas.burns@yale.edu

Liza Cariaga-Lo, Assistant Dean; Director, Office for Diversity and Equal Opportunity, 127 HGS, 436.1301, liza.cariaga-lo@yale.edu

Lisa Brandes, Assistant Dean for Student Affairs; Director, Office of Student Life, 122 HGS, 432.2583, lisa.brandes@yale.edu

DIRECTORS OF GRADUATE STUDIES (DGS)

A senior faculty member, appointed by the dean, serves as director of graduate studies (DGS) for each department or program. The directors of graduate studies are responsible for the satisfactory administration of the programs of graduate study and function as advisers and guides to all graduate students in their respective department and programs. They help graduate students to plan an appropriate course of study and research, and advise on and approve course schedules. The DGS acts as the liaison between each student in the department or program and the Office of the Dean.

OFFICE FOR DIVERSITY AND EQUAL OPPORTUNITY

Liza Cariaga-Lo, Assistant Dean, Director, 127 HGS, 432.0763,
liza.cariaga-lo@yale.edu
www.yale.edu/graduateschool/services/odeo.html

The Office for Diversity and Equal Opportunity's mission is to expand the diversity within the student body and to enhance the intellectual experience of the entire scholarly community. The office coordinates efforts to recruit and retain minority students, women, and other underrepresented groups at Yale Graduate School. The assistant dean works collaboratively with departments and programs to support the needs of these students as they pursue graduate study. The assistant dean advises prospective and current

minority graduate students, directs the Summer Undergraduate Research Fellowship (SURF) Program, Post-Baccalaureate Research Education Program (PREP), oversees Minority Recruitment Days, writes and administers grants, and provides reports on the Graduate School's progress in recruiting and retaining underrepresented students. Graduate Diversity Fellows within the office are also appointed annually to assist the office in the development and implementation of a wide array of programs, such as application seminars, mentoring programs, discussions and lectures presented by minority scholars, and social and cultural events. An Advisory Committee, appointed by the dean, meets regularly to discuss and review the office's programmatic efforts.

TEACHING

The Teaching Fellow Program

Judith Dozier Hackman, Director, 139 HGS, 432.2757, judith.hackman@yale.edu

The Teaching Fellow Program is the principal framework at Yale in which graduate students learn to become effective teachers. Learning to teach and to evaluate student work is fundamental to the education of graduate students. The Teaching Fellow Program provides opportunities for graduate students to develop teaching skills, under faculty guidance, through active participation in the teaching of Yale undergraduates. Teaching fellows who encounter problems or difficulties related to their teaching roles are encouraged to meet with the director of the Teaching Fellow Program or their associate dean.

THE MCDOUGAL GRADUATE STUDENT CENTER

Hall of Graduate Studies, 432.BLUE (2583)
www.yale.edu/graduateschool/mcdougal/

Facilities and Services

A generous gift from Mr. Alfred McDougal '53, a Yale alumnus, and his wife, Ms. Nancy Lauter, enabled Yale to create the McDougal Graduate Student Center in 1997. The McDougal Center provides space and programs for building intellectual, cultural, and social community, as well as facilitating professional development activities across the departments of the Graduate School.

The facilities of the McDougal Center, which is housed in HGS, enhance student life in many ways. The restored Common Room has a lounge with comfortable furnishings and the student-run Blue Dog Cafe, which serves coffee and light foods. Other center facilities include large meeting rooms, a seminar room, a recreation room with children's corner, an ITS student computing cluster with printer and copier, telephones, information kiosks, lockers, and vending machines, a music room, and the Resource Library. The Center also has offices for the McDougal Fellows, Diversity Fellows, and Graduate Teaching Center student staff, the Graduate Student Assembly, as well as the directors and staff of Graduate Student Life, Graduate Career Services, and Graduate Teaching Center, described below.

The McDougal Center, which is open days, evenings, and weekends during the academic term, provides members of the Graduate School community with a place of their own on campus. The Center also welcomes postdoctoral appointees, faculty, staff, and alumni/ae of the Graduate School, as well as members of the larger Yale graduate and professional school community. Graduate student groups and departments may request to reserve space by contacting the Center office.

Graduate Student Life

Lisa Brandes, Director, Graduate Student Life and Assistant Dean for Student Affairs
HGS 122, 432.2583
mcdougal.center@yale.edu
www.yale.edu/mcdougal/life

The Office of Graduate Student Life is responsible for student life programs in the McDougal Center and student services in the Graduate School. McDougal Graduate Fellows and staff produce a wide array of student life programs, including coffeehouses, arts, music, and cultural events, health and wellness sessions, outings, literary and academic writing programs, community service opportunities, monthly happy hours, dances, and events for various student groups. Graduate Student Life provides advice and support to graduate student organizations, which may sponsor events at the Center. Activities are announced in the weekly e-mail *McDougal Notes* (www.yale.edu/graduateschool/mcdougal), through specialized e-mail lists, and on the McDougal Center Student Life Web calendar at the site listed above.

The Office of Graduate Student Life also coordinates general campus services for graduate students, serving as the student advocate and departmental liaison for graduate housing, dining services, health services, athletics, security, and parking and transit. The director and staff are available to answer questions or help with any problems that students may have, including speaking individually about issues concerning their life at Yale and other personal matters and concerns. This office maintains a Web site of information and links about graduate student services (www.yale.edu/graduateschool/services/). The Student Life office also organizes recruitment activities, new student orientation, dean's events, Commencement, and other events for the Graduate School community.

The McDougal Graduate Teaching Center

William C. Rando, Director, Graduate Teaching Center and Dean's Adviser on Teaching and Learning
125 HGS, 432.2583, william.rando@yale.edu
www.yale.edu/mcdougal/teaching

The Graduate Teaching Center offers a full range of training, consultation, and development services to teachers and teaching fellows at Yale. The director and staff of fifteen graduate teaching consultants are available throughout the year and in a variety of capacities, providing assistance and training for brand-new teachers as well as experienced members of the faculty. Each year the Center offers a comprehensive program of teach-

ing workshops, dealing with topics such as effective discussion leading, classroom management, lecturing, and course design. The Center also organizes four- to six-week courses in the fundamentals of teaching in each of four areas: humanities, social sciences, sciences, and foreign languages. Through its Spring Teaching Forum and lecture series, the GTC also provides a venue for members of the Yale community to discuss issues in undergraduate education and to explore the latest in teaching innovation. Anyone teaching at Yale can contact the Center for an individual consultation at any time. Classroom visitations and videotaping are also available. The GTC works closely with academic departments to design discipline-specific training for teaching fellows and new faculty. The GTC publishes *Becoming Teachers: A Graduate Students' Guide to Teaching at Yale* as well as the spirited newsletter known as *The Brain*. Graduate students interested in the activities organized by the GTC should visit the Web site and sign up for the GTC listserv, *TeachingNotes*.

Graduate Career Services

Mary Johnson, Director, Graduate Career Services and Dean's Adviser on Career Education.
124 HGS, 432.2583, mcdougal.careers@yale.edu
www.yale.edu/graduatechool/mcdougal/gcs

Graduate Career Services (GCS) is a comprehensive career center for students and alumni/ae of the Graduate School and for postdoctoral fellows. Through individual counseling, a full schedule of programs each term, videotaped mock interviews, and a library of print resources as well as career-related Web links, the office assists graduate students and alumni/ae with career decision making and planning. It helps them think about what they want to do, know what is out there, make career decisions, and know how to search for a job. For graduate students considering nonacademic careers, the director initiates programs and develops links with employers who seek graduate students' skills. The GCS director consults with directors of graduate studies to develop programs that supplement the department's role in the professional development of students pursuing an academic career. GCS encourages students to begin using the services of the office early in their graduate careers in order to increase their opportunities upon the completion of their degree.

Dossier Service

126 HGS, McDougal Center, 432.8850, fax 432.8356, dossier@yale.edu
www.yale.edu/graduateschool/mcdougal/dossier.html

Students and alumni/ae applying for academic or nonacademic positions may use the dossier service. The dossier contains students' letters of recommendation and an official transcript of Yale graduate work. On request, a dossier will be sent to employers, agencies, and schools considering a student or alumnus/a for permanent or short-term positions, and for grants and fellowships. The director of Graduate Career Services oversees the Dossier Service.

Resource Library

121 HGS, McDougal Center
www.yale.edu/graduateschool/mcdougal/resource.html

The Resource Library, a self-service facility, provides information for graduate students, postdoctoral appointees, and faculty on fellowships, research and travel funding, and information on teaching, careers, writing, academic life, and professional development. The Fellowship Collection of the library contains copies of the Graduate School Fellowship Guide, grant directories and fellowship announcements, and an online site of links, announcements, and searchable databases. Materials may be consulted in the library or checked out for use in the Center.

OFFICE OF FINANCE AND ADMINISTRATION

Alice Oliver, Director, 131 HGS, 432.2739, alice.oliver@yale.edu
www.yale.edu/graduateschool/financial/
Jennifer Brinley, Associate Director, 130 HGS, 432.7980

The Office of Finance and Administration helps students with their financial questions and works with the dean to develop and manage the budgets of the Graduate School. The office oversees and maintains financial and data management systems. The office is a resource to students, departments, and outside organizations needing advice or assistance with statistical information, administration of external fellowships, student loan programs, and financial aid policies.

OFFICE OF GRADUATE ADMISSIONS

Robert Colonna, Director, 117B HGS, 203.432.2771, graduate.admissions@yale.edu
www.yale.edu/graduateschool/admissions/

The Office of Graduate Admissions coordinates and oversees all aspects of application to the Graduate School for individuals seeking master's and doctoral degrees, as well as for nondegree study. The Office of Graduate Admissions also works with the associate deans and academic departments to provide relevant information and decisions to applicants.

REGISTRAR'S OFFICE

Stephen Goot, Deputy Registrar, 142 HGS, 432.2743, stephen.goot.@yale.edu
www.yale.edu/graduateschool/academics/registrar.html

The Registrar's Office maintains the academic records of all students in the Graduate School. In addition, the Registrar's Office develops course and classroom schedules and oversees registration, tuition charges, academic holds, dissertation submission, final clearance at graduation, and release of diplomas for Commencement. Students should consult this office to report changes in name or address, to request transcripts, or to certify their enrollment in the Graduate School.

COMMITTEES

Currently five standing committees are concerned with the policies and procedures of the Graduate School; as with all standing committees, their deliberations are confidential. Student members of these committees are selected by the Graduate Student Assembly.

The Executive Committee: A committee of faculty members and graduate students, chaired by the dean, advises the dean on broad matters of policy and procedure, and makes recommendations to the faculty of the Graduate School.

The Degree Committees: There are three degree committees, serving the divisions of humanities, social sciences, and biological and physical sciences. The degree committees, composed of members of the division's faculty and chaired by the dean, meet twice a year and are responsible to the faculty of the Graduate School for maintaining standards of graduate education in the School and for recommending candidates for degrees. They review special academic problems of individual students and, when appropriate, the educational programs of the departments.

Dean's Advisory Committee on Student Grievances: Composed of three students, three faculty members, normally one from each division, and one administrator of the Graduate School, the committee reviews complaints brought by graduate students against a member of the faculty or administration of the Graduate School (see the description of grievance procedures on pages 411–12).

The Grievance Board for Student Complaints of Sexual Harassment: Composed of two faculty members, two graduate student members, an administrator of the Graduate School, and a person with counseling experience, the board exists to support an atmosphere of mutual tolerance and respect in the Graduate School. It is responsible for addressing complaints of sexual harassment brought by graduate students against administrators, faculty of the Graduate School of Arts and Sciences, other instructors of graduate students, postdoctoral appointees, or other graduate students (see the description of grievance procedures on pages 411–12).

The Committee on Regulations and Discipline: Composed of three graduate students, three faculty members, normally one from each division, and an associate dean, the committee reviews violations of the regulations governing academic and personal conduct (see pages 410–11).

GRADUATE STUDENT ASSEMBLY (GSA)

B43 HGS, 432.8893
graduate.student.assembly@yale.edu
www.yale.edu/assembly

Students in the Graduate School are represented collectively by the Graduate Student Assembly, which provides a forum for students to address issues across the Graduate

School and University. It consults with the dean and other administrators on proposed changes in Graduate School policy, raises concerns expressed by the student body, and nominates the student members of all Graduate School standing committees. Representatives to the assembly are elected by students in individual departments and degree programs. Each department or program has at least one student representative, with additional representatives allotted proportionally by size of the student population.

Departments and Programs

This section provides information on all departments and programs of the Graduate School of Arts and Sciences. Each listing provides a roster of faculty, special admissions and degree requirements for that department or program, and the courses offered in 2003–2004. The requirements appearing in the *Graduate School of Arts and Sciences Programs and Policies* take precedence over any statements published separately by individual departments and programs.

The degree requirements of the Graduate School itself appear later in this publication, on pages 392–403. These apply to all students in the Graduate School, although there are variations in the pattern of their fulfillment in individual departments and programs. The requirements of the Graduate School may change from time to time. If a requirement changes within the period normally required for completion of a student's course of study, the student will normally be given the choice of completing either the new or the old requirement.

The requirements of individual departments also may change from time to time, with the approval of the Graduate School. After such approval has officially been given, students in that department or program will receive written notification. All changes in departmental degree requirements occurring after the publication closing date of the *Graduate School of Arts and Sciences Programs and Policies* are posted in the Faculty of Arts and Sciences Registrar's Office, 246 Church Street, third floor.

The course listings and instructors that follow reflect information received by the registrar as of the publication date and are subject to change without notice. Students are advised to consult the Graduate School's publication *2003 Fall Term Course Offerings,* or www.yale.edu/courseinfo/ for the most recent information.

Fall-term courses are indicated by the letter "a," spring-term courses by the letter "b." Yearlong courses have no letter designation or list both "a" and "b." Course numbers followed by a superscript "u" are also open to undergraduates in Yale College. Courses in brackets are not offered during the current academic year. Course information is also available at www.yale.edu/courseinfo/.

AFRICAN AMERICAN STUDIES

493 College, 432.1170
M.A., M.Phil., Ph.D.

Chair
Paul Gilroy

Director of Graduate Studies
Matthew Jacobson [F] (493 College, matthew.jacobson@yale.edu)
Gerald Jaynes [Sp] (493 College, gjaynes@msn.com)

Professors
Hazel Carby, William Foltz, Glenda Gilmore, Paul Gilroy, Ezra Griffith, Matthew Jacobson, Gerald Jaynes, Serene Jones, Vera Kutzinski, Christopher L. Miller, Joseph Roach, Robert Stepto, John Szwed, Robert Thompson

Associate Professors
Elizabeth Alexander, Jonathan Holloway, David Krasner, Patricia Pessar

Assistant Professors
Jennifer Baszile, Khalilah Brown-Dean, Kamari Clarke, Nadine George-Graves, Ange-Marie Hancock, Kellie Jones, Alondra Nelson, Naomi Pabst, Diana Paulin, Michael Veal

Lecturers
Kathleen Cleaver, Achille Mbembe, Flemming Norcott, Seth Silberman, Gerald Thomas

Fields of Study

African American Studies offers a combined Ph.D. with a number of other departments and programs. Departments and programs which currently offer a combined Ph.D. with African American Studies are: American Studies, Anthropology, English, French, History, History of Art, Political Science, Psychology, Religious Studies, Sociology, and Spanish and Portuguese. Within the field of study, the student will select an area of concentration in consultation with the directors of graduate studies of African American Studies and the joint department or program. An area of concentration in African American Studies may take the form of a single area study or a comparative area study: e.g., Caribbean or African American literature, a comparison of African American literature in a combined degree with the Department of English; an investigation of the significance of the presence of African cultures in the New World, either in the Caribbean or in Latin and/or South America in a combined degree with the Spanish and Portuguese department. An area of concentration may also follow the fields of study already established within a single discipline, e.g., race/minority/ethnic studies in a combined degree with Sociology. An area of concentration must either be a field of study offered by a department or fall within the rubric of such a field. Please refer to the description of fields of study of the prospective joint department or program.

Special Admissions Requirements

Strong undergraduate preparation in a discipline related to African American studies; writing sample; description of the fields of interest to be pursued in a combined degree. This is a combined degree program. To be considered for admission to this program you must indicate both African American Studies and *one* of the participating departments/programs listed above. Additionally, please indicate both departments on all supporting documents (personal statement, letters of recommendation, transcripts, etc.).

Special Requirements for the Ph.D. Degree

Students will be subject to the combined Ph.D. supervision of the African American Studies department and the relevant participating department or program. The student's academic program will be decided in consultation with an adviser, the director of graduate studies of African American Studies, and the director of graduate studies of the participating department or program and must be approved by all three. Students are required to take four designated core courses in African American Studies. Core courses are (1) Theorizing the Racial Formation of the United Statesin the Late Twentieth Century (AFAM 505a), which is a required course for all *first-year* graduate students in the combined program; (2) Race Politics in the Twentieth-Century United States (AFAM 714b/AMST 713b/HIST 754b); (3) Modernity and Its Others: Self, Subject, and Cultural Differences (AFAM 712b/SOCY 650b); (4) Research Workshop (AFAM 895). After completion of course work, students will be required to attend the one-year research workshop during their third year. This research workshop is intended to support preparation of the dissertation proposal. Each student will be expected to present his or her dissertation prospectus during that year. The research workshop will also feature seminars in which students present chapters of their dissertations-in-progress. The expectation is that this workshop will be voluntarily attended by students even during terms when they are not required to register for it. The workshop will be an important part of each graduate student's professionalization and will serve as a vital stimulus to intellectual activity.

Qualifying examinations and the dissertation proposal will be administered jointly by the program and participating department and must be passed within the time required by the participating department. The total number of courses required will adhere to the requirements of the participating department or program. For details of these requirements see the special requirements of the combined Ph.D. for the particular department printed in this publication. Students will be required to meet the foreign-language requirements of the participating department (see Policies and Regulations: Degree Requirements in this publication). Students will not be admitted to candidacy until all requirements, including the dissertation prospectus, have been met and approved by the Graduate Studies Executive Committee of the African American Studies department and the participating department. If a student intends to apply for this combined Ph.D. in African American Studies and another department, he or she should contact the prospective department and request a description of all Ph.D. requirements and courses.

The faculty in African American Studies consider teaching to be an essential component of graduate education, and students therefore will teach in their third and fourth years.

Master's Degrees

M.Phil. See Graduate School requirements, pages 397–98.

M.A. (en route to the joint Ph.D.). Students will be awarded a combined M.A. degree in African American Studies and the relevant participating department or program upon successful completion of *all* course work except the Research Workshop, which is taken in the student's third year of study. See also Graduate School requirements, pages 392–403.

Program materials are available upon request to the Director of Graduate Studies, African American Studies, Yale University, PO Box 203388, New Haven CT 06520-3388.

Courses

AFAM 505a, Theorizing the Racial Formation of the United States in the Late Twentieth Century. Paul Gilroy.

T 9.30–11.20

A designated core course for students in the joint Ph.D. program; also open to students in American Studies and Sociology. The interdisciplinary seminar includes readings from the fields of anthropology, critical legal studies, cultural studies, literary history, history, politics, and sociology. *Also AMST 643a, SOCY 644a.*

[**AFAM 516b, Deconstructing Black Identities: Methods from the Humanities and Social Sciences.**]

AFAM 525b[u], Psychosocial Study of Black Autobiography. Ezra Griffith.

W 2.30–4.20

Autobiographies of black men and women analyzed especially for an understanding of their coping mechanisms, with attention to problems, satisfactions, disappointments, grief, and fulfillments.

AFAM 542a[u], Comparative Approaches to Recounting Stories of Black Lives. Ezra Griffith.

W 2.30–4.20

A comparative analysis of several methodologies used by writers to recount the story of a black life. Systematic attention is given to the framework established by Erik Erikson and Daniel Levinson to study single life development. Then this framework is applied to the study of black autobiographies, biographies (e.g., Charles Hamilton's *Adam Clayton Powell, Jr.*), and other genres of storytelling as seen, for example, in Sarah Lawrence-Lightfoot's *I've Known Rivers,* James Comer's *Maggie's American Dream,* and James McBride's *The Color of Water.* The strengths and weaknesses of these different techniques of black single life study are considered.

[**AFAM 557a[u], Introduction to Jazz Studies.**]

[**AFAM 562a[u], Miles Davis.**]

[**AFAM 563a[u], Ralph Ellison in Context.**]

[**AFAM 568a, Race, Nation, and American Modernisms.**]

[**AFAM 573a, Transnationalism, Modernity, and Diaspora.**]

[**AFAM 588b[u], Autobiography in America.**]

[**AFAM 590b, Race, Gender, and the Culture Industry in Twentieth-Century America.**]

AFAM 595b,Problems in the Study of African American Literature. Robert Stepto.
M 1.30–3.20
This seminar examines both nineteenth- and twentieth-century African American literary texts, and while students gain a comprehensive understanding of the breadth of the field, we focus on several key issues or "problems" central to the study of African American literary history. We read variously from slave narratives, autobiographies, poetry, novels, nonfiction essays, and anthologies, joining close readings of literary texts with the interdisciplinary contexts of history, cultural criticism and theory, and other art forms. *Also AMST 640b, ENGL 940b.*

[**AFAM 632b,Race and Memory.**]

AFAM 639b[u], Yoruba Communities in National and Transnational Perspectives. Kamari Clarke.
M 3.30–5.20
This is a survey of the literature on the history and development of Yoruba communities in West Africa and throughout its diaspora. Attention is paid to communities in Nigeria, Benin, Cuba, the United States, Brazil, and Trinidad. *Also AFST 670b[u], ANTH 670b[u].*

[**AFAM 656b[u], Social Change and Popular Culture in Sub-Saharan Africa.**]

AFAM 657b,Globalization,Religious Nationalism,and Rethinking Human Rights. Kamari Clarke.
M 1.30–3.20
Anthropology has neither traditionally addressed issues related to state formation nor has it paid attention to the growing significance of the post-WWII proliferation of nongovernmental organizations, especially in the third world. However, given that increasing numbers of transnational studies have critiqued the absence of the complex analysis of interrelationships between the local and the global in anthropology, this course is an attempt to critically engage the turn in anthropology. Organized as an overview of anthropological approaches to globalization, the course explores the politics of religious nationalism and the role of state and non-state actors in shaping and changing networks of transnational interaction, in order to provide a theoretical and practical approach to socially significant transformations. *Also AFST 511b, ANTH 511b.*

[**AFAM 673a,Roots and Routes: Identity and Travel in African American Political Culture.**]

[**AFAM 683b[u], Recasting Gender: Religion,Science,and the Body.**]

AFAM 687a,Race and Races in American Studies. Matthew Jacobson.
W 10.30–12.20
This reading-intensive seminar examines influential scholarship across the discipline on "the race concept" and racialized relations in American culture and society. Rather than attempting vainly to cover the field exhaustively, the focus here is upon selected themes, approaches, methods, debates, and problems in a variety of scholarly genres. Major topics include the cultural construction of race; race as both an instrument of oppression and an idiom of resistance in American politics; the centrality of race in literary, anthropological, and legal discourse; the racialization of U.S. foreign policy; "race mixing" and "passing," vicissitudes of "whiteness" in American politics; the centrality of race in American political culture; and "race" in the realm of popularly cultural representation. Writings under investigation include classic formulations by scholars like Winthrop Jordan and Ronald Takaki, as well as more recent efforts by Cheryl Harris, Kevin Gaines, Tomas Almaguer, and Louise Newman. Seminar papers give students an opportunity to explore in depth the themes, periods, and methods which most interest them. *Also AMST 701a, HIST 751a.*

AFAM 689a,Race,Gender, and Power in British Culture. Hazel Carby.
T 1.30–3.20
This seminar draws on a variety of material from history, literature, and the social sciences to consider the consequences of imperialism, colonialism, and postcolonialism for the formation of racial selves in British culture. A research paper is required.

[**AFAM 706b,Readings in Twentieth-Century American Political and Social History.**]

[**AFAM 709b,Research in Twentieth-Century American Political and Social History.**]

[**AFAM 710a,Readings in African American History since 1865.**]

AFAM 712b,Modernity and Its Others: Self,Subject,and Cultural Differences. Paul Gilroy.
T 9.30–11.20
This social theory course explores aspects of the political, philosophical, and sociological debates that have emerged around the concept of modernity. It looks particularly at articulations of modernity and "race" following four interlinked lines of inquiry: how has the subject of modernity been imagined and articulated; what attributes and experiences have qualified that subject as properly human and rational; where has identity been recognized as coming from, culturally and materially; and where has cosmopolitan loyalty emerged as a demand to see and act beyond the boundaries of immediate particularity? *Also SOCY 650b.*

AFAM 714b,Race Politics in the Twentieth-Century United States. Jonathan Holloway, Stephen Pitti.
Th 10.30–12.20
This course examines a range of civil rights movements as they have been developed and articulated since 1919. Readings in the course pay particular attention to the contested nature of such movements, their multifaceted nature, and the deep social fissures they reveal along lines of race, class, gender, and sexuality. Primary and secondary sources cover a range of methodological perspectives. Readings and discussion. *Also AMST 713b, HIST 754b.*

AFAM 722b,Theorizing "Black"and "Asian"Intersectionalities in the United States. Diana Paulin.
W 1.30–3.20
This graduate seminar approaches racial formation and racial representation through the lens of Asian American and African American literary and cultural production. We read theoretical and primary texts from various fields, including performance studies, literary studies, psychoanalytic theory, cultural studies, gender studies, and postcolonial studies, in order to construct a critical apparatus for understanding race relationally rather than as strictly defined categories of identity that have, traditionally, been studied in segregated disciplines (such as black studies, whiteness studies, Asian and Asian American studies). We address the following topics: performance of identity, racial/sexual minorities and the politics of inclusion/exclusion, alliances across racial and national boundaries, diasporic identities, history and memory. We consider how a comparative approach might produce new methodologies for thinking about Asian American and African American representation comparatively. In doing so, we interrogate conventional black/white paradigms of race by looking at intersectionalities that unsettle binaries. Along these lines, we also account for the way in which race intersects with other categories of identity, such as sexuality, gender, nation, and class. We study works by authors/artists such as Judith Butler, David Eng, Claudia Tate, Vijah Prashad, Jose Muñoz, Franz Fanon, Homi Bhaba, Kobena Mercer, Mira Nair, and Anna Deveare Smith. *Also AMST 673b.*

AFAM 726a,Black Travel and Transnationality. Naomi Pabst.
Th 1.30–3.20
This course examines literary and critical writings on African American and black diasporic travel and transnational movement. Emphasizing issues of representation and narrative strat-

egy, we explore the history of black transnational border-crossing and its influence on the cultural, political, and ideological parameters of black identity. The course establishes the forms, varieties, conflicts, and dilemmas of black transnational movement, travel, and tourism transhistorically. *Also AMST 674a.*

AFAM 727a, Biopolitics, Sovereignty, and the Right to Kill. Achille Mbembe.
W 10.30–12.20
The ultimate expression of sovereignty resides, to a large degree, in the power and the capacity to dictate who may live and who must die. Hence, to kill or to allow to live constitutes the limits of sovereignty, its fundamental attributes. This interdisciplinary seminar examines long-standing philosophical traditions that identify the essence of sovereignty with the state's right to the death of its enemies and its citizens. The types of questions (legal, political, philosophical, ethical, literary) addressed include the following: Under what practical conditions is the right to kill, to allow to live, or to expose to death exercised? Who is the subject of this right? What does the implementation of such a right tell us about the person who is thus put to death and about the relation of enmity that sets that person against his or her murderer? Is the notion of "biopolitics" sufficient to account for the contemporary ways in which the political, under the guise of war, resistance, or the fight against terror, makes the murder of the enemy its primary and absolute objective?

AFAM 728b[u], From West Africa to the Black Americas. Robert Thompson.
TTh 11.30–12.45
Art, music, and dance in the history of key classical civilizations south of the Sahara — Mali, Asante, Dahomey, Yoruba, Ejagham, Kongon — and their impact on the rise of New World art and music. *Also AFST 778b[u], HSAR 778b[u].*

AFAM 729a[u], New York Mambo: Microcosm of Black Creativity. Robert Thompson.
TTh 11.30–12.45
Rise, development, and philosophic achievement of the world of New York mambo and salsa. Emphasis on Palmieri, Cortijo, Roena, Harlow, and Colon. Examination of parallel traditions, e.g., New York Haitian art, Dominican merengue, reggae and rastas of Jamaican Brooklyn, and the New York school of Brazilian capoeira. *Also HSAR 779a[u].*

[**AFAM 730b, The Face of the Gods: Icons and Architecture of the Black Atlantic World.**]

AFAM 739a,b, Problem and Theory in Afro-Atlantic Architecture. Robert Thompson.
Th 3.30–5.20
The seminar addresses a new frontier — rebuilding the inner cities. This refers to Latino and mainland black cities within the cities of America. Accordingly, the course focuses on major roots of Latino and black traditional architecture — Ituri Forest and Namibian spatial solutions, Berber casbah architecture and its interactions with the Jews on Djerba isle and in Morocco, the concept of the Muslim *assatayah* creolized into the Iberia *azotea* and the spread of this terrace-roof style throughout Latin America. Topics include the architecture of Djenne, Berber art and architecture, Mauritanian sites, the monumental stone architecture of Zimbabwe, the sacred architecture of Ethiopia, and Muslim-influenced architecture from Rabat to Zanzibar. Then comes a case-by-case examination of some of the sites of African influence on the architecture of the Americas — the Puerto Rican *casita;* the southern verandah; the round-houses of New York, Virginia, North Carolina, Mexico, Panama, and Colombia; Ganvie, the Venice of West Africa, and its mirror image among the tidal stilt architectures of blacks of the Choco area in Pacific Colombia. The seminar ends with the shrine architecture of New World adherents of the classical religions of Dahomey. *Also AFST 781a,b, HSAR 781a,b.*

[**AFAM 746a,Race and Representation in U.S. Literature and Culture.**]

AFAM 749b,The Global Imaginary. Hazel Carby.
T 1.30–3.20
This interdisciplinary seminar discusses what is meant by globalization and the new world order. If globalization is a process currently dominated by the United States as empire, how do critical and dissenting intellectuals imagine alternative structures of citizenship and belonging? Final paper. *Also AMST 648b.*

AFAM 751a,Reading Black Queer Literatures of the United States and the Caribbean. Seth Silberman.
HTBA
Close study of both the racial underpinnings of psychoanalytic method and psychoanalytic discourse in fiction by black Americans Zora Neale Hurston, James Weldon Johnson, LeRoi Jones, Nella Larsen, Charles Perry; Jamaican Andrew Salkey; Martiniquan Joseph Zobel; Guyanan Edgar Mittelholzer. Exploration of race and sexuality in psychoanalytic criticism by W. E. B. Du Bois, Daniel Boyarin, Frantz Fanon, Sigmund Freud, Jacques Lacan, Hortense Spillers, Claudia Tate. Our aim is twofold: first, to examine psychoanalytic discourse in literary metaphors of black liberation; and second, to ameliorate psychoanalysis anxiety in African American Studies scholarship. *Also WGST 740a.*

[**AFAM 758b,Readings in African American History to Emancipation.**]

[**AFAM 759b,Magic Realism in the Americas.**]

AFAM 760b,American Legal History, 1880–1980. Robert Gordon.
MW 2.10–3.25
Selected topics in the modern history of American law, legal thought, legal institutions, and the legal profession. Examination, with an option (open to a limited number of students) to write a research paper based on primary sources. *Also AMST 780b, HIST 760b, Law 21063.*

[**AFAM 768b,Issues in Performance Art.**]

[**AFAM 772a,African,Oceanic,and Native American Perceptions of "Primitivist Modernism": Challenging the West as Arbiter of Art.**]

[**AFAM 789a,Music of Sub-Saharan Africa.**]

AFAM 809b,Intersecting Identities: Nation,Race,and Gender. Ange-Marie Hancock.
T 3.30–5.20
This seminar explores the value of approaching political identity from an intersectional perspective, primarily using the political philosophies of Hannah Arendt, W. E. B. Du Bois, and democratic theory. *Also PLSC 813b.*

AFAM 814b,Race and Ethnicity. Khalilah Brown-Dean.
HTBA
This course is an introduction to research on race and ethnicity in American politics. Topics include the social construction of race; intersections between race and gender; black, Latino, and Asian American public opinion and political participation; minority representation; the relationship between race, racism, and public policy; immigration and citizenship; state politics; the psychology of racial politics; and the role of race in campaigns. We discuss and debate the empirical contributions of this literature, as well as questions of theory, methodology, and research design. *Also PLSC 823b.*

AFAM 815b,American Legal History: The Law of Slavery and Anti-Slavery. Kathleen Cleaver.
TH 2.30–4.20

This seminar focuses on the way legal institutions adapted to the institution of human slavery in North America during the eighteenth and nineteenth centuries, and prompted the evolution of legal support for resistance to slavery. Students investigate the tension slavery generated in a republican society by examining federal and state statutes, proclamations, constitutions, and judicial opinions, as well as historical scholarship and autobiographical writings by slaves. Topics examined include the African slave trade, the colonial rejection of slavery in Georgia, the catalyst of slavery in New England's economy, women in the abolitionist movement, fugitives and maroon communities, gradual emancipation, and the impact of territorial expansion on the law of slavery, with particular emphasis on the 1856 *Dred Scott* decision in the U.S. Supreme Court. Course requires a journal and a research paper.

[**AFAM 839b, Postcolonial Drama: From Shaw to Soyinka.**]

AFAM 841b, Black British Art and Theory. Kellie Jones.
W 2.30–4.20
This course considers the development of visual culture in this European outpost of the African diaspora. Of interest is the way the discipline of cultural studies, which evolved in postwar Birmingham, intersected with the rise of black consciousness throughout Britain in the 1980s. How did the interactions of intellectuals and artists at this moment in the late twentieth century lead to the creation of strong postcolonial theory and practice? Readings include works by Bhabha, Carby, Gilroy, Hall, Maharaj, and Mercer. We look at visual production by Bhimji, D-Max, Fani-Kayode, Gupta, Julien, Kempadoo, Kureshi, Piper, Pollard, and Sulter among others. We also discuss selected exhibitions and publications that supported this movement. *Also HSAR 770b.*

[**AFAM 846a, Postcolonial Theory and Its Literature.**]

[**AFAM 854b, The French Atlantic Triangle and the Literature of the Slave Trade.**]

AFAM 880a or b, Directed Reading.
By arrangement with faculty.

AFAM 895, Research Workshop. Faculty.
A noncredit, yearlong course required of all third-year students. Fall term consists of biweekly work-in-progress talks by Yale faculty, advanced graduate students, and outside speakers. Spring term has biweekly workshops that focus on the dissertation prospectus.

For course offerings in African languages, see African Studies.

AFRICAN STUDIES

142 Luce Hall, 34 Hillhouse, 432.3436
M.A.

Chair
Robert Harms (*History*)

Director of Graduate Studies
Ann Biersteker (*Linguistics*) (432.9902, ann.biersteker@yale.edu)

Director of Program in African Languages
Sandra Sanneh (432.1179, sandra.sanneh@yale.edu)

Professors
Lea Brilmayer (*Law School*), Owen Fiss (*Law School*), William Foltz (*Political Science*), Robert Harms (*History*), Andrew Hill (*Anthropology*),ChristopherL.Miller (*French; African American Studies*),Curtis Patton (*Epidemiology*), Lamin Sanneh (*History; Divinity School*), Ian Shapiro (*Political Science*), Robert Thompson (*History of Art*), Christopher Udry (*Economics*)

Associate Professors
Ann Biersteker (*Adjunct; Linguistics*), David Watts (*Anthropology*), Eric Worby (*Anthropology*)

Assistant Professors
Kamari Clarke (*Anthropology*),David Graeber (*Anthropology*),LawrenceKing (*Sociology*), Michael Mahoney (*History*), Michael Veal (*Music*)

Senior Lectors
Sandra Sanneh (*African Languages*), Kiarie Wa'Njogu (*African Languages*)

Lector
Ore Yusuf (*African Languages*)

Lecturers
Kana Dower (*African Studies*), Anne-Marie Foltz (*Epidemiology & Public Health*), Peter Marris (*Sociology*), Gerald Thomas (*African American Studies; History*)

Fields of Study

African Studies considers the arts, history, cultures, languages, literatures, politics, religions, and societies of Africa as well as issues concerning development, health, and the environment. Considerable flexibility and choice of areas of concentration are offered because students entering the program may have differing academic backgrounds and career plans. Enrollment in the M.A. program in African Studies provides students with the opportunity to register for the many African studies courses offered in the various departments of the Graduate School of Arts and Sciences and the professional schools. In addition, the Program in African Studies offers two interdisciplinary seminars to create dialogue and to integrate approaches across disciplines.

The African collections of the Yale libraries together represent one of the largest holdings on Africa found in North America. The University now possesses over 220,000 volumes including, but not limited to, government documents, art catalogues, photographs, manuscripts, correspondence, and theses, many published in Africa.

Special Admissions Requirements

The GRE General Test is required.

Special Requirements for the M.A. Degree

The Yale University Master of Arts degree program in African Studies was instituted in 1986. The two-year interdisciplinary, graduate-level curriculum isintended for students who will later continue in a Ph.D. program or a professional school, or for those who will enter business, government service, or another career in which a sound knowledge of Africa is essential or valuable. A student may choose one of the following areas of concentration: history; anthropology; political science; economics; sociology; arts and literatures; languages and linguistics; religion; environmental and developmental studies.

The program requires sixteen courses: two compulsory introductory interdisciplinary seminars, Research Methods in African Studies (AFST 501a) and Africa and the Disciplines (AFST 764a), four courses of instruction in an African language, four courses in one of the above areas of concentration, five other approved courses offered in the Graduate School or professional schools, and two terms of directed reading and research (AFST 900a or b) during which students will complete the required thesis. A student who is able to demonstrate advanced proficiency in an African language may have the language requirement waived and substitute four other approved courses. The choice of courses must be approved by the director of graduate studies, Ann Biersteker, and students should consult with her as soon as possible in the first term.

The Master's Thesis

The master's thesis is based upon research on a topic approved by the director of graduate studies and advised by a faculty member with expertise or specialized competence in the chosen topic.

Program materials are available upon request from the Director of Graduate Studies, Council on African Studies, Yale University, PO Box 208206, New Haven CT 06520-8206; african.studies@yale.edu.

Courses

AFST 501a,Research Methods in African Studies. Ann Biersteker.
HTBA
This course considers disciplinary and interdisciplinary research methodologies in African studies. The focus of the course is on field methods and archival research in the social sciences and humanities. Topics include use of African studies and disciplinary sources (including bibliographical databases and African studies archives), research design, interviewing, survey methods, analysis of sources, and the development of databases and research collections.

AFST 511b, Globalization,Religious Nationalism,and Rethinking Human Rights. Kamari Clarke.
M 1.30–3.20
Anthropology has neither traditionally addressed issues related to state formation nor has it paid attention to the growing significance of the post-WWII proliferation of nongovernmental organizations, especially in the third world. However, given that increasing numbers of transnational studies have critiqued the absence of the complex analysis of interrelationships between the local and the global in anthropology, this course is an attempt to critically engage the turn in anthropology. In an overview of anthropological approaches to globalization, we explore the politics of religious nationalism and the role of state and nonstate actors in shaping and changing networks of transnational interaction, in order to provide a theoretical and practical approach to socially significant transformations. *Also AFAM657b, ANTH 511b.*

AFST 541bu, Comparative Perspectives on African Literatures. Ann Biersteker.
Th 1.30–3.20
Introduction to a wide range of topics in African literature through an examination of English translations of works composed both in African and in European languages. Readings include poetry, novels, plays, essays, nonliterary texts, and autobiographies. Consideration of the symbiotic relationship between printed text and oral performance, between composition and transmission.

AFST 598u, Introduction to an African Language. Sandra Sanneh and staff.
5 HTBA
Beginning instruction in an African language other than those regularly offered. Courses offered depend on availability of instructors. Methodology and materials vary with the language studied. Individualized or small-group instruction.

AFST 600u, Elementary Kiswahili. Kiarie Wa'Njogu.
MTWThF 9.30–10.20
Beginning course with intensive training and practice in speaking, listening, reading, and writing. Initial emphasis is on the spoken language and conversation. During the second term students read texts that provide an introduction to Kiswahili culture and literature.

AFST 601u, Intermediate Kiswahili. Kiarie Wa'Njogu.
MTWThF 10.30–11.20
Refinement of the student's speaking, listening, reading, and writing skills. Prepares the student for further work in literary, language, and cultural studies as well as for a functional use of Kiswahili. Study of structure and vocabulary is based on a variety of cultural documents including literary and nonliterary texts. After AFST 600.

AFST 603u, Advanced Kiswahili. Kiarie Wa'Njogu.
3 HTBA
An advanced course intended to improve the student's aural and reading comprehension as well as speaking and writing skills. Emphasis on acquiring a command of idiomatic usage and stylistic nuance. Reading assignments include materials on cultural, political, and social topics. After AFST 601.

AFST 604au or bu, Topics in Kiswahili Literature. Ann Biersteker.
3 HTBA
Advanced readings and discussion with emphasis on literary and historical texts. Reading assignments include materials on Kiswahili poetry, Kiswahili dialects, and the history of Kiswahili. After AFST 603.

AFST 610u, Elementary Yoruba. Ore Yusuf.
MTWThF 9.30–10.20
Intensive training and practice in speaking, listening, reading, and writing. Initial emphasis is on spoken language and conversation. During the second term students read and listen to texts that provide an introduction to Yoruba culture.

AFST 611u, Intermediate Yoruba. Ore Yusuf.
MTWThF 11.30–12.20
Refinement of the student's speaking, listening, reading, and writing skills. Prepares the student for further work in literary, language, and cultural studies as well as for a functional use of Yoruba. Study of structure and vocabulary is based on a variety of cultural documents including literary and nonliterary texts. After AFST 610.

AFST 612u, Advanced Yoruba. Ore Yusuf.
3 HTBA
An advanced course intended to improve the student's aural and reading comprehension as well as speaking and writing skills. Emphasis on acquiring a command of idiomatic usage and stylistic nuance. Reading assignments include materials on cultural, political, and social topics. After AFST 611.

AFST 614u, Elementary Zulu. Sandra Sanneh.
MW 11:30–12:20, TTh 11:30–12:45
A beginner's course in conversational IsiZulu. The fall term emphasizes the sounds of the language, including clicks and tonal variation, and the words and structures needed for initial social interaction. The spring term develops communicative skills through dialogues and role-plays, and reading skills with texts drawn from traditional and popular literature and songs. Documentaries, movies, and local television programs add a diversity of images of contemporary Zulu culture.

AFST 615u, Intermediate Zulu. Sandra Sanneh.
5 HTBA
Development of speaking, listening, reading, and writing skills with an emphasis on fluency. Readings, viewings, and role-play situations are drawn from folk and popular culture and from mass media. Grammar review as necessary. Prepares the student for research involving interviewing and discussion, and for study of oral and literary genres. After AFST 614.

AFST 616u, Advanced Zulu. Sandra Sanneh.
3 HTBA
Refinement of listening, speaking, and writing skills using excerpts from oral genres such as praise poetry of kings and of commoners, from short stories and novels, and from dramas made for television. Survey of language use in South Africa. After AFST 615.

AFST 620,Second Year in an African Language.
By arrangement with faculty.

AFST 621,Third Year in an African Language.
By arrangement with faculty.

AFST 623, Fourth Year in an African Language.
By arrangement with faculty.

AFST 634au, Anthropology of the Postcolonial State. Eric Worby.
Th 1.30–3.20
Ethnographic and interpretive approaches to the postcolonial state and the forms of public culture to which it gives rise. Topics include: the formation of state structures and citizen subjects; nationalism in relation to discourses of gender, race, marginality, and modernity; corruption and moral discourse in the public sphere; ritual and aesthetic dimensions of rule and resistance; tensions between popular, civic, and global culture. *Also ANTH 634a.*

AFST 647bu, Structure of Swahili. Ann Biersteker.
TTh 4–5.15
Study of Swahili grammar. Phonology, morphology, and syntax of Swahili examined in detail. Topics also include Swahili dialects, history of Swahili, and comparison with other Bantu languages. *Also LING 647bu.*

AFST 670b[u], Yoruba Communities in National and Transnational Perspectives. Kamari Clarke.
M 3.30–5.20
This is a survey on the literature on the history and development of Yoruba communities in West Africa and throughout its diaspora. Attention is paid to communities in Nigeria, Benin, Cuba, the United States, Brazil, and Trinidad. *Also AFAM 639b[u], ANTH 670b[u].*

AFST 702a[u], South African Democracy in Comparative Perspective. Courtney Jung.
T 3.30–5.20
This seminar is an intensive examination of South African politics, ranging over the rise and fall of Apartheid, the negotiated transition to democracy, and the period of democratic consolidation that has been under way since 1994. The South African political experience is located in two theoretical debates. The first concerns the dynamics of transition negotiations: why they begin and what makes them succeed or fail. Here the comparative points of reference are other successful transitions in Latin America and the post-communist world, as well as failed transition negotiations in the Middle East and the sputtering one in Northern Ireland. Our question is: What light, if, any, does South Africa's success to date shed on these and other cases? The second debate concerns the distributive politics in new democracies, with particular attention to the structure and social composition of inequality following transitions to democracy. Here the questions revolve around the failure of previously excluded groups to use their new access to the political system to achieve significant redistribution, land reform, or in many cases even minimal economic security. Again our concern is to understand the degree to which the South African experience mirrors, or departs from, patterns in Latin America and the post-communist world, and to account for the similarities and differences that we find. *Also PLSC 702a[u].*

AFST 717b[u], The Political Evolution of French-Speaking Africa. William Foltz.
T 1.30–3.20
The political history of French-speaking Africa from colonization to the present. French colonial theory and practice; African elites under the Third and Fourth Republics; decolonization; distinctive properties of francophone states; French postcolonial influence. Reading knowledge of French required. *Also PLSC 717b[u].*

AFST 759a, Issues in the Analysis of African Politics. William Foltz.
M 1.30–3.20
Subjects to be discussed include the influence of pre-colonial systems and colonial rule on contemporary politics; states and statelessness; the politics of economic performance; communal conflict; attempts at regional and sub-regional unity. *Also PLSC 759a.*

AFST 764b[u], Africa and the Disciplines. William Foltz.
W 1.30–3.20
An exploration of how the different academic disciplines reconceptualize the study of Africa and the ways in which the disciplines draw on each others' techniques and results in the process. *Also PLSC 784b[u].*

AFST 778b[u], From West Africa to the Black Americas. Robert Thompson.
TTh 11.30–12.45
Art, music, and dance in the history of key classical civilizations south of the Sahara — Mali, Asante, Dahomey, Yoruba, Ejagham, Kongon — and their impact on the rise of New World art and music. *Also AFAM 728b[u], HSAR 778b[u].*

AFST 781a,Problem and Theory in Afro-Atlantic Architecture I: Africa. Robert Thompson.
TH 3.30–5.20
The seminar addresses a new frontier—rebuilding the inner cities. This refers to Latino and mainland black cities within the cities of America. Accordingly, the course focuses on major roots of Latino and black traditional architecture—Ituri Forest and Namibian spatial solutions, Berber casbah architecture and its interactions with the Jews on Djerba isle and in Morocco, the concept of the Muslim *assatayah* creolized into the Iberia *azotea* and the spread of this terrace-roof style throughout Latin America. Topics include the architecture of Djenne, Berber art and architecture, Mauritanian sites, the monumental stone architecture of Zimbabwe, the sacred architecture of Ethiopia, and Muslim-influenced architecture from Rabat to Zanzibar. Then comes a case-by-case examination of some of the sites of African influence on the architecture of the Americas—the Puerto Rican *casita;* the southern verandah; the round-houses of New York, Virginia, North Carolina, Mexico, Panama, and Colombia; Ganvie, the Venice of West Africa, and its mirror image among the tidal stilt architectures of blacks of the Choco area in Pacific Colombia. The seminar ends with the shrine architecture of New World adherents of the classical religions of Dahomey. *Also AFAM 739a, HSAR 781a.*

AFST 781b,Problem and Theory in Afro-Atlantic Architecture II: The Black Americas. Robert Thompson.
TH 3.30–5.20
A continuation of AFST 781a. *Also AFAM 739b, HSAR 781b.*

AFST 820b[U], Cultural Approaches to Education in Africa. Kana Dower.
W 2.30–4.20
Examination of schooling in Africa, using case studies of evangelical education, African education during the colonial era, and contemporary schools. Principal focus is historical and cultural, viewing schooling as a window on social change. Reading materials include ethnography, historical documents, fiction, and autobiography.

AFST 839b, Environmental History of Africa. Robert Harms.
TH 1.30–3.20
An examination of the interaction between people and their environments in Africa, and the ways in which this interaction has affected or shaped the course of African history. *Also HIST 839b.*

AFST 900a or b,Master's Thesis. Ann Biersteker and faculty.
Directed reading and research on a topic approved by the director of graduate studies and advised by a faculty member (by arrangement) with expertise or specialized competence in the chosen field. Readings and research are done in preparation for the required master's thesis.

AFST 951a or b, Directed Reading and Research. Ann Biersteker and faculty.
By arrangement with faculty.

AMERICAN STUDIES

231 Hall of Graduate Studies, 432.1186
M.A., M.Phil., Ph.D.

Chair
Jean-Christophe Agnew [F] (231 HGS, 432.1186, jean-christophe.agnew@yale.edu)
John Mack Faragher [Sp] (231 HGS, 432.1186, john.faragher@yale.edu)

Director of Graduate Studies
Wai Chee Dimock (231 HGS, 432.1186, wai.chee.dimock@yale.edu)

Professors
Jean-Christophe Agnew, Richard Brodhead, Jon Butler, Hazel Carby, Edward Cooke, Jr., John Demos (*on leave* [Sp]), Michael Denning, Wai Chee Dimock, Kathryn Dudley, John Mack Faragher (*on leave* [F]), Glenda Gilmore (*on leave*), Dolores Hayden (*on leave* [Sp]), Matthew Jacobson, Vera Kutzinski, Charles Musser (*on leave* [Sp]), Alexander Nemerov, Michael Roemer (*Adjunct*), Stephen Skowronek, Robert Stepto (*on leave* [F]), Harry Stout, John Szwed, John Harley Warner, Laura Wexler

Associate Professors
Thomas Otten, Patricia Pessar (*Adjunct*), Stephen Pitti

Assistant Professors
Jennifer Baszile (*on leave*), Elizabeth Dillon, Jonathan Holloway, Amy Hungerford, Guillermo Irizarry, Mary Lui (*on leave*), Sanda Lwin (*on leave*), Diana Paulin, Alicia Schmidt Camacho (*on leave*), Steven Stoll, Vron Ware, Kariann Yokota

Lecturers
Wes Davis, David Musto

Fields of Study

Fields include American literature, history, the arts and material culture, philosophy, cultural theory, and the social sciences.

Special Admissions Requirement

A writing sample of reasonable length is required with the application.

Special Requirements for the Ph.D. Degree

During the first two years of study students are required to take twelve term courses; at least two of these each year must be in American Studies. The student's program will be decided in consultation with the adviser and the director of graduate studies. In each of the two years, the student should take at least one seminar devoted to research or requiring a substantial original paper, and must achieve two grades of Honors, with an average

overall of High Pass. Students will be required to show either proficiency in one language tested in two successive stages, or proficiency in two languages each tested once. After completing both parts of the language requirement, a student should schedule the oral qualifying examinations in four fields, in the fifth term of study. Preparation, submission, and approval of the dissertation prospectus are normally completed by the end of the sixth term with a final deadline at the end of the seventh term. Students are admitted to candidacy for the Ph.D. at the end of the third year, upon completion of all predissertation requirements, including the prospectus. Students in American Studies teach in the third and fourth years of study.

Combined Ph.D. Programs

AMERICAN STUDIES AND AFRICAN AMERICAN STUDIES

The American Studies Program also offers, in conjunction with the Department of African American Studies, a combined Ph.D. in American Studies and African American Studies. This combined degree is most appropriate for students who intend to concentrate in and write a dissertation on any aspect of African American history, literature, or culture in the United States and other parts of the Americas. For further details, see African American Studies.

AMERICAN STUDIES AND FILM STUDIES

The Department of American Studies also offers, in conjunction with the Program in Film Studies, a joint Ph.D. in American Studies and Film Studies. For further details, see Film Studies on page 177. Applicants to the joint program must indicate on their application that they are applying both to Film Studies and to American Studies. All documentation within the application should include this information.

Master's Degrees

M.Phil. See Graduate School requirements, pages 397–98.

M.A. (en route to the Ph.D.). The M.A. is granted upon the completion of six term courses (two grades must be Honors and the other four grades must average High Pass), and the successful completion of the first part of the language requirement. It can be petitioned for in the term following completion of the requirements.

Master's Degree Program. The basic requirements for this terminal degree are six term courses, including a special writing project, and the successful completion of the first stage of the language examination. The project involves the submission of substantial written work either in conjunction with one course or as a tutorial that substitutes for one course. Students must earn a grade of Honors in two of their courses and an average grade of High Pass in the others.

For further information, see the American Studies Web site: www.yale.edu/amstud/.

Courses

AMST 622a and 623b, Working Group on Globalization and Culture. Michael Denning.

M 1.30 and TBA

A continuing collective research project, a cultural studies "laboratory," inaugurated in the fall of 2003, for which first- and second-year students receive course credit. Through regular meetings throughout the year, we develop a program of reading, collective and individual research, dialogues with invited speakers, and a Web journal in which the work of the group is published. The general theme for the working group is culture and globalization, with three principal aspects: (a) the globalization of cultural industries and goods, and its consequences for patterns of everyday life as well as for forms of fiction, film, broadcasting, and music; (b) the trajectories of social movements and their relation to patterns of migration, the rise of global cities, the transformation of labor processes, and forms of ethnic, class, and gender conflict; (c) the emergence of and debates within transnational social and cultural theory. The specific focus, projects, and directions of the working group are determined by the interests, expertises, and ambitions of the members of the group, and change as its members change. Initial organizing meetings: Monday at 1.30, others to be arranged.

AMST 640b, Problems in the Study of African American Literature. Robert Stepto.

M 1.30–3.20

This seminar examines both nineteenth- and twentieth-century African American literary texts, and while students gain a comprehensive understanding of the breadth of the field, we focus on several key issues or "problems" central to the study of African American literary history. We read variously from slave narratives, autobiographies, poetry, novels, nonfiction essays, and anthologies, joining close readings of literary texts with the interdisciplinary contexts of history, cultural criticism and theory, and other art forms. *Also AFAM 595b, ENGL 940b.*

AMST 643a, Theorizing the Racial Formation of the United States in the Late Twentieth Century. Paul Gilroy.

T 9.30–11.20

This interdisciplinary seminar includes readings from the fields of anthropology, critical legal studies, cultural studies, literary history, history, politics, and sociology. *Also AFAM 505a, SOCY 644a.*

AMST 648b, The Global Imaginary. Hazel Carby.

T 1.30–3.20

This interdisciplinary seminar discusses what is meant by globalization and the new world order. If globalization is a process currently dominated by the United States as empire, how do critical and dissenting intellectuals imagine alternative structures of citizenship and belonging? Final paper. *Also AFAM 749b.*

AMST 673b, Theorizing "Black" and "Asian" Intersectionalities in the United States. Diana Paulin.

W 1.30–3.20

This graduate seminar approaches racial formation and racial representation through the lens of Asian American and African American literary and cultural production. We read theoretical and primary texts from various fields, including performance studies, literary studies, psychoanalytic theory, cultural studies, gender studies, and postcolonial studies, in order to construct a critical apparatus for understanding race relationally rather than as strictly defined categories of identity that have, traditionally, been studied in segregated disciplines (such as black studies, whiteness studies, Asian and Asian American studies). We address the following topics: performance of identity, racial/sexual minorities and the politics of inclusion/exclusion, alliances across racial and national boundaries, diasporic identities, history and memory.

We consider how a comparative approach might produce new methodologies for thinking about Asian American and African American representation comparatively. In doing so, we interrogate conventional black/white paradigms of race by looking at intersectionalities that unsettle binaries. Along these lines, we also account for the ways in which race intersects with other categories of identity, such as sexuality, gender, nation, and class. We study works by authors/artists such as Judith Butler, David Eng, Claudia Tate, Vijah Prashad, Jose Muñoz, Franz Fanon, Homi Bhaba, Kobena Mercer, Mira Nair, and Anna Deveare Smith. *Also AFAM 722b.*

AMST 674a, Black Travel and Transnationality. Naomi Pabst.
Th 1.30–3.20
This course examines literary and critical writings on African American and black diasporic travel and transnational movement. Emphasizing issues of representation and narrative strategy, we explore the history of black transnational border-crossing and its influence on the cultural, political, and ideological parameters of black identity. The course establishes the forms, varieties, conflicts, and dilemmas of black transnational movement, travel, and tourism transhistorically. *Also AFAM 726a.*

AMST 700a, Introduction to the Historiography of the United States. Jon Butler.
TTh 10.30–12.20
Readings and discussion of scholarly work on U.S. history from the settlement era to the present. Members of the department faculty visit the class on a rotating basis. *Also HIST 700a.*

AMST 701a, Race and Races in American Studies. Matthew Jacobson.
W 10.30–12.20
This reading-intensive seminar examines influential scholarship across the discipline on "the race concept" and racialized relations in American culture and society. Rather than attempting vainly to cover the field exhaustively, the focus here is upon selected themes, approaches, methods, debates, and problems in a variety of scholarly genres. Major topics include the cultural construction of race; race as both an instrument of oppression and an idiom of resistance in American politics; the centrality of race in literary, anthropological, and legal discourse; the racialization of U.S. foreign policy; "race mixing" and "passing," vicissitudes of "whiteness" in American politics, the centrality of race in American political culture; and "race" in the realm of popularly cultural representation. Writings under investigation include classic formulations by scholars like Winthrop Jordan and Ronald Takaki, as well as more recent efforts by Cheryl Harris, Kevin Gaines, Tomas Almaguer, and Louise Newman. Seminar papers give students an opportunity to explore in depth the themes, periods, and methods which most interest them. *Also AFAM 687a, HIST 751a.*

AMST 713b, Race Politics in the Twentieth-Century United States. Jonathan Holloway, Stephen Pitti.
Th 10.30–12.20
This course examines a range of civil rights movements as they have been developed and articulated since 1919. Readings in the course pay particular attention to the contested nature of such movements, their multifaceted nature, and the deep social fissures they reveal along lines of race, class, gender, and sexuality. Primary and secondary sources cover a range of methodological perspectives. Readings and discussion. *Also AFAM 714b, HIST 754b.*

AMST 715a, Readings in Nineteenth-Century American History, 1820–1877. David Blight.
W 1.30–3.20
This course explores recent trends and historiography on several problems through the middle of the nineteenth century: sectionalism; expansion; slavery and the Old South; northern society and reform movements; Civil War causation; the meaning of the Confederacy;

why the North won the Civil War; the political, constitutional, and social meanings of emancipation and Reconstruction; violence in Reconstruction society; the relationships between social/cultural and military/political history; problems in historical memory; the tension between narrative and analytical history writing; and the ways in which race and gender have reshaped research and interpretive agendas. *Also HIST 715a.*

AMST 716a,Film and the Transformation of Theatrical Culture. Charles Musser.
T 3.30–5.20
Explores the transformation in American theater that resulted from the introduction of motion pictures. Cinema is examined as a theatrical form of entertainment that restructured both the theatrical world and spectatorship between 1895 and 1930. The unfolding interactions between stage and screen are considered through a variety of films and texts (plays, critical and theoretical writings). Adaptation is employed as a crucial lens for exploring this historical dynamic. Works by Belasco, Wilde, O'Neill, Porter, Griffith, Lubitsch, DeMille, and Micheaux. *Also FILM 728a[u].*

AMST 717a,Readings in Twentieth-Century American Political and Social History. Jennifer Klein.
Th 1.30–3.20
Readings in American social and political history from the late nineteenth century to the present, with an emphasis on political economy. Major topics include changing relationship between the state, economy, and communities over time; the role of social movements of the Left and Right in political, social, and economic transformations; definitions and boundaries of citizenship; development of social policy, labor policy and politics, and the "New Deal Order"; America's rural and urban economies in regional, national, and international context. *Also HIST 735a.*

AMST 722b,Research Seminar in United States History. David Blight.
W 1.30–3.20
Some class sessions focus on matters of craft: research techniques, styles of writing narrative and analysis; judging scholarly work; and philosophical dimensions of doing history in the early twenty-first century. Primary focus of the course is for each student to complete his/her own major research paper. Students in any field of American history are welcome. *Also HIST 722b.*

AMST 729b,American Furniture 1600 to the Present. Edward Cooke.
W 3.30–5.20
In-depth analysis of American furniture made over the past four centuries. Methodologies for the analysis of furniture are reviewed and developed through reading and close examination of objects in the Art Gallery collection. Such topics as materials, techniques, style, use, and market are stressed. *Also HSAR 729b.*

AMST 732b,Material Culture in Historical Research. Kariann Yokota.
W 3.30–5.20
The material objects people produce and consume provide rich texts for historical analysis. This seminar explores how the cultural meanings of objects have been analyzed and understood from various perspectives. Readings are interdisciplinary, including works by historians, anthropologists, cultural theorists, sociologists, postcolonial scholars, writers, museum curators, and archaeologists. Topics of discussion include the role of material culture in the formation of national, ethnic, gender, and class identities. *Also HIST 783b.*

AMST 733b,Art,Sex,and the Sixties. Jonathan D. Katz.
M 3.30–5.20
Using the work of Andy Warhol as our ur-text, this graduate seminar maps the development of increasingly cool and ironic modes of art making against the heated and ideologically loaded social and political developments of the 1960s. Its central query concerns why a set of

aesthetic practices that seemingly celebrated normative values (i.e., Pop art) were nonetheless elevated to dominance ahead of a range of more confrontational and oppositional strategies in line with the tenor of the times. Sexuality, its liberation and its suppression figure prominently in this inquiry into the paradoxical engendering of opposition through the citation of normative forms. *Also HSAR 703b, WGST 730b.*

AMST 738b,Reading and Research in Western and Frontier History. John Mack Faragher.
T 10.30–12.20
An introduction to recent work on the history of North American frontiers and the region of the American West. *Also HIST 738b.*

AMST 748a,Field Methods and Research Design. Kathryn Dudley.
W 1.30–3.20
The course offers critical evaluation of the nature of ethnographic research. Research design includes the rethinking of sire, voice, and ethnographic authority. *Also ANTH 501a.*

[**AMST 767b,Magic Realism in the Americas.**]

AMST 775a,Culture in U.S. International and Transnational Histories. Seth Fein.
M 11.30–1.20
Reading seminar that examines interdisciplinary approaches to the study of "culture" in relations between, within, and among the United States and other nations (mainly since 1900). Discussions and papers focus on comparing methodologies, using theory, doing research, writing history. Topics include globalization, Americanization, transnationalism, and hybridity; gender, national identity, international relations, and state formation; imperialism, postcolonialism, hegemony, and resistance; mass culture, political economy, foreign policy, and postmodernity. *Also HIST 757a.*

AMST 780b,American Legal History, 1880–1980. Robert Gordon.
MW 2.10–3.25
Selected topics in the modern history of American law, legal thought, legal institutions, and the legal profession. Examination, with an option (open to a limited number of students) to write a research paper based on primary sources. *Also AFAM 760b, HIST 760b, Law 21063.*

AMST 790a,Narrative,and Other, Histories. John Demos.
W 3.30–5.20
An exploration, through readings and discussion, of the recent "literary turn" in historical scholarship. Readings include history, fiction, and some theory. In addition, a month-long "practicum" focuses on writings by course participants. *Also HIST 790a.*

AMST 796b,Interdisciplinary Approaches to the History of Capitalism and Culture. Jean-Christophe Agnew.
W 10.30–12.20
A reading-intensive seminar that explores the historical intersections between capitalism and culture in the United States and elsewhere. Subjects range from the cultural construction of credit and risk, to cultural capital and class formation, gift and commodity exchange, law and the corporation, gender and the "invisible economy," virtualism and the "experience economy." Readings include both canonical treatments of capitalism and culture and more recent contributions by scholars associated with feminist criticism, the New Economic Criticism, and economic anthropology and sociology. *Also HIST 796b.*

AMST 864b,American Romanticism,1799–1826. Alexander Nemerov.
Th 1.30–3.20
This course focuses on American visual and literary production in the Early Republic. Artists, writers, and other figures to be discussed include the Peale family, John Vanderlyn, Charles Brockden Brown, Benjamin Rush, William Rush, and Benjamin West. Attention throughout

the course is on close analysis of paintings, sculpture, and literature. A term paper and a major in-class presentation are required. *Also ENGL 864b, HSAR 735b.*

AMST 870b[u], Visuality and Violence. Laura Wexler.
W 7–8.50
(Formerly Photography and Images of the Social Body.) Examination of different sets of photographic images — documentary, medical, and digital images; family snapshots; stereotypes and anti-stereotypes of race and gender; portraiture; advertising; industrial images; and art — in light of major writings on photographic representation. Study of how different ways of making and displaying images of the body invest it with culturally specific and historically informative meanings. *Also WGST 750b[u].*

AMST 877a,Readings in the History of American Medicine. John Harley Warner.
M 1.30–3.20
An examination of the variety of approaches to the social and cultural history of medicine and public health, taking as a focus nineteenth- and twentieth-century America. Readings are drawn from recent literature, sampling writings on health care, illness, experiences, and medical cultures in the United States. Topics include the role of gender, class, ethnicity, race, region, and religion, in the experience of sickness and health care: the multiple meanings of science in medicine, the intersection of lay and professional understandings of the body, and the role of the marketplace in shaping professional identities and patient expectations. *Also HIST 932a, HSHM 719a.*

AMST 897b, Postmodern Fiction, Postmodern Theory. Amy Hungerford.
F 10–11.50
Study of novels and theoretical works of the second half of the twentieth century, focusing on the conjunction of belief and meaninglessness in literary and critical practice. Novelists (about three-quarters of the syllabus) include Flannery O'Connor, William Burroughs, Thomas Pynchon, Philip Roth, Toni Morrison, Don DeLillo, Cormac McCarthy, John Edgar Wideman, and Myla Goldberg. Theorists (one-quarter of the syllabus) include W. K. Wimsatt, Walter Benn Michaels and Steven Knapp, Richard Rorty, David Tracy, and others. *Also ENGL 897b.*

[**AMST 914b,Built Environments and the Politics of Place.**]

[**AMST 922a,Gender, Territory, and Space.**]

AMST 923a,Cities,Suburbs, and the Culture of Sprawl. Dolores Hayden.
T 1.30–3.20
In 2000, more Americans lived in suburbs than rural areas and central cities combined. The seminar explores the changing meanings of "city" and "suburb" in the American metropolitan landscape and considers definitions of "sprawl." The process of building and marketing suburbia has been influenced by political coalitions promoting urban growth and by federal subsidies for real estate development. Examining architecture and land use, we survey seven suburban configurations: the "borderlands" of the 1820s, the picturesque enclaves of the 1840s, the dense streetcar suburbs of the late nineteenth century, the mail-order house boom of the 1920s, the mass-produced bedroom communities of the 1950s, the mall-centered "edge cities" along highways of the 1970s, and the rural fringes of the 1980s. A research paper of approximately twenty pages is required. Enrollment is limited to twelve. *Also ARCH 925a.*

AMST 925a,American Literary Globalism. Wai Chee Dimock.
W 10.30–12.20
What is the relation between American literature and world culture? How important are cross-time translations, and what does it mean for Emerson, Thoreau, Margaret Fuller, Ezra Pound, Robert Lowell, and W. S. Merwin to be practitioners in this genre? How important

are global roots to authors such as Maxine Hong Kingston, Toni Morrison, and Leslie Silko? This course explores "globalism" as the broadest possible frame for American literature, bringing together authors across centuries, across racial divisions, and across the customary division between poetry and prose. *Also CPLT 529a, ENGL 925a.*

AMST 926a,Promised Lands: Slavery, Literature,and Modernity in Russia and the United States. John MacKay.

T 1.30–3.20

Close, comparative, contextualized examination of literary and other forms of cultural production associated with U.S. slavery and Russian serfdom. Special attention is paid to the relation between bondage and national, cultural, and personal identity; the role of bondage in definitions of "aesthetic experience" in the pre- and post-emancipation periods; the relation between literacy and the literary; literature of protest in the two countries; and connections between geographical and subjective space within cultures of enslavement. We examine works by Pushkin, Aksakov, Gogol, Simms, Cooper, Crèvecoeur, Radishchev, Karamzin, Goncharov, Tolstoy, Kennedy, and the "plantation novelists," Stowe, Melville, Turgenev, slave and serf autobiographers, freedman's textbooks, Fet, Lanier, Page, Chesnutt, and Bunin; historical treatments by Kolchin, Genovese, and others; theoretical works by Said, Jameson, Saidiya Hartman, Bakhtin, and others. Requirements: in-class presentations; research paper. No knowledge of Russian required. *Also CPLT 571a, RUSS 675a.*

ANTHROPOLOGY

51 Hillhouse, Rm 2A, 432.3665
M.A., M.Phil., Ph.D.

Chair
Andrew Hill

Director of Graduate Studies
Helen Siu [F] (Rm 4, 158 Whitney Avenue, 432.3680)
Kathryn Dudley (*Acting* [Sp]) (Rm 2, 158 Whitney Avenue, 432.7664)

Professors
Arjun Appadurai, Richard Burger, Michael Dove (*Forestry & Environmental Studies*), Kathryn Dudley, J. Joseph Errington, Andrew Hill, Frank Hole, William Kelly, Enrique Mayer, Harold Scheffler, James Scott (*Political Science*), Helen Siu, John Szwed, David Watts, Harvey Weiss (*Near Eastern Languages & Civilizations*)

Associate Professors
Nora Groce (*Epidemiology & Public Health*), Patricia Pessar (*Adjunct, American Studies*), Linda-Anne Rebhun, Eric Worby

Assistant Professors
J. Bernard Bate, Richard Bribiescas, Marcello Canuto, Kamari Maxine Clarke, David Graeber, Eric Sargis, Thomas Tartaron

Lecturers
Carol Carpenter (*Forestry & Environmental Studies*), Ilana Gershon, Christina Katsougiannopoulou Ewald (*Classics; History of Art*), Vyjayanthi Rao, Katherine Rupp, Iman Saca

Fields of Study

The department has four subfields. Archaeology focuses on ritual complexes and writing, ceramic analysis, warfare, ancient civilizations, origins of agriculture, and museum studies. Sociocultural anthropology provides a range of courses: classics in ethnography and social theory, religion, myth and ritual, kinship and descent, historical anthropology, culture and political economy, agrarian studies, ecology, environment and social change, medical anthropology, emotions, public health, sexual meanings and gender, postcolonial development, ethnicity, identity politics and diaspora, urban anthropology, global mass culture, and alternate modernity. Linguistic anthropology includes language, nationalism, and ideology, structuralism and semiotics, feminist discourse. Physical anthropology focuses on paleoanthropology, evolutionary theory, human functional anatomy, race and human biological diversity, primate ecology. There is strong geographical coverage in Africa, the Caribbean, East Asia (China and Japan), Latin America and South America, Southeast Asia (Indonesia), South Asia and the Indian Ocean, the Near East, Europe, and the United States.

Special Requirements for the Ph.D. Degree

Although there are a few required courses or seminars for each subfield, more than three-fourths of a student's program consists of electives, including course work in other departments. Admission to candidacy requires: (1) completion of two years of course work (sixteen term courses); (2) independent study and research; (3) satisfactory performance on qualifying examinations; and (4) a dissertation research proposal submitted and approved before the end of the third year. Qualifying examinations, normally taken at the end of the second year, consist of eight hours written (four hours on one of the subfields, four hours on the student's special interest), and two hours oral. Dissertations are normally based on field or laboratory research.

Combined Ph.D. Programs

The Anthropology department also offers a combined Ph.D. in Anthropology and Forestry & Environmental Studies in conjunction with the School of Forestry & Environmental Studies, and a combined Ph.D. in Anthropology and African American Studies in conjunction with the Department of African American Studies. These combined programs are ideal for students who intend to concentrate in, and to write dissertations on, thematic and theoretical issues centrally concerned with anthropology and one of these other areas of study. Students in the combined degree programs will be subject to the combined supervision of faculty members in the Anthropology department and in the respective department or school.

Admission into the combined degree program in Anthropology and African American Studies is based on mutual agreement between these two departments. Individual students will develop courses of study in consultation with their academic advisers and with the directors of graduate study for both departments. Students in the program must take core courses in Anthropology and in African American Studies, plus related courses in both departments approved by their advisory committees. In addition, they must successfully complete the African American Studies third-year Research Workshop. Oral and written qualifying examinations must include two topics in the field of African American Studies and two topics in Anthropology. The examination committee must include at least one faculty member from each department. The dissertation prospectus must be submitted to the directors of graduate study of both departments and approved by the faculty of both. The thesis readers committee must also include at least one faculty member from each department, and the faculties of both departments must approve its composition.

Master's Degrees

M.Phil. See Graduate School requirements, pages 397–98.

M.A. This degree is intended for students not continuing in the Ph.D. program. Requirement is satisfactory completion of at least one year in that program. Special attention is given to the quality of papers submitted in course work. Applications for a terminal master's degree are not accepted.

Program materials are available upon request to the Director of Graduate Studies, Department of Anthropology, Yale University, PO Box 208277, New Haven CT 06520-8277; 203.432.3665; e-mail, anthropology@yale.edu; Web site, http://www.yale.edu/anthropology/.

Courses

ANTH 500a,Seminar in Social and Cultural Anthropology. Harold Scheffler.
W 10–11.50
The major theoretical orientations in social and cultural anthropology (especially in the United States and Europe), their historical development and importance, their relation to one another and to other disciplines.

ANTH 500b,Seminar in Sociocultural Anthropology II. Arjun Appadurai, William Kelly.
T 10–11.50
This seminar continues the themes of ANTH 500a, with special emphasis on the characteristics of anthropology as a discipline and as a profession and on the historical trajectory of sociocultural anthropology from the late nineteenth century to the 1970s. The seminar is reserved for first-year doctoral students in Anthropology, and students are presumed to have taken ANTH 500a.

ANTH 501a,Field Methods and Research Design. Kathryn Dudley.
W 1.30–3.20
The course offers critical evaluation of the nature of ethnographic research. Research design includes the rethinking of site, voice, and ethnographic authority. *Also AMST 748a.*

ANTH 502a[u], Anthropological Perspectives on Emotion. Linda-Anne Rebhun.
W 1.30–3.20
This seminar focuses on cross-cultural meanings of emotional experiences. Topics include the relations among emotion, cognition, and other psychological experiences in various cultural settings, vocabularies of emotion in different languages, gender issues in emotion, and the interconnections among emotion, sickness, religion, and healing. *Also WGST 710a.*

ANTH 505b[u], Kinship,Descent,and Alliance. Harold Scheffler.
T 1.30–3.20
The role of kinship in the organization of social life, with emphasis on tribal societies. Topics include regulation of sexual behavior and marriage, varieties of group organization, modes of kin classification and their social significance, and so on.

ANTH 511b,Globalization,Religious Nationalism,and Rethinking Human Rights. Kamari Clarke.
M 1.30–3.20
Anthropology has neither traditionally addressed issues related to state formation nor has it paid attention to the growing significance of the post-WWII proliferation of nongovernmental organizations, especially in the third world. However, given that increasing numbers of transnational studies have critiqued the absence of the complex analysis of interrelationships between the local and the global in anthropology, this course is an attempt to critically engage the turn in anthropology. In an overview of anthropological approaches to globalization, we explore the politics of religious nationalism and the role of state and nonstate actors in shaping and changing networks of transnational interaction, in order to provide a theoretical and practical approach to socially significant transformations. *Also AFAM 657b, AFST 511b.*

ANTH 513b[u], Language,Culture,and Ideology. J. Joseph Errington.
Th 1.30–3.20
Influential anthropological theories of culture are reviewed with critical reference to theories of language that inspired or informed them. Topics include American and European structuralism, cognitivist and interpretivist approaches to cultural description, work of Bakhtin, Bourdieu, and various "critical theorists."

ANTH 520b,Anthropology of Knowledge. Ilana Gershon.
M 10–12
In this course we explore and compare the local epistemologies, focusing on the principles behind knowledge circulation in various cultures. We look at a range of ethnographic examples — from craft apprentices and seasoned skilled manual workers to schoolchildren and laboratory scientists. We pay particular attention to the embodiment, inculcation, and transmission of practical knowledge, and to the roles institutions and social organization play in shaping knowledge.

ANTH 532b,Direct Action and Radical Social Theory. David Graeber.
T 1.30–3.20
This course is meant to explore some of the recent directions of radical social theory within, and around, the emergence of the globalization movement and the politics of direct action. The course begins with a famous example of direct action, the shut-down of Seattle meetings of the WTO in November 1999, and examines some of the history of the ideas (anarchism, direct action, direct democracy, primitivism) which inspired it. It then proceeds to trace the influences of Situationism and related branches of revolutionary theory on the present, and ends with a series of particular case studies from the current "global uprising" which provide revealing conjunctures of new theory and radical practice.

ANTH 533b[u], Bilingualism in Social Context. J. Joseph Errington.
T 1.30–3.20
The linguistic phenomenon of bilingualism is presented through broad issues in social description inseparably linked to it: growth and change in bilingual communities; bilingual usage, social identity, and allegiance; interactional significances of bilingual speech repertoire use.

ANTH 541a,Agrarian Societies: Culture,Society, History, and Development. Robert Harms, James Scott,Michael Dove, Paul Freedman.
M 1.30–5.20
An interdisciplinary examination of agrarian societies, contemporary and historical, Western and non-Western. Major analytical perspectives from anthropology, economics, history, political science, and environmental studies are used to develop a meaning-centered and historically grounded account of the transformations of rural society. Team taught. *Also F&ES 753a, HIST 965a, PLSC 779a.*

ANTH 548b[u], Gender and Media in India. Bernard Bate.
T 1.30–3.20
Examination of narratives of gender in India. Folkloristic and anthropological approaches to gendered performance in story, song, and theater. Recent feminist examinations of television, film, advertising, and literature. Topics include classical epic (*Ramayana, Shilapathigaram*), stories of gods and goddesses in film and television, and the gendering of politics.

ANTH 569b[u], Economic Anthropology. Enrique Mayer.
Th 1.30–3.20
Introduction to understanding economic systems in other cultures and societies. How work and leisure is organized, who gets what and how, and how economic concerns tie into other aspects of social life. Major debates and controversies examined, and examples from different parts of the world are presented. No prior training in economics or anthropology necessary.

ANTH 580a[u], Language and Political Practice. Bernard Bate.
T 1.30–3.20
An exploration of the relationship between language and politics in a number of societies. The course examines how language use, as both mode of social practice and object of ideology and political organization, is constitutive of political relations and social organization generally. Topics include the relationship of ideologies and aesthetics of language to broader political economies; speech genre and the performance of self and social organization; and oratory and its relationship to the constitution of the social field as an integral element of political praxis.

ANTH 581a,Society and Environment: Introduction to Theory and Method. Michael Dove.
Th 2.30–5.20
Critical issues in the analysis of relations between society and environment. Topics include: (1) the identification of environmental "problems," focusing on the rationale of development intervention and failure, and the study of environmental discourse; (2) conceptual boundaries in resource-use systems and in conceptions of nature and culture; (3) conceptual boundaries in environmental relations between center and periphery and between the local and the global; (4) the sociology of science of environmental relations, encompassing views of indigenous knowledge, objective distance, scientific "forgetfulness," and relations between the natural and social sciences; and (5) the implications of the foregoing for current critiques of science. *Also F&ES 747a.*

ANTH 590a,Ethnic Violence in South Asia. Arjun Appadurai.
W 10–12
This course focuses on large-scale ethnic violence in South Asia, especially in the last fifteen years. Major emphasis is placed on Hindu-Muslim conflicts in India, but some comparative attention is also paid to violence against various ethnic minorities in Sri Lanka and Pakistan. The purpose of the course is to explore the relationship between large-scale identities, new religious movements, and changes in regional politics and economy linked to globalization. Limited to fifteen students. *Also PLSC 728a.*

ANTH 592a,Anthropology and Classical Social Theory. David Graeber.
W 1.30–3.20
The course is meant not only to introduce anthropology students to the founding works of Western social theory — the big names like Marx, Weber, and Durkheim — but also to place these authors in the context of the Western intellectual and cultural tradition from which they emerged and to discuss their ongoing relevance to anthropological thought. A central goal of the seminar is to identify ways of disarticulating the production of gender by examining how these roles are both naturalized and disrupted in local and global spheres.

ANTH 597b,Sustainable Development and Conservation: Introduction to Social Aspects. Carol Carpenter.
This course provides a fundamental understanding of the social aspects involved in implementing sustainable development and conservation projects. Social science has two things to contribute to the practice of development and conservation. First, it provides ways of thinking about, researching, and working with social groupings — including rural households and communities, but also development and conservation institutions, states, and NGOs. Second, social science tackles the analysis of the knowledge systems that implicitly shape development and conservation policy and impinge on practice. The goal of the course is to stimulate students to apply informed and critical thinking to whatever roles they play in sustainable development and conservation, in order to move toward more environmentally and socially sustainable projects and policies. A prerequisite for F&ES 752b and F&ES 759b. Three hours lecture/seminar. *Also F&ES 757b.*

ANTH 603a[u], Women's Lives in the Eastern Mediterranean. Christina Katsougiannopoulou Ewald.
TH 3.30–5.20
The course focuses on women's roles in Byzantine and modern Greek society (from the fourth century A.D. to the present), and it explores the lives of women in the larger Mediterranean and Balkan context.

ANTH 604b,American Communities. Kathryn Dudley.
W 1.30–3.20
Consideration of the concept of community and an examination of various kinds of communities — ranging from those defined by social proximity to those defined by a common experience or ideology — that are part of the American experience, in order to understand the value Americans place on community itself and the ways in which the pull of individualism exacts a toll on that commitment.

ANTH 607b,Gender and Sexuality in Latin America. Linda-Anne Rebhun.
W 1.30–3.20
Issues such as machismo, marianismo, gender identity, and sexual behavior have been studied in Latin America and among Latinos. This course examines the literature on gender and sexuality, considering cultural, economic, and religious aspects of gender, sexuality, and gender identity in Latin America.

ANTH 610b,Society and Environment: Advanced Readings in Social Theory. Michael Dove,Carol Carpenter.
This is an advanced seminar on the relationship between society and environment, examining key theoretical developments and current issues in social, political, and historical ecology and ecological anthropology. The course explores the wider conceptual and institutional contexts of resource use and environmental relations. It focuses on discourses and debates about nature and culture, and examines the paradigm shift from modernity to postmodernity in theorizing about the environment. The relationship between society and the environment is examined through both contemporary theory and ethnographic examples. The course is an opportunity for students to plumb critical issues, place their work in a wider theoretical context, and develop their own research and writing. Prerequisite: F&ES 747a, F&ES 757b, or F&ES 756b. Team-taught. Limited enrollment. Three hours lecture/seminar. Taught alternate years. *Also F&ES 752b.*

ANTH 620a[u], Anthropology of Science. Ilana Gershon.
M 3.30–5.20
This course looks at science from an anthropological perspective, viewing scientific practices as fortuitous sites for examining Euro-American epistemological assumptions. Students learn how to analyze the ways in which knowledge circulates to forge certain types of truth in Euro-American contexts. Particular emphasis is placed on how boundaries are fashioned and overcome in a variety of senses; students examine how science is a discourse for constructing selves, genders, Others, and disciplinary boundaries, and how it articulates with other institutions, both national and international.

ANTH 632a[u], Politics of Language. J. Joseph Errington.
M 1.30–3.20
This course centers on aspects of language difference and inequality as often neglected but crucial shapers of the political dynamics and social change in plural societies. The first part of the course involves broad comparative and theoretical approaches to the politics of sociolinguistic difference. The second part is devoted to case studies which foreground specific issues: "problems" of substandard languages, bilingual identities, globalization and language shift, language death, and others.

ANTH 634a,Anthropology of the Postcolonial State. Eric Worby.
TH 1.30–3.20
Ethnographic and interpretive approaches to the postcolonial state and the forms of public culture to which it gives rise. Topics include the formation of state structures and citizen subjects; nationalism in relation to discourses of gender, race, marginality, modernity; corruption, and moral discourse on the public sphere; ritual and aesthetic dimensions of rule and resistance; tensions between popular, civic, and global culture. *Also AFST 634a.*

ANTH 670b[u], Yoruba Communities in National and Transnational Perspectives. Kamari Clarke.
M 3.30–5.20
This is a survey of the literature on the history and development of Yoruba communities in West Africa and throughout its diaspora. Attention is paid to communities in Nigeria, Benin, Cuba, the United States, Brazil, and Trinidad. *Also AFAM 639b[u], AFST 670b[u].*

ANTH 701a[u], Foundations of Modern Archaeology. Frank Hole.
W 1.30–3.20
Discusses how method, theory, and social policy have influenced the development of archaeology as a set of methods, an academic discipline, and a political tool. This course assumes a background in the basics of archaeology equivalent to one of the introductory courses. *Also ARCG 701a[u].*

ANTH 705Lb[u], Archaeology Laboratory II. Marcello Canuto.
W 1–4
Practical experience in preparation, analysis, and interpretation of artifacts and nonartificial archaeological data. Students undertake term projects. *Also ARCG 705Lb[u].*

ANTH 710a[u], Maya Art and Archaeology of Copan and Quirigua. Mary Miller, Marcello Canuto.
M 1.30–3.20
This seminar addresses the art, archaeology, and history of the southeastern Maya region, particularly the cultural production and developments at the Classic Maya centers of Copan, Honduras, and Quirigua, Guatemala. Among the particular topics for discussion and research are areas in which the study of art, archaeology, and anthropology converge to develop interdisciplinary interpretations of this region's importance and role in Classic Maya civilization. Open to advanced undergraduates with appropriate course preparation. *Also ARCG 710a[u], HSAR 747a.*

ANTH 716a[u], Neanderthals and Wise Men. Iman Saca.
TTH 11.30–12.45
Examines popular and scientific views concerning the archaic hominids known as neanderthals and their role in the cultural and biological evolution of modern Homo sapiens. *Also ARCG 716a[u].*

ANTH 721a[u], Archaeological Approaches to Architecture. Richard Burger.
T 9.30–11.20
The archaeological study of architectural remains is considered from a historic and theoretical perspective. Particular attention is given to the way in which contrasting theoretical orientations have shaped excavation and analytical strategies. The geographical focus of this seminar is comparative and includes both Old World and New World cases. *Also ARCG 721a[u].*

ANTH 722b[u], The Archaeology of Ethnicity. Marcello Canuto.
T 1.30–3.20
In this seminar the difficult questions involving the recognition, delineation, definition, and interpretation of "ethnicity" in the archaeological record are discussed. This course begins with a theoretical and methodological discussion of this concept and its utility to archaeolog-

ical investigation. In the second half of the course, a cross-cultural approach is used to apply the theoretical and methodological issues in relation to distinct case studies. Open to advanced undergraduates with appropriate course preparation. *Also ARCG 722b[u]*.

ANTH 731a[u], Near Eastern Prehistory. Iman Saca.
MW 11.30–12.45
A review of the archaeology of the Near East from the time of early hominids to the establishment of agricultural villages and towns. *Also ARCG 731a[u]*.

ANTH 732a[u] and 733La[u], Archaeological Field Techniques and Archaeology Lab I. Marcello Canuto.
MW 9–10.15, Lab SA 9–5
An introduction to the practice and techniques of modern archaeology, including methods of excavation, recording, mapping, dating, and ecological analysis. The lab offers instruction in the field at an archaeological site in Connecticut in stratigraphy, mapping, artifact recovery, and excavation strategy. The courses must be taken concurrently and are counted together as 1 credit. *Also ARCG 732a[u] and ARCG 733La[u]*.

ANTH 734b[u], Archaeology and the Modern World. Iman Saca.
W 9.30–11.20
Throughout the centuries, the science of archaeology has been used as a means to justify political, cultural, and religious claims through declaring ownership of the past. Through the use of case studies, this seminar tracks some of the perceptions, uses, and abuses of archaeology and our cultural past, and how this constructed past is used to strengthen religious, national, and ethnic loyalties. We examine how countries use their archeological/cultural heritage to present themselves to their population and to the outside world. We also consider the social and political construction of cultural heritage values, and the role that international organizations play in the development, protection, and promotion of the cultural heritage of developing countries. *Also ARCG 734b[u]*.

ANTH 736b[u], Environmental History of the Near East. Harvey Weiss.
TH 9.30–11.20
Natural and anthropogenic climate and environmental changes of the Holocene studied in the lake, marine, and terrestrial records of West Asia. Periodic adaptations to these changes through the modern period within regional habitat-tracking, agricultural innovation and pastoralism, political expansion and disintegration, and ideological reformulation. *Also ARCG 736b[u], NELC 587b[u]*.

ANTH 748b,Contemporary Archaeological Theory. Richard Burger.
W 1.30–3.20
This seminar explores contemporary theory in all of its diversity. The course begins with an examination of multiple critiques of New Archaeology and the remaining legacy of this approach. It then focuses on the diversity of competing approaches, sometimes grouped as post-processualist, that are currently employed in the United States and the United Kingdom, including critical archaeology, the archaeology of gender, structuralist approaches, various Marxist and neo-Marxist formulations of archaeological theory, and applications of evolutionary theory. The differing trajectory of distinctive archaeological approaches outside the English-speaking world is also explored. *Also ARCG 748b*.

ANTH 753a[u], Early Prehistory. Frank Hole.
TTH 9–10.15
A study of the formation of complex societies in the Near East during the fourth–third millennia B.C. The focus is on the Tigris-Euphrates watershed, including Iraq, Syria, and parts of Turkey and Iran. Topics include the development of religion, monumental architecture, craft production, writing, and trade, both within and outside the region. *Also ARCG 753a[u]*.

ANTH 758b[u], Chavín and the Origins of Peruvian Civilization. Richard Burger.
T 9.30–11.20
The development of early complex society in Peru during the Early Horizon is examined along with its antecedents during the Preceramic and Initial periods. This seminar focuses on the problems of elucidating the sociopolitical organization of these societies and the factors responsible for their transformation. General theories of the origins of complex society are critically reviewed in light of the Peruvian case. *Also ARCG 758b[u].*

ANTH 773b[u], Civilizations and Collapse. Harvey Weiss.
Th 2.30–4.20
Collapse documented in the archaeological and early historical records of the Old and New Worlds, including Mesopotamia, Mesoamerica, the Andes, and Europe. Analysis of politicoeconomic vulnerabilities, resiliencies, and adaptations in the face of abrupt climate change, anthropogenic environmental degradation, resource depletion, "barbarian" incursions, or class conflict. *Also ARCG 773b[u], NELC 588b[u].*

ANTH 803b, Reproductive Ecology of Humans and Nonhuman Primates. Richard Bribiescas.
T 1.30–3.20
Survey of the current understanding of the physiology of reproductive function within the control of evolutionary and life history theory. Emphasis on population variation in female and male reproductive endocrinology as well as the sources of that variation.

ANTH 806b,Research Methods in Biological Anthropology. Eric Sargis.
Th 11.30–3.20
This seminar introduces students to methods and approaches for developing and carrying out research projects in biological anthropology. Each student develops a project, writes and presents a proposal of the project, and presents the results in both oral and written form. Discussion topics include the distinctions between inductive and predictive science, integrity in science, research design, data collection methods, communicating in science, and an introduction to biostatistical analysis. Focus is on how scientific research projects are successfully presented and communicated.

ANTH 825b,Hunters and Gatherers. David Watts.
Societies in which people subsist or subsisted mostly or entirely on foraging for wild resources, or "Hunter-Gatherer" societies, have long evoked great anthropological interest and debate. The implicit or explicit assumption that hunting and gathering more or less like that documented ethnographically was the subsistence mode during most of our species's history has given research on foraging societies an important place in the study of human evolution. More recently, research on contemporary foragers has assumed great importance in the study of human behavioral ecology. However, the assumptions behind, and conclusions derived from, such research have inspired considerable controversy. This course reviews some of the ethnographic record concerning foraging societies and some of the theory behind, and empirical results of, research inspired by evolutionary ecology and life history theory (e.g., research based on optimal foraging theory). We examine the debate about possible misinterpretations of the socioecology and history of modern hunter-gatherers and about the difficulties inherent in arguments about the human "environment of evolutionary adaptedness." We also examine a series of related issues, such as the question whether indigenous people are "conservationists" and the situation of modern foragers in relation to nation states and human rights.

ANTH 851a, Topics and Issues in Evolutionary Theory. Eric Sargis, Richard Bribiescas.
T 1.30–3.20
Focus on current literature in theoretical evolutionary biology, intended to give new graduate students intensive training in critical analysis of theoretical models and in scientific writing.

ANTH 856a[u], Reconstructing Human Evolution: An Ecological Approach. Andrew Hill.
Th 1.30–3.20
If human evolutionary change has been determined or affected by ecological factors, like changes in climate, competition with other animals, availability and kinds of food supply, then it is important to determine ecological and environmental information about the regions and time period in which human evolution has occurred. An examination of methods of obtaining data relevant to this, by evaluating the techniques and results of such other fields as geology, paleobotany, and paleozoology. It also surveys ethnographic, primatological, and other biological models of early human behavior.

ANTH 875a[u], Topics and Issues in Primate Behavioral Ecology. David Watts.
M 2.30–4.20
Includes kinship and dominance as organizing principles of primate social groups; feeding competition and risk of predation as determinants of group size; mating strategies and sexual dimorphism; dispersal, transfer, and the permeability of social boundaries; the structure of primate communities; the role of primates in ecological community function.

ANTH 941a and b,Research Seminar in Japan Anthropology. William Kelly.
HTBA
This seminar offers professional preparation for doctoral students in Japan anthropology through systematic readings and analysis of the anthropological literature, in English and in Japanese. Open only by permission of the instructor.

ANTH 942a,Research Seminar in South Asia Anthropology. Bernard Bate.
F 3–5
This ongoing research seminar explores critical texts in the anthropology (and anthropography) of South Asia. The fall 2003 seminar covers the production of South Asia as a disciplinary site in anthropology, including key texts and debates on caste, class, community, and gender. Based on student suggestions and interests, future semesters will focus on particular issues (caste, race, community, gender, language, postcoloniality, politics, etc.) and/or regions. The seminar is designed for doctoral students specializing in some aspect of South Asia. Others with appropriate backgrounds and interests may be admitted in consultation with the instructor.

ANTH 951a or b, Directed Research in Ethnology and Social Anthropology.
By arrangement with faculty.

ANTH 952a or b,Directed Research in Linguistics.
By arrangement with faculty.

ANTH 953a or b,Directed Research in Archaeology and Prehistory.
By arrangement with faculty.

ANTH 954a or b,Directed Research in Physical Anthropology.
By arrangement with faculty.

APPLIED MATHEMATICS

A. K. Watson Hall, 432.1278
M.S., M.Phil., Ph.D.

Chair and Director of Graduate Studies
Steven Zucker (AKW 107A, 432.1278, zucker@cs.yale.edu)

Professors
Andrew Barron (*Statistics*), Richard Beals (*Mathematics*), Donald Brown (*Economics*), Joseph Chang (*Statistics*), Ronald Coifman (*Mathematics; Computer Science*), Gustave Davis (*Pathology*), Eric Denardo (*Operations Research*), Stanley Eisenstat (*Computer Science*), Michael Fischer (*Computer Science*), John Hartigan (*Statistics*), Roger Howe (*Mathematics*), Peter Jones (*Mathematics*), Ravindran Kannan (*Computer Science; Applied Mathematics*), Steven Orszag (*Mathematics; Applied Mathematics*), David Pollard (*Statistics*), Vladimir Rokhlin (*Computer Science; Mathematics*), Herbert Scarf (*Economics*), Martin Schultz (*Computer Science*), Mitchell Smooke (*Mechanical Engineering; Applied Physics*), Katepalli Sreenivasan (*Adjunct, Mechanical Engineering; Applied Physics*), Steven Zucker (*Computer Science; Electrical Engineering*)

Associate Professor
James Aspnes (*Computer Science*)

Assistant Professors
John Emerson (*Statistics*), Hannes Leeb (*Statistics*)

Fields of Study

The graduate program in Applied Mathematics comprises mathematics and its applications to a range of areas, to the mathematical sciences (including computer science and statistics), and to the other sciences and engineering. Topics covered by the program include classical and modern applied harmonic analysis, linear and nonlinear partial differential equations, numerical analysis, scientific computing and applications, discrete algorithms, combinatorics and combinatorial optimization, graph algorithms, geometric algorithms, discrete mathematics and applications, statistical theory and applications, probability theory and applications, information theory, econometrics, financial mathematics, statistical computing, and applications of mathematical and computational techniques to fluid mechanics, combustion, and other scientific and engineering problems.

Special Requirements for the Ph.D. Degree

All students are required to: (1) complete twelve term courses (including reading courses) at the graduate level, at least two with Honors grades; (2) pass a qualifying examination on their general applied mathematical knowledge; (3) submit a dissertation prospectus; (4) participate in the instruction of undergraduates; (5) be in residence for at least three years; and (6) complete a dissertation that clearly advances understanding of the subject it considers. The normal time for completion of the Ph.D. program is four years.

Requirement (1) normally includes four core courses in each of methods of applied analysis, numerical computation, algorithms, and probability; these should be taken during the first year. The qualifying examination is normally taken by the end of the third term and will test knowledge of the core courses as well as more specialized topics. The thesis is expected to be independent work, done under the guidance of an adviser. This adviser should be contacted not long after the student passes the qualifying examinations. A student is admitted to candidacy after completing requirements (1)–(5) and obtaining an adviser.

Master's Degrees

M. Phil. See Graduate School requirements, page 397.

M.S. (en route to the Ph.D.). The M.S. degree is a terminal degree and is not awarded en route to the Ph.D.

Master's Degree Program. Students may also be admitted to a terminal master's degree program directly. This program is normally completed in one year, but a part-time program may be spread over as many as four years. To quality for the M.S., the student must pass eight graduate-level courses. Courses taken as part of the M.S. program must be preapproved by the director of graduate studies to ensure that a suitable distribution of topics is covered.

Honors Requirement

Students must meet the Graduate School's Honors requirement by the end of the fourth term of full-time study (see pages 394–95).

Program materials and additional information concerning degrees offered and admissions requirements are available upon request to the Graduate School of Arts and Sciences, Yale University, PO Box 208323, New Haven CT 06520-8323.

APPLIED PHYSICS

Dunham Laboratory, 432.4250
M.Eng., M.S., M.Phil., Ph.D.

Chair
Daniel Prober

Professors
William Bennett, Jr. (*Emeritus*), Richard Chang, Michel Devoret, Joseph Dillon, Jr. (*Adjunct*), Paul Fleury, Steven Girvin, Robert Grober, Victor Henrich, Arvid Herzenberg (*Emeritus*),PierreHohenberg (*Adjunct*),MarshallLong, Tso-Ping Ma, Daniel Prober, Nicholas Read, Mark Reed, Subir Sachdev, Ramamurty Shankar, Mitchell Smooke, A. Douglas Stone, John Tully, Robert Wheeler (*Emeritus*), Werner Wolf (*Emeritus*), Jerry Woodall

Associate Professors
Sean Barrett, Robert Schoelkopf

Assistant Professors
Charles Ahn, Janet Pan

FIELDS OF STUDY

Fields include areas of theoretical and experimental condensed-matter physics, optical and laser physics, and material physics. Specific programs include surface science, microlithography and quantum transport, optical properties of micro-cavities, spectroscopy at the nanoscale, near-field microscopy, atomic force microscopy and ferroelectronic materials, molecular beam epitaxy, mesoscopic physics, and medical instrumentation.

For admissions and degree requirements, and for course listings, see Engineering and Applied Science, pages 132–45.

ARCHAEOLOGICAL STUDIES

51 Hillhouse, 432.3772
M.A.

Chair and Director of Graduate Studies
Richard Burger (*Anthropology*)

Professors
Richard Burger (*Anthropology*), Edward Cooke, Jr. (*History of Art*), Robert Gordon (*Geology & Geophysics*), Andrew Hill (*Anthropology*), Frank Hole (*Anthropology*), Diana Kleiner (*Classics*), Mary Miller (*History of Art*), William Simpson (*Near Eastern Languages & Civilizations*), Ronald Smith (*Geology & Geophysics*), Karl Turekian (*Geology & Geophysics*), Harvey Weiss (*Near Eastern Languages & Civilizations*)

Assistant Professors
Marcello Canuto (*Anthropology*), John Darnell (*Near Eastern Languages & Civilizations*), Björn Ewald (*Classics*), Thomas Tartaron (*Anthropology*)

Lecturers
Karen Foster (*Near Eastern Languages & Civilizations*), Iman Saca (*Anthropology*)

The aims of the program are to give students the academic background needed for careers in the conservation of archaeological resources, to prepare students to teach in community colleges and secondary schools, and to provide the opportunity for teachers, curators, and administrators to refresh themselves on recent developments in archaeology. The program is administered by Yale's Council on Archaeological Studies, with faculty from the departments of Anthropology, Classics, Geology & Geophysics, History of Art, and Near Eastern Languages & Civilizations.

Special Admissions Requirements

The GRE General Test; applicants need not have an archaeology background, but a strong grounding in the social sciences or history is recommended.

Special Requirements for the M.A. Degree

Courses are drawn from the graduate programs of the participating departments and from those undergraduate courses that are also open to graduate students. Eight courses are required. Unless previously taken for credit, these will include: Field Techniques; World Prehistory, Origins of Western Civilizations, or Introduction to Archaeology; at least one laboratory course; a course related to archaeology in each of the following groups: Anthropology; Classics, History of Art, or Near Eastern Languages & Civilizations; Ecology & Evolutionary Biology, Forestry & Environmental Studies, or Geology & Geophysics; and two electives. In addition, each student will write a master's thesis. Degree candidates are required to pay a minimum of one year of full tuition. Full-time

students can complete the course requirements in one academic year, and all students are expected to complete the program within a maximum period of three academic years.

Program materials are available upon request to the Director of Graduate Studies, Archaeological Studies, Department of Anthropology, Yale University, PO Box 208277, New Haven CT 06520-8277; e-mail, anthropology@yale.edu; Web site, http://www.yale.edu/archaeology/.

Courses

ARCG 701a[u], Foundations of Modern Archaeology. Frank Hole.
W 1.30–3.20
Discusses how method, theory, and social policy have influenced the development of archaeology as a set of methods, an academic discipline, and a political tool. This course assumes a background in the basics of archaeology equivalent to one of the introductory courses. *Also ANTH 701a[u].*

ARCG 705Lb[u], Archaeology Laboratory II. Marcello Canuto.
W 1–4
Practical experience in preparation, analysis, and interpretation of artifacts and nonartificial archaeological data. Students undertake term projects. *Also ANTH 705Lb[u].*

ARCG 710a[u], Maya Art and Archaeology of Copan and Quirigua. Mary Miller, Marcello Canuto.
M 1.30–3.20
This seminar addresses the art, archaeology, and history of the southeastern Maya region, particularly the cultural production and developments at the Classic Maya centers of Copan, Honduras, and Quirigua, Guatemala. Among the particular topics for discussion and research are areas in which the study of art, archaeology, and anthropology converge to develop interdisciplinary interpretations of this region's importance and role in Classic Maya civilization. Open to advanced undergraduates with appropriate course preparation. *Also ANTH 710a[u], HSAR 747a[u].*

ARCG 716a[u], Neanderthals and Wise Men. Iman Saca.
TTh 11.30–12.45
Examines popular and scientific views concerning the archaic hominids known as neanderthals and their role in the cultural and biological evolution of modern Homo sapiens. *Also ANTH 716a[u].*

ARCG 721a[u], Archaeological Approaches to Architecture. Richard Burger.
T 9.30–11.20
The archaeological study of architectural remains is considered from a historic and theoretical perspective. Particular attention is given to the way in which contrasting theoretical orientations have shaped excavation and analytical strategies. The geographical focus of this seminar is comparative and includes both Old World and New World cases. *Also ANTH 721a[u].*

ARCG 722b[u], The Archaeology of Ethnicity. Marcello Canuto.
T 1.30–3.20
In this seminar the difficult questions involving the recognition, delineation, definition, and interpretation of "ethnicity" in the archaeological record are discussed. This course begins with a theoretical and methodological discussion of this concept and its utility to archaeological investigation. In the second half of the course, a cross-cultural approach is used to apply

the theoretical and methodological issues in relation to distinct case studies. Open to advanced undergraduates with appropriate course preparation. *Also ANTH 722b[u]*.

ARCG 731a[u], Near Eastern Prehistory. Iman Saca.
MW 11.30–12.45
A review of the archaeology of the Near East from the time of early hominids to the establishment of agricultural villages and towns. *Also ANTH 731a[u]*.

ARCG 732a[u] and 733La[u], Archaeological Field Techniques and Archaeology Lab I. Marcello Canuto.
MW 9–10.15, Lab SA 9–5
An introduction to the practice and techniques of modern archaeology, including methods of excavation, recording, mapping, dating, and ecological analysis. The lab offers instruction in the field at an archaeological site in Connecticut in stratigraphy, mapping, artifact recovery, and excavation strategy. The courses must be taken concurrently and are counted together as 1 credit. *Also ANTH 732a[u] and ANTH 733La[u]*.

ARCG 734b[u], Archaeology and the Modern World. Iman Saca.
W 9.30–11.20
Throughout the centuries, the science of archaeology has been used as a means to justify political, cultural, and religious claims through declaring ownership of the past. Through the use of case studies, this seminar tracks some of the perceptions, uses, and abuses of archaeology and our cultural past, and how this constructed past is used to strengthen religious, national, and ethnic loyalties. We examine how countries use their archeological/cultural heritage to present themselves to their population and to the outside world. We also consider the social and political construction of cultural heritage values, and the role that international organizations play in the development, protection, and promotion of the cultural heritage of developing countries. *Also ANTH 734b[u]*.

ARCG 736b[u], Environmental History of the Near East. Harvey Weiss.
TH 9.30–11.20
Natural and anthropogenic climate and environmental changes of the Holocene studied in the lake, marine, and terrestrial records of West Asia. Periodic adaptations to these changes through the modern period within regional habitat-tracking, agricultural innovation and pastoralism, political expansion and disintegration, and ideological reformulation. *Also ANTH 736b[u], NELC 587b[u]*.

ARCG 748b,Contemporary Archaeological Theory. Richard Burger.
W 1.30–3.20
This seminar explores contemporary theory in all of its diversity. The course begins with an examination of multiple critiques of New Archaeology and the remaining legacy of this approach. It then focuses on the diversity of competing approaches, sometimes grouped as post-processualist, that are currently employed in the United States and the United Kingdom, including critical archaeology, the archaeology of gender, structuralist approaches, various Marxist and neo-Marxist formulations of archaeological theory, and applications of evolutionary theory. The differing trajectory of distinctive archaeological approaches outside the English-speaking world is also explored. *Also ANTH 748b.*

ARCG 753a[u], Early Prehistory. Frank Hole.
TTH 9–10.15
A study of the formation of complex societies in the Near East during the fourth–third millennia B.C. The focus is on the Tigris-Euphrates watershed, including Iraq, Syria, and parts of Turkey and Iran. Topics include the development of religion, monumental architecture, craft production, writing, and trade, both within and outside the region. *Also ANTH 753a[u]*.

ARCG 758b[u], Chavín and the Origins of Peruvian Civilization. Richard Burger.
T 9.30–11.20
The development of early complex society in Peru during the Early Horizon is examined along with its antecedents during the Preceramic and Initial periods. This seminar focuses on the problems of elucidating the sociopolitical organization of these societies and the factors responsible for their transformation. General theories of the origins of complex society are critically reviewed in light of the Peruvian case. *Also ANTH 758b[u].*

ARCG 773b[u], Civilizations and Collapse. Harvey Weiss.
TH 2.30–4.20
Collapse documented in the archaeological and early historical records of the Old and New Worlds, including Mesopotamia, Mesoamerica, the Andes, and Europe. Analysis of politicoeconomic vulnerabilities, resiliencies, and adaptations in the face of abrupt climate change, anthropogenic environmental degradation, resource depletion, "barbarian" incursions, or class conflict. *Also ANTH 773b[u], NELC 588b[u].*

ARCG 953a or b,Directed Research in Archaeology and Prehistory. Faculty.
By arrangement.

Related Courses

ARCG 120a,Art and Architecture in Mesoamerica. Mary Miller.
Also HSAR 200a.

ARCG 171b,Great Discoveries in Archaeology. Iman Saca.

ARCG 232a,Ancient Civilizations of the Andes. Richard Burger.

ARCG 238a,Buried Cities: Thera, Pompeii,and Herculaneum. Karen Foster.
Also HSAR 238a.

ARCG 467b,Geochemical Approaches to Archaeology. Karl Turekian.
Also G&G 467b.

HSAR 213a,American Material Life: Architecture and Decorative Arts in the Seventeenth Century. Edward Cooke.

HSAR 214b,American Material Life: Architecture and Decorative Arts in the Eighteenth Century. Edward Cooke.

HSAR 235b,The Worlds of Homer. Karen Foster.
Also NELC 106b.

HSAR 407b,Royal Maya Cities. Mary Miller.

HSAR 425a, Pompeii and Herculaneum. Björn Ewald.

ASTRONOMY

J.W. Gibbs Laboratories, 432.3000
M.S., M.Phil., Ph.D.

Chair
Charles Bailyn

Director of Graduate Studies
Sarbani Basu (274 JWG, 432.3028, sarbani.basu@yale.edu)

Professors
Charles Bailyn, Charles Baltay (*Physics*), Paolo Coppi, Pierre Demarque (*Emeritus*), Jeffrey Kenney, Richard Larson, Peter Parker (*Physics*), Sabatino Sofia, Megan Urry (*Physics*), William van Altena, Robert Zinn

Assistant Professors
Sarbani Basu, Priyamvada Natarajan, Pieter van Dokkum

Fields of Study

Fields include observational and theoretical galactic astronomy, solar and stellar astrophysics,astrometry, extragalactic astronomy, radio astronomy, high-energy astrophysics, and cosmology.

Special Admissions Requirements

Applicants should have a strong undergraduate preparation in physics and mathematics. Although some formal training in astronomy is useful, it is by no means required for admission. Applicants should take the GRE Subject Test in Physics.

Special Requirements for the Ph.D. Degree

A typical program of study includes twelve courses during the first four terms, of which at least four must be in astronomy. At least two courses (and no more than four) must be research credits, each earned by working in close collaboration with a faculty member. The choice of the remaining courses depends on the candidate's interests and background. Students are encouraged to take graduate courses in physics or other related fields. No individual course is required, but students normally take the core courses (Stellar Populations, Stellar Astrophysics, Interstellar Matter and Star Formation, Stellar Dynamics, Galaxies, Cosmology), which provide a basic preparation in astronomy, and additional courses related to their research interests. On an irregular basis, special topic courses and seminars are offered, which provide the opportunity to study some fields in greater depth than is possible in the standard courses. To achieve both breadth and depth in their education, students are encouraged to take a few courses or seminars beyond their second year of study. During the course of their first year of graduate studies, students who have had little or no previous training in astronomy must demonstrate in an examination their knowledge of general astronomy at the undergraduate level.

There is no foreign-language requirement. An oral and written comprehensive examination, normally taken at the end of the fourth term of graduate work, tests the student's familiarity with the entire field of astronomy and related branches of physics and mathematics. Satisfactory performance in this examination, an acceptable record in course and research work, and an approved dissertation prospectus are required for admission to candidacy for the Ph.D. degree. The dissertation should present the results of an original and thorough investigation, worthy of publication. Most important, it should reflect the candidate's capacity for independent research. An oral dissertation defense is required.

Teaching experience is an integral part of graduate education in astronomy. All students will serve as teaching fellows and complete a total of 9 TF units. Both the levels of teaching assignments and the scheduling of teaching are flexible. By the end of the third term, however, most students will have completed 6 TF units. The additional 3 TF units will normally be carried out with a different professor than the earlier position to provide broader teaching experience.

Honors Requirement

Students must meet the Graduate School's Honors requirement by the end of the fourth term of full-time study (see pages 394–95).

Master's Degrees

M.Phil. See Graduate School requirements, pages 397–98.

M.S. (en route to the Ph.D.). Upon application, the department will recommend for the award of the M.S. degree any student who has satisfactorily completed the first year of the program leading to the Ph.D. degree. The department requires, in addition, that at least one of the courses taken during the year be a research course.

Program materials are available upon request to the Director of Graduate Studies, Department of Astronomy, Yale University, PO Box 208101, New Haven CT 06520-8101.

Courses

[**ASTR 510b[u], Stellar Populations.**]

ASTR 518a[u], Stellar Dynamics. Gordon Drukier.
MW 10.30–11.20, 1 HTBA
The dynamics and evolution of star clusters; structure and dynamics of our galaxy; theories of spiral structure; dynamical evolution of galaxies.

ASTR 520a,Computational Analysis. Paolo Coppi.
3 HTBA
The analytic and numerical/computational tools necessary for effective research in astronomy and related disciplines. Topics include numerical solutions to differential equations, spectral methods, and Monte Carlo simulations. Applications are made to common astrophysical problems including fluids and N-body simulations.

[**ASTR 530a[u], Galaxies.**]

[**ASTR 540a[u], Radiative Processes in Astrophysics.**]

[**ASTR 550b[u], Stellar Astrophysics.**]

ASTR 555a[u], Observational Techniques. William van Altena.
MW 1–2.15
The design and use of optical telescopes, cameras, spectrographs, and detectors to make astronomical observations. The reduction and analysis of photometric and spectroscopic observations.

ASTR 560b[u], Interstellar Matter and Star Formation. Richard Larson.
MW 10.30–11.20, 1 HTBA
Observations of interstellar matter at optical, infrared, radio, and X-ray wavelengths. Dynamics and evolution of the interstellar medium including interactions between stars and interstellar matter. Molecular clouds and processes of star formation.

ASTR 565a,The Early Universe. Pieter van Dokkum.
TTh 10.30–11.20, 1 HTBA
The emergence of structure in the universe: stars, galaxies, and clusters of galaxies. Theories of galaxy formation, and the properties of distant galaxies. Emphasis is placed on the interplay of theory and observations in this rapidly evolving field.

[**ASTR 570b[u], High-Energy Astrophysics.**]

ASTR 575b, Topics in Astrometry. William van Altena.
Dramatic improvements made in the technologies of measurement and computation over the past few years have made it possible to use astrometric techniques to investigate current problems in astronomy and astrophysics. In this seminar we develop the astrometric techniques required to study the cosmological distance scale, the spatial and kinematic structure of our galaxy, and the stellar mass-luminosity relation.

ASTR 580a or b,Research.
By arrangement with faculty.

ASTR 590b,Solar Physics. Sabatino Sofia.
The very detailed observations of the sun have uncovered properties and variabilities not explainable in terms of standard models of stellar structure and evolution. This course describes these observations and develops a theoretical framework to address them.

ASTR 600b,Cosmology. Priyamvada Natarajan.
The large-scale contents and structure of the universe and the origin of galaxies. *Also PHYS 600b.*

[**ASTR 705b,Research Seminar in Stellar Population.**]

ASTR 710a or b,Professional Seminar. Charles Bailyn.
A seminar covering science and professional issues in astronomy.

ATMOSPHERIC SCIENCE

Advisory Committee
Donald Aylor (*Forestry & Environmental Studies*)
Gary Haller (*Chemical Engineering; Chemistry*)
Xuhui Lee (*Forestry & Environmental Studies*)
Daniel Rosner (*Chemical Engineering; Mechanical Engineering*)
Steven Sherwood (*Geology & Geophysics*)
Ronald Smith (*Geology & Geophysics*)
Sabatino Sofia (*Astronomy*)
Jan Stolwijk (*Epidemiology & Public Health*)
Karl Turekian (*Geology & Geophysics*)
John Wettlaufer (*Geology & Geophysics; Physics*)

A number of departments of the Graduate School offer courses dealing with the physics, dynamics, and chemistry of the atmosphere, and the interactions of the atmosphere with the biosphere, oceans, and cryosphere, including all biogeochemical cycles. In order to permit students whose interests lie in the field of atmospheric science to develop an integrated program of studies, an interdisciplinary program is offered. Typical areas of interest included in the scope of the program are: theory of weather and climate, air pollution from industrial and natural sources, urban environmental health, global climatic change, paleoclimatology, hydrometeorology, anddynamics of atmospheric and oceanic motions. The program is individually planned for each student through a faculty adviser system.

Special Admissions Requirements

A student should, on the basis of scientific orientation, seek admission to one of the participating departments. The Department of Geology and Geophysics is the focus for studies of physical and dynamical meteorology, oceanography, and atmospheric chemistry, and the departments of Epidemiology & Public Health and Engineering & Applied Science (which includes the programs of Applied Physics, Chemical Engineering, Electrical Engineering, and Mechanical Engineering) provide additional courses in environmental health and atmospherically related processes. The Ph.D. and M.Phil. requirements are those of the admitting departments (see entries in this publication).

COMBINED PROGRAM IN THE BIOLOGICAL AND BIOMEDICAL SCIENCES (BBS)

L-200 Sterling Hall of Medicine, 785.3735

Director
Lynn Cooley (lynn.cooley@yale.edu)

Fields of Study

As the broad field of biological and biomedical sciences has become more exciting, it has also become more complex and demanding. The successful scientist today can no longer be an expert in only one area or one technique, but must be able to make use of information, technologies, and experimental strategies that ignore the boundaries defined by traditional university departments. In the coming decades, opportunities for research and scientific discovery will be greater, but also more challenging, than ever before. A student interested in pursuing a career in science should receive a breadth and depth of training in graduate school that will define his or her ultimate goal, whether he/she chooses to enter academia, industry, education, or any of the many other career opportunities that will be available to young scientists.

To help meet this challenge, Yale faculty have reorganized their approach to graduate education and formed the interdepartmental Combined Program in the Biological and Biomedical Sciences (BBS). Unique among graduate programs, BBS gives entering students access to more than 250 Yale biological science faculty in all departments, both at the School of Medicine and on the main university campus.

The primary purpose of BBS is to provide an environment for graduate education in modern biological and biomedical sciences that is both broad in scope and rigorous in depth. BBS serves as a focal point for research, education, and career development in the biological sciences and sponsors exciting initiatives, including new courses (like genomics and informatics; and laboratory practicals in confocal microscopy, immunocytochemistry, and molecular biology); informal scientific exchanges; the annual student-run Graduate Student Research Symposium; career counseling and development; and numerous social activities.

BBS is composed of the faculty in the departments of Cell Biology; Cellular and Molecular Physiology; Experimental Pathology; Genetics; Immunobiology; the Interdepartmental Neuroscience Program; Microbial Pathogenesis; Molecular Biophysics and Biochemistry; Molecular, Cellular, and Developmental Biology; Neurobiology; and Pharmacology; and it draws relevant faculty from various clinical departments. The program is divided into several interest-based tracks whose identity may change with the changing interests of faculty. Beginning in the fall of 2003, the tracks will be: (1) Computational Biology and Bioinformatics; (2) Molecular Cell Biology, Genetics and Development; (3) Immunology; (4) Microbiology; (5) Molecular Biophysics and Biochemistry; (6) Neuroscience; (7) Pharmacological Sciences and Molecular Medicine; and (8) Physiology and Integrative Medical Biology. Each track draws its faculty from several departments and has a specific set of recommended courses and activities for first-year students.

Entering students apply to and then affiliate with a track, which places them with the group of students and faculty that most closely reflects their interests. Nevertheless, the courses, faculty, students, and, most important, laboratory research opportunities in all tracks remain completely available at all times, regardless of a student's primary track.

Entering students are admitted to Yale University as members of the BBS program and generally affiliate with the track to which they initially applied. The total number of students admitted each year is approximately seventy to eighty, with between five and twenty-five being admitted to any one track, depending on the interests and quality of the applicant pool. A student remains a member of the track for his or her first year and generally takes courses (with the advice of the track adviser or director) and performs at least three three-month rotations in a laboratory at Yale. At the end of the first year students generally select an adviser and also a department or academic program in which they take a qualifying examination in the second year and through which they eventually will earn a Ph.D. Advisers may be any full-time or affiliated Yale faculty member, regardless of their department or the student's track.

For the duration of their studies all students receive a stipend, which increases yearly, full tuition, health coverage, and a yearly allotment for travel to scientific meetings or courses. Financial support comes from university fellowships, National Institutes of Health (NIH) Training Grants, grants from foundations and companies, and from the Bristol-Myers Squibb Educational Alliance.

Special Admissions Requirements

Entrance requirements to BBS are track-specific but include the following: GRE General Test scores; relevant GRE Subject Test scores (strongly recommended but not a strict requirement); undergraduate major in a relevant biological, chemical, or physical science; three letters of recommendation addressing the student's academic performance and/or laboratory training; and TOEFL exam scores for students whose native language is not English. Track-specific requirements are listed below.

COMPUTATIONAL BIOLOGY AND BIOINFORMATICS

A strong background in the basic sciences, along with computer science training, is expected.

MOLECULAR CELL BIOLOGY, GENETICS AND DEVELOPMENT

No additional requirements or recommendations.

IMMUNOLOGY

It is preferred that students have taken courses in biology, organic chemistry, biochemistry, genetics, cell biology, physics, and mathematics. Actual course requirements, however, are not fixed, and students with outstanding records in any area of the biological sciences may qualify for admission. In special cases, Medical College Admission Test (MCAT) scores may be substituted for the GRE General Test scores.

MICROBIOLOGY

No additional requirements or recommendations.

MOLECULAR BIOPHYSICS AND BIOCHEMISTRY

Actual course requirements in a student's background area are flexible. Desirable courses include biology; biochemistry; general, organic, and physical chemistry; physics; and math.

NEUROSCIENCE

Most applicants have had course work in neuroscience, psychobiology, physiological psychology, mathematics through calculus, general physics, general biology, general chemistry, organic chemistry, biochemistry, computer science, or engineering. Laboratory research experience is beneficial but is not a formal requirement. Medical College Admission Test (MCAT) scores may be substituted for the GRE General Test scores.

PHARMACOLOGICAL SCIENCES AND MOLECULAR MEDICINE

No additional requirements or recommendations.

PHYSIOLOGY AND INTEGRATIVE MEDICAL BIOLOGY

No additional requirements or recommendations.

Program materials and applications are available by request to John Alvaro, Administrative Director, BBS Program, Yale University, PO Box 208084, New Haven CT 06520-8084; telephone 203.785.3735; telefax 203.785.3734; e-mail, bbs@yale.edu; Web site, info.med.yale.edu/bbs/.

BIOLOGY

Kline Biology Tower, 432.2538
M.S., M.Phil., Ph.D.

Directors of Graduate Study
Günter Wagner (*Ecology & Evolutionary Biology*)
Ronald Breaker (*Molecular, Cellular & Developmental Biology*)

In the 1998–99 academic year, the Department of Biology reorganized to form the Department of Ecology and Evolutionary Biology (E&EB) and the Department of Molecular, Cellular, and Developmental Biology (MCDB). The graduate program in Biology will continue to exist until all of its current students complete the program. No additional students will be admitted into the Biology graduate program. New students will be admitted into one of the new departments.

BIOMEDICAL ENGINEERING

Dunham Laboratory, 432.4250
M.Eng., M.S., M.Phil., Ph.D.

Professors
James Duncan, Robert Grober, Csaba Horváth, Steven Segal, Mark Saltzman, Fred Sigworth, Steven Zucker

Associate Professors
Lawrence Staib, Hemant Tagare

Assistant Professors
Jacek Cholewicki, Erin Lavik

FIELDS OF STUDY

Fields include the physics of image formation (MRI, ultrasound, nuclear medicine, and X-ray), NMR spectroscopy, digital image analysis and processing, computer vision, biological signals and sensors, biomechanics, physiology and human factors engineering, biotechnology, biochemical engineering, and tissue engineering.

For admissions and degree requirements, and for course listings, see Engineering and Applied Science, pages 132–45.

BIOSTATISTICS

60 College Street, 785.6383
M.S.

Division Head
Robert Makuch

Director of Graduate Studies
Nancy Ruddle (785.6383)

Fields of Study

Faculty in the Biostatistics division of the Department of Epidemiology and Public Health offers a two-year terminal Master of Science degree in Biostatistics. Fields include clinical trials, epidemiologic methodology, statistical genetics, and mathematical models for infectious diseases. A Ph.D. program in Biostatistics is also available. See Epidemiology and Public Health, pages 154–70, for further details on the Ph.D. program and on courses available.

Special Admissions Requirements

Applicants should have a strong background in mathematics, and undergraduate course work in the biological and social sciences is recommended. The GRE General Test is required.

Special Requirements for the M.S. Degree

A minimum of twelve courses must be completed, and a grade of Honors achieved in at least two courses. An acceptable master's thesis must be submitted.

Program materials are available upon request from the Director of Graduate Studies (c/o M. Elliot), Epidemiology and Public Health, Yale University, PO Box 208034, New Haven CT 06520-8034; e-mail, ephdoctoral@yale.edu.

CELL BIOLOGY

C-207 Sterling Hall of Medicine, 785.4320
M.S., M.Phil., Ph.D.

Chair
Ira Mellman

Director of Graduate Studies
Susan Ferro-Novick (254B BCMM, 737.5207, susan.ferronovick@yale.edu)

Professors
Norma Andrews (*Microbial Pathogenesis*), Roland Baron (*Orthopaedics*), Michael Caplan (*Physiology*), Lynn Cooley (*Genetics*), Peter Cresswell (*Immunobiology*), Pietro De Camilli, Susan Ferro-Novick, Jorge Galán (*Microbial Pathogenesis*), Fred Gorelick (*Internal Medicine/Digestive Diseases*), James Jamieson, Keith Joiner (*Internal Medicine/Infectious Diseases*), Thomas Lentz, Vincent Marchesi (*Pathology*), Ira Mellman, Mark Mooseker (*Molecular, Cellular & Developmental Biology*), Michael Nathanson (*Internal Medicine/Digestive Diseases*), Peter Novick, Tom Pollard (*Molecular, Cellular & Developmental Biology*), Elisabetta Ullu (*Internal Medicine/Infectious Diseases*), Graham Warren

Associate Professors
Carl Hashimoto, Sandra Wolin

Assistant Professors
Karin Reinisch, Elke Stein (*Molecular, Cellular & Developmental Biology*),Peter Takizawa

Fields of Study

Fields include membrane biology of eukaryotic cells (molecular mechanisms of membrane biogenesis, traffic, and fusion; organelle biogenesis), intracellular transport of membrane and secretory proteins, receptor-mediated endocytosis, generation of transmembrane signals, epithelial cell polarity and the extracellular matrix, protein folding, membrane function in the nervous system (synapse formation and function), developmental genetics, cell biology of protozoan parasites and of pathogen/host interactions, cell biology of the immune response, mRNA and protein localization, the role of RNA particles, cell biology of bone remodeling and of the cytoskeleton. Approaches to these topics include biochemistry, molecular biology, and macromolecular crystallography; yeast and *Drosophila* genetics; immunocytochemistry and electron microscopy; cell fractionation; and live cell imaging.

Special Admissions Requirements

An undergraduate major in biology, biophysics, molecular biology, or biochemistry is recommended. MCAT scores may be substituted for the GRE General Test; GRE Subject Test recommended.

To enter the Ph.D. program, students apply to an interest-based track, usually the Molecular Cell Biology, Genetics, and Development track, in the combined program in Biological and Biomedical Sciences (BBS) http://info.med.yale.edu/bbs/.

Special Requirements for the Ph.D. Degree

Five courses are required: CBIO 602a, 727b, GENE 625b, MCDB 630b, in addition to one elective in one of the following areas: Genetics, Development, Neurobiology, Immunology, Microbiology, Pharmacology, Virology, or Molecular Genetics. Students plan their courses in consultation with the director of graduate studies to meet individual needs and interests. During the first year, students are also required to participate in three laboratory rotations. In the second year, a committee of faculty members determines whether each student is qualified to continue in the Ph.D. program. There is a written and oral qualifying examination at the end of the fourth term. In order to be admitted to candidacy, students must have met the Graduate School Honors requirement, maintained a better than passing record in the area of concentration, passed the qualifying examination, and submitted an approved prospectus. The remaining degree requirements include completion of the dissertation project and the writing of the dissertation and its oral defense, the formal submission of copies of the written dissertation to the Graduate School, and the deposit of an additional copy with the department. Laboratory rotations and thesis research may be conducted outside of the department.

An important aspect of graduate training in cell biology is the acquisition of teaching skills through participation in courses appropriate for the student's scientific interests. These opportunities can be drawn from a diverse menu of lecture, laboratory, and seminar courses given at the undergraduate, graduate, and medical school level. Ph.D. students are expected to participate in two terms (or the equivalent) of teaching. Students are not expected to teach during their first year.

Master's Degrees

M.Phil. Requirements for the M.Phil. degree are the same as for admission to candidacy (see above).

M.S. See Graduate School requirements, page 398; this degree is normally granted only to students who are withdrawing from the Ph.D. program.

Prospective applicants are encouraged to visit the BBS Web page (info.med.yale.edu/bbs/), MCGD Track. Program materials are available upon request to the Director of Graduate Studies, Department of Cell Biology, Yale University, PO Box 203333, New Haven CT 06520-3333.

Courses

CBIO 502,The Cellular Basis of Human Biology. James Jamieson,Thomas Lentz, Fred Gorelick,and staff.

This full-year course is designed to provide medical students with a current and comprehensive review of biologic structure and function at the cellular, tissue, and organ system levels.

Areas covered include replication and transcription of the genome; regulation of the cell cycle and mitosis; protein biosynthesis and membrane targeting; cell motility and the cytoskeleton; signal transduction; nerve and muscle function; and endocrine and reproductive cell biology. Clinical correlation sessions, which illustrate the contributions of cell biology to specific medical problems, are interspersed in the lecture schedule. Histophysiology laboratories provide practical experience with the light microscope for exploring cell and tissue structure.

CBIO 503,Histology Laboratory. Thomas Lentz and staff.
A laboratory in microscopic anatomy to be taken in conjunction with CBIO 502.

CBIO 601,The Molecular and Cellular Basis of Human Disease. Pietro De Camilli, Fred Gorelick,and staff.
An exploration of primary literature and critical assessment of the data that form a basis for understanding human disease. A series of human genetic diseases, whose mechanisms have been identified as a result of sequencing of the human genome, are explored. Students are required to search out supportive data, discuss it with the session leader, and present it to the group. This course runs in parallel with CBIO 502.

CBIO 602a,Molecular Cell Biology. Sandra Wolin,Thomas Pollard, Graham Warren,and faculty.
MW 1.45–3
A comprehensive introduction to the molecular and mechanistic aspects of cell biology for graduate students in all programs. Emphasizes fundamental issues of cellular organization, regulation, biogenesis, and function at the molecular level. *Also MB&B 602a, MCDB 602a.*

CBIO 603a,Seminar in Molecular Cell Biology. Sandra Wolin,Thomas Pollard, Graham Warren,and faculty.
TH 9–11
A graduate-level seminar course in modern cell biology. The class is devoted to the reading and critical evaluation of classical and current papers. The topics are coordinated with the CBIO 602a lecture schedule. Thus, concurrent or previous enrollment in CBIO 602a is required. *Also MCDB 603a.*

CBIO 727b,Advanced Seminar Course. Susan Ferro-Novick.
This seminar course, which meets once a week, covers several topics suggested by the second-year cell biology students. It should serve to introduce students to areas they might not have considered in prior courses. Each topic is spread over 3–6 sessions, starting with an introductory overview and followed by detailed analysis of key papers.

CBIO 900a and 901b,First-Year Introduction to Research. Susan Ferro-Novick, Ronald Breaker, Michael Stern.
Lab rotations, Grant Writing and Ethics for Molecular Cell Biology, Genetics, and Development track students. *Also GENE 900a and 901b, MCDB 900a and 901b.*

CELLULAR AND MOLECULAR PHYSIOLOGY

B-147 Sterling Hall of Medicine, 737.2215
M.S., M.Phil., Ph.D.

Chair
Steven Hebert

Director of Graduate Studies
Emile Boulpaep (B-142 SHM, 785.4055, emile.boulpaep@yale.edu)

Professors
Peter Aronson (*Internal Medicine/Nephrology*), Henry Binder (*Internal Medicine/Digestive Disease*), Walter Boron, Emile Boulpaep, Thomas Brown (*Psychology*), Michael Caplan, W. Knox Chandler, Lawrence Cohen, Arthur DuBois (*Epidemiology*), Barbara Ehrlich (*Pharmacology*), Bliss Forbush III, John Geibel (*Surgery*), Gerhard Giebisch, Steven Goldstein (*Pediatrics*), Steven Hebert, Leonard Kaczmarek (*Pharmacology*), Steven Segal, Gerald Shulman (*Internal Medicine/Endocrinology*), Fred Sigworth, Carolyn Slayman (*Genetics*), Clifford Slayman, John Stitt (*Epidemiology*), Fred Wright (*Internal Medicine/Nephrology*)

Associate Professors
Cecilia Canessa, Lloyd Cantley (*Internal Medicine/Nephrology*), Marie Egan (*Pediatrics*), Vincent Pieribone, George Richerson (*Neurology*), Yufeng Zhou

Assistant Professors
Angelique Bordey (*Neurosurgery*), Reiko Maki Fitzsimonds, P. Darrell Neufer, David Zenisek

Fields of Study

Fields of study range from cellular and molecular physiology to integrative medical biology. Areas of current interest include: ion channels, transporters and pumps, membrane biophysics, cellular and systems neurobiology, protein trafficking, epithelial transport, signal transduction pathways, vascular biology, organ physiology, genetic models of human disease, pathophysiology, structural biology of membrane proteins, and physiological genomics.

Special Admissions Requirements

We welcome applications from students with backgrounds in the biological, chemical, and/or physical sciences. These include majors in biology, biochemistry, physiology, genetics, chemistry, physics, mathematics, engineering, computer science, and psychology. Courses in biology, biochemistry, organic and physical chemistry, and mathematics through elementary calculus are recommended. The GRE General Test is required. To enter the Ph.D. program, students will apply to the Physiology and Integrative Medical Biology track within the interdepartmental graduate program in the Biological and Biomedical Sciences (see pages 65–67).

Special Requirements for the Ph.D. Degree

Formal requirements for the Ph.D. degree include two or three terms of course work, a qualifying examination taken by the end of the second year, submission of a thesis prospectus, and completion and satisfactory defense of the thesis.

Students are expected to design a suitable program of courses in consultation with a faculty adviser. The director of graduate studies will provide general oversight of the course selections. These courses will provide a coherent background for the expected area of thesis research and also satisfy the department's subject and proficiency requirements. Students must pass at least six graduate-level courses including C&MP 550a and C&MP 560b. Also during the first two terms, each student should explore research projects by performing rotations in at least three laboratories to create an informed basis upon which to select a thesis project. There is no foreign-language requirement. The qualifying examination, which must be passed by the end of the student's second year, will cover areas of physiology that complement the student's major research interest. After passing the qualifying examination and submitting a satisfactory thesis prospectus, students are admitted to candidacy and begin research on their thesis. The completed dissertation must describe original research making a significant contribution to knowledge.

An important dimension of graduate training in cellular and molecular physiology is the acquisition of teaching skills through participation in courses appropriate for the student's academic interests. Ph.D. students are expected to participate in two terms (or the equivalent) of teaching. Students are not expected to teach during their first year.

Honors Requirement

Students must meet the Graduate School's Honors requirement by the end of the fourth term of full-time study (see page 394–95).

Master's Degrees

No students are admitted for master's degrees. Under certain circumstances continuing or transferring students may become eligible for the M.S. or M.Phil. degree. See Graduate School requirements, pages 397–98.

Program materials are available upon request to the Department Registrar, Department of Cellular and Molecular Physiology, Yale University, School of Medicine, 333 Cedar Street, Yale University, PO Box 208026, New Haven CT 06520-8026.

Courses

C&MP 520a,Current Perspectives in Physiology. Reiko M.Fitzsimonds, David Zenisek.

TTh 2.30–3.45

This seminar course explores a diverse range of current topics in physiology, emphasizing readings and discussions of recent primary literature. A variety of expert physiologists present topics such as structural biology, membrane transport, signal transduction, sensory systems,

exercise physiology. Instructors guide the discussion regarding the background, the experiments, the methods, and most importantly the impact of relevant research papers. The aim of the course is to understand how physiological approaches integrate the study of organismal function from genes, to systems, to behavior and disease.

C&MP 550a,Physiological Systems. Steven Segal and staff.
MWF 9.30–10.20
We develop a foundation in human physiology, the regulation of homeostasis, and the biophysical properties of cells, tissues, and organs. Basic concepts in cell and membrane physiology are synthesized through exploring the function of skeletal, smooth, and cardiac muscle. Regulation of cardiac output, blood flow, and vascular exchange are integrated in light of exercise performance. Respiratory physiology explores the mechanics of ventilation, gas diffusion, and acid-base balance. Renal physiology explores the formation and composition of urine and the regulation of electrolyte, fluid, and acid-base balance. Organs of the digestive system are developed from the perspective of substrate metabolism and energy balance. Hormonal regulation is applied to metabolic control and to calcium, water, and electrolyte balance. The special senses are considered in light of signaling processes inherent to the nervous system. Weekly discussion sections provide a forum for in-depth exploration of topics. Graduate students evaluate research findings through literature review and weekly meetings with the instructor. *Also ENAS 550a[u], MCDB 550a[u].*

C&MP 560b,Cellular and Molecular Physiology: Molecular Machines in Human Disease. Michael Caplan,Emile Boulpaep,Mark Mooseker.
MWF 9.30–10.20
This course focuses on understanding the processes that transfer molecules across membranes at the cellular, molecular, biophysical, and physiologic levels. Students learn about the different classes of molecular machines that mediate membrane transport, generate electrical currents, or perform mechanical displacement. Emphasis is placed upon the relationship between the molecular structures of membrane proteins and their individual functions. The interactions among transport proteins in determining the physiologic behaviors of cells and tissues are also stressed. Molecular motors are introduced and their mechanical relationship to cell function is explored. Students read papers from the scientific literature that establish the connections between mutations in genes encoding membrane proteins and a wide variety of human genetic diseases. *Also MCDB 560b[u].*

[**C&MP 610b,Neurophysiology: Theory and Practice.**]

C&MP 710b,Electron Cryo-Microscopy for Protein Structure Determination. Vinzenz Unger, Fred Sigworth.
Understanding cellular function requires structural and biochemical studies at an ever-increasing level of complexity. An introduction into the concepts and applications of high-resolution electron cryo-microscopy. This rapidly emerging new technique is the only tool known to date that allows biological macromolecules to be studied at all levels of resolution ranging from their cellular organization to near atomic detail. *Also MB&B 710b4.*

CHEMICAL ENGINEERING

Dunham Laboratory, 432.4250
M.Eng., M.S., M.Phil., Ph.D.

Chair
John Walz

Professors
Eric Altman, Daniel Crothers (*Adjunct*), Menachem Elimelech, Abbas Firoozabadi (*Adjunct*), Thomas Graedel, Gary Haller, Csaba Horváth, Lisa Pfefferle, Joseph Pignatello (*Adjunct*), Daniel Rosner, John Walz, L. Lee Wikstrom (*Adjunct*), Kurt Zilm (*Adjunct*)

Associate Professors
Gaboury Benoit, Michael Loewenberg, Paul Van Tassel

Assistant Professor
William Mitch

FIELDS OF STUDY

Fields include combustion, separation processes, catalysis, statistical mechanics of adsorption, high-temperature chemical reaction engineering, convective heat and mass transfer, chromatography, biochemical and biomedical engineering, biotechnology, molecular beams, aerosol science and technology, materials processing, surface science, and environmental engineering.

For admissions and degree requirements, and for course listings, see Engineering and Applied Science, pages 132–45.

CHEMISTRY

Sterling Chemistry Laboratory, 432.3913
M.S., Ph.D.

Chair
Gary Brudvig (*Interim*) (Rm 1, SCL, 432.3912, chemistry.chair@ursula.chem.yale.edu)

Director of Graduate Studies
Mark Johnson (Rm 1, SCL, 432.3913)

Professors
SidneyAltman (*Molecular, Cellular & DevelopmentalBiology*), JeromeBerson (*Emeritus*), Gary Brudvig, William Chupka (*Emeritus*), Robert Crabtree, R. James Cross, Jr., Donald Crothers (*Emeritus*), John Faller, Gary Haller (*Engineering & Applied Science*), Andrew Hamilton, John Hartwig, Francesco Iachello (*Physics*), Mark Johnson, William Jorgensen, Philip Lyons (*Emeritus*), J. Michael McBride, Peter Moore, Lynne Regan (*Molecular Biophysics & Biochemistry*), Martin Saunders, Alanna Schepartz, Robert Shulman (*Emeritus, Molecular Biophysics & Biochemistry*), Oktay Sinanoglu (*Emeritus*), Dieter Söll (*Molecular Biophysics & Biochemistry*), Thomas Steitz (*Molecular Biophysics & Biochemistry*), Julian Sturtevant (*Emeritus*), John Tully, Patrick Vaccaro, Harry Wasserman (*Emeritus*), Kenneth Wiberg (*Emeritus*), John Wood, Frederick Ziegler, Kurt Zilm

Associate Professors
David Austin, Craig Crews (*Molecular Biophysics & Biochemistry*), Charles Schmuttenmaer, Scott Strobel (*Molecular Biophysics & Biochemistry*)

Assistant Professors
Victor Batista, J. Patrick Loria, Glenn Micalizio, Ann Valentine

Fields of Study

Fields include bio-inorganic chemistry, bio-organic chemistry, biophysical chemistry, chemical physics, inorganic chemistry, organic chemistry, physical chemistry, physical-organic chemistry, synthetic-organic chemistry, and theoretical chemistry.

Special Admissions Requirements

Applicants are expected to have completed or be completing a standard undergraduate chemistry major including a year of elementary organic chemistry, with laboratory, and a year of elementary physical chemistry. Other majors are acceptable if the above requirements are met. The GRE General Test and the Subject Test in Chemistry are required. Students whose native language is not English are required to take the Test of English as a Foreign Language (TOEFL) and the Test of Spoken English (TSE).

Special Requirements for the Ph.D. Degree

A foreign language is not required. Three term courses are required in each of the first two terms of residence, and participation in additional courses is encouraged in subsequent terms. Courses are chosen according to the student's background and research area. To be admitted to candidacy a student must: (1) receive at least two term grades of Honors, exclusive of those for research; (2) pass either three cumulative examinations and one oral examination (organic students) or two oral examinations (nonorganic students) by the end of the second year of study; and (3) submit a thesis prospectus no later than the end of the third year of study. Remaining degree requirements include completing eight cumulative examinations (organic students), a written thesis describing the research, and an oral defense of the thesis. The ability to communicate scientific knowledge to others outside the specialized area is crucial to any career in chemistry. Therefore, all students are required to teach a minimum of two terms at the level of Teaching Fellow 3 or higher.

Master's Degree

M.S. (en route to the Ph.D.). A student must pass at least five graduate-level term courses in the Chemistry department exclusive of seminars and research. The student must obtain at least one term grade of Honors or three of High Pass in graduate-level courses. One full year of residence is required.

Program materials are available upon request to the Director of Graduate Studies, Department of Chemistry, Yale University, PO Box 208107, New Haven CT 06520-8107.

Courses

CHEM 520[u], Advanced Organic Chemistry. Martin Saunders [F], William Jorgensen [Sp].
MWF 9.30–10.20
A discussion of structure and mechanism in organic chemistry. Fall: bonding, structure and strain; carbanions, carbocations, and carbenes. Spring: The second term covers kinetics, basics of molecular orbital theory and its applications to organic reactivity, pericyclic reactions, non-covalent interactions, and molecular recognition.

[**CHEM 522a[u], Chemical Biology II.**]

CHEM 523[u], Synthetic Methods in Organic Chemistry. Glenn Micalizio [F], John Wood [Sp].
MWF 10.30–11.20
Modern methods of design in synthetic organic chemistry with an emphasis on natural products. Structural-type recognition, stereochemistry, mechanism and function group transformations in multifunctional group molecules are covered.

CHEM 525b[u], Spectroscopic Methods of Structure Determination. Martin Saunders.
TTh 10.30–11.20, 1 HTBA
Applications of NMR, ESR, infrared, UV, visible, and mass spectroscopy to chemical problems concerning structures and reactions. X-ray crystallography. Computer simulation of NMR spectra.

[**CHEM 526a[u], Computational Chemistry and Biochemistry.**]

CHEM 530b[u], Statistical Methods and Thermodynamics. Victor Batista.
MWF 9.30–10.20
The fundamentals of statistical mechanics are developed and used to elucidate gas phase and condensed phase behavior, as well as to establish a microscopic derivation of the postulates of thermodynamics. Topics include ensembles; Fermi, Bose, and Boltzmann statistics; density matrices; mean field theories; phase transitions; chemical reaction dynamics; time-correlation functions; Monte Carlo and molecular dynamics simulations.

[**CHEM 535a,Chemical Dynamics.**]

CHEM 540a[u], Molecules and Radiation I. Kurt Zilm.
MWF 8.30–9.20
An integrated treatment of quantum mechanics and modern spectroscopy. Covers basic wave and matrix mechanics, perturbation theory, angular momentum, group theory, time-dependent quantum mechanics, selection rules, coherent evolution in two-level systems, lineshapes, and NMR spectroscopy.

CHEM 542b[u], Molecules and Radiation II. Mark Johnson.
MWF 10.30–11.20
An extension of the material covered in CHEM 540a to atomic and molecular spectroscopy, including rotational, vibrational, and electronic spectroscopy, as well as an introduction to laser spectroscopy.

[**CHEM 547b,Electron Paramagnetic Resonance.**]

CHEM 548b,Nuclear Magnetic Resonance in Liquids. J. Patrick Loria.
TTh 10.30–11.45
A theoretical treatment of solution NMR spectroscopy with emphasis on applications to proteins and biological macromolecules. This includes a classical and quantum mechanical description of NMR, product operator formalism, multidimensional NMR, phase cycling and gradient selection, relaxation phenomena, and protein resonance assignments.

CHEM 549b[u], Biophysical Chemistry. Peter Moore.
TTh 9–10.15
A detailed discussion of several important experimental techniques used to study the properties of biological macromolecules, emphasizing the application of Fourier methods and concepts to NMR spectroscopy, optical and electron microscopy, image reconstruction, X-ray scattering/diffraction, and mass spectroscopy (also calorimetry and sedimentation, if time permits). Emphasis on the physical chemistry that underlies both the execution of such experiments and the interpretation of the resulting data.

CHEM 550b[u], Theoretical and Inorganic Chemistry. John Faller.
TTh 9–10.15
Covers the major physical methods used in the determination of molecular structure, bonding, and physical properties of metal complexes. Aimed at advanced undergraduate and first-year graduate students. Students should be familiar with both inorganic coordination chemistry and physical chemistry.

CHEM 551a,Physical Inorganic Chemistry. John Faller.
MW 9–10.15
A discussion of stereochemistry in inorganic and organometallic chemistry and physical methods for investigating structure and mechanism. Topics include asymmetric catalysis, methods of resolution of racemic mixtures, CD and ORD, organometallic radicals, supramolecular coordination chemistry, and solid state chemistry.

CHEM 552a[u], Organometallic Chemistry. John Hartwig.
TTh 9–10.15
A general introduction to organometallic chemistry, mostly of the transition metal elements. Topics include bonding, structure, and reactivity of transition metal organometallic compounds, ligand substitution reactions, oxidative addition/reductive elimination reactions, insertion reactions, reactions of coordinated ligands, applications to catalytic processes, and organic synthesis.

[**CHEM 553b,Main Group Chemistry.**]

CHEM 554b,Bio-Inorganic Chemistry. Ann Valentine.
MWF 11.30–12.20
An advanced introduction to biological inorganic chemistry. Important topics in metalloprotein chemistry are illustrated. Objective is to define and understand function in terms of structure. Topics include catalysis with and without electron transfer, and carbon, oxygen, and nitrogen metabolism.

[**CHEM 555a, Transition Metal Reaction Mechanisms.**]

CHEM 556a,Biochemical Rates and Mechanisms. J. Patrick Loria.
MWF 9.30–10.20
The fundamental basis of and methods for studying enzyme function. Topics include transition state theory, pre-steady-state and steady-state enzyme kinetics, and allosterism. The physical principles underlying enzymatic rate enhancements are discussed using examples from the primary literature.

CHEM 557a[u], Modern Coordination Chemistry. Ann Valentine.
TTh 11.30–12.45
The structure of the atom, molecular topologies, ionic bonding, covalent bonding, chemical forces, reaction pathways; fundamental concepts for transition metal complexes; coordination chemistry; structural aspects, isomerism, electron transfer reactions, substitution reactions, molecular rearrangements, and reactions of coordinated ligands; transition metal clusters, multiple bonding between transition metal atoms.

CHEM 560L,Advanced Physical Methods in Molecular Science. Patrick Vaccaro [F], R. James Cross,Jr. [Sp].
F 3–4
A laboratory course introducing physical chemistry tools used in the experimental and theoretical investigation of large and small molecules. Modules include machining materials, electronics, vacuum technology, magnetic resonance, optical spectroscopy and lasers, computational aids, and molecular modeling.

CHEM 562L,Laboratory in Instrument Design and the Mechanical Arts. Kurt Zilm, David Johnson.
Familiarization with modern machine shop practices and techniques. Use of basic metalworking machinery and instruction in techniques of precision measurement and properties of commonly used metals, alloys, and plastics.

CHEM 564L,Advanced Mechanical Instrumentation. Kurt Zilm,David Johnson.
A course geared for both the arts and sciences that goes beyond the basic introductory shop courses, offering an in-depth foundation study utilizing "hands-on" instructional techniques that must be learned from experience. Prerequisite: CHEM 562L.

[**CHEM 565a,Computational Chemistry.**]

[**CHEM 567a[u], Topics in Chemical Biology.**]

[**CHEM 568a,Applications of Molecular Orbital Theory.**]

[**CHEM 569a,Molecular Modeling.**]

CHEM 570a[u], Introductory Quantum Chemistry. Victor Batista.
TTh 9–10.15
The elements of quantum mechanics developed and illustrated with applications to chemical problems. Suitable for first-year graduate students in chemistry who have had some exposure to quantum mechanics as part of an undergraduate chemistry course.

CHEM 572a[u], Advanced Quantum Mechanics. John Tully.
TTh 9–10.15
Topics in quantum mechanics that are essential for understanding modern chemistry, physics, and biophysics. Topics include the interaction of radiation with matter, using quantitized radiation fields, and may include time-dependent quantum theory, scattering, semiclassical methods, angular momentum, density matrices, and electronic structure methods. Prerequisite: CHEM 570 or the equivalent.

[**CHEM 580b[u], Bio-Organic Chemistry.**]

CHEM 600–670,Research Seminars. Faculty.
Presentation of a student's research results to his/her adviser and fellow research group members. Extensive discussion and literature review are normally a part of the series.

CHEM 700,Laboratory Rotation for First-Year Biophysical Graduate Students. Gary Brudvig.

CHEM 720,Current Topics in Organic Chemistry.
A seminar series based on invited speakers in the general area of organic chemistry.

CHEM 730,Molecular Science Seminar.
A seminar series based on invited speakers in the areas of physical, inorganic, and biological chemistry.

CHEM 990,Research. Faculty.
Individual research for Ph.D. degree candidates in the Department of Chemistry, under the direct supervision of one or more faculty members.

CLASSICS

402 Phelps Hall, 432.0977
M.A., M.Phil., Ph.D.

Chair
John Matthews

Director of Graduate Studies
Susanna Morton Braund (404 Phelps, 432.0980, susanna.braund@yale.edu)

Professors
Robert Babcock (*Adjunct, Beinecke Library*), Victor Bers, Susanna Morton Braund, Donald Kagan, Diana Kleiner, John Matthews, William Metcalf (*Adjunct, Art Gallery*)

Associate Professor
Stephen Colvin (*on leave*)

Assistant Professors
Michael Anderson, Björn Ewald, Carlos Noreña, Corinne Pache (*on leave*), Shilpa Raval, Celia Schultz

Lecturers
John Anderson, Emily Anhalt, William Desmond, Veronika Grimm

Senior Research Scholar/Lecturer
Ann Ellis Hanson

Affiliated Faculty
Susanne Bobzien (*Philosophy*), Tad Brennan (*Philosophy*), Maria Georgopoulou (*History of Art; on leave*), Dimitri Gutas (*Near Eastern Languages & Civilizations*), Bentley Layton (*Religious Studies*), Dale Martin (*Religious Studies*), David Quint (*Comparative Literature*), Barbara Shailor (*Deputy Provost for the Arts*)

Fields of Study

The degree program in Classics seeks to provide an overall knowledge of Greek and Roman civilization, combined with specialized work in a number of fields or disciplines within the total area.

Special Admissions Requirements

A minimum of three years of college training in one of the classical languages and two years in the other.

Special Requirements for the Ph.D. Degree in Classics

(1) Passing sight translation examinations in Greek and Latin by the end of the first year in residence; (2) passing departmental reading examinations in French and German by the beginning of the second year in residence; (3) completing fourteen term courses

including: four courses in the history of Greek and Latin literature (or a reasonable equivalent), one course in historical or comparative linguistics, three seminars (two in one language and one in the other), one course in ancient history or classical art and archaeology, one further course not involving the study of Greek or Latin language or literature; (4) satisfying the departmental composition requirement in Greek and Latin (which may but need not be satisfied by courses taken under (3) above); (5) passing translation examinations in Greek and Latin, based on the Ph.D. reading list, by the end of the fifth term in residence; (6) passing oral examinations in Greek and Latin literature, based on the Ph.D. reading list, by the end of the fifth term in residence; (7) passing the special fields oral examinations by the end of the sixth term, consisting of two areas of special concentration in each language selected by the candidate in consultation with the DGS; (8) presentation of a dissertation prospectus by the end of the seventh term in residence to the approval of the Graduate Committee; (9) a dissertation.

In addition to the Graduate School's requirement of Honors grades in at least one year course or two term courses, students must have a High Pass average in the remaining courses. Admission to candidacy for the Ph.D. is granted upon completion of all predissertation requirements not later than the end of the seventh term of study.

The faculty considers experience in the teaching of language and literature to be an important part of this program. Students in Classics typically teach in their third and fourth years of study.

Combined Programs

ANCIENT HISTORY

The Ph.D. program in Ancient History is offered in collaboration with the Department of History and may be pursued in either department. In the Classics department, the Ancient History program of study comprises: (A) language and literature, to include: (1) passing sight translation examinations in Greek and Latin by the end of the first year in residence; (2) passing departmental reading examinations in French and German by the beginning of the second year in residence; (3) completing at least six term courses including two courses in the history of Greek or Latin literature; (4) passing translation examinations in Greek or Latin, based on the Ph.D. reading list, by the end of the fifth term in residence; (5) passing oral examinations in Greek or Latin literature, based on the Ph.D. reading list, by the end of the fifth term in residence; (6) passing a translation examination in the other ancient language based on a 1,000-page reading list approved by the DGS, by the end of the fifth term in residence; and (B) Greek and Roman history, to include: (1) six term courses in Greek and Roman history and, normally, two in another period of history, of which three must be graduate seminars; (2) passing oral examinations in Greek and Roman history on topics approved by the DGS; (C) presentation of a dissertation prospectus by the end of the seventh term in residence to the approval of the Graduate Committee; (D) a dissertation.

CLASSICAL ART AND ARCHAEOLOGY

The program is offered in collaboration with the Department of the History of Art and is designed to give a general knowledge of the development of art in Greece and Italy from the Bronze Age to late antiquity, combining this with a detailed study of one particular period and area; and an acquaintance with the contribution made by field archaeology to our understanding of the classical world. It is expected that each student will be given the opportunity to visit the major sites and monuments. Students are required to pass fourteen term courses, to include three seminars, divided between the two departments; distribution may be adjusted to suit the interests of individual students. Students must demonstrate a competence in Greek and Latin, usually by passing at least one 400/700-level course in each language. They must also pass departmental examinations in German and one other modern language, usually Italian or French, by the beginning of the second year in residence. They will be admitted to candidacy for the Ph.D. after passing a written and oral comprehensive examination in classical art and archaeology and by securing approval of their dissertation prospectus. Further details should be obtained from the director of graduate studies.

CLASSICS AND COMPARATIVE LITERATURE

Students may be admitted to this joint program after consultation with the director of graduate studies of each department, normally during the first term. The requirements are as follows: (1) passing sight translation examinations in Greek and Latin by the end of the first year in residence; (2) completing fourteen term courses including at least seven in Classics, including: two courses in the history of Greek or Latin literature and two seminars; and at least six courses in Comparative Literature, including: at least four courses on post-classical European literature and two courses on literary theory or methodology; (3) demonstrating literary proficiency in English, Greek, Latin, German, and one other modern language during the first two years; (4) passing an oral examination in the Comparative Literature department on six topics appropriate to both disciplines, selected in consultation with the two DGSs, by the end of the sixth term; (5) passing translation examinations in Greek and Latin, based on the Ph.D. reading list, by the end of the fifth term in residence; (6) passing oral examinations in Greek and Latin literature, based on the Ph.D. reading list, by the end of the fifth term in residence; (7) presentation of a dissertation prospectus by the end of the sixth term in residence to the approval of the two DGSs; (8) a dissertation.

CLASSICS AND PHILOSOPHY

Students who have had at least three years of college Greek and two of philosophy may be admitted to a joint program offered in collaboration with the Department of Philosophy. Further details should be obtained from the director of graduate studies of either department.

CLASSICS AND RENAISSANCE STUDIES

The Department of Classics also offers, in conjunction with the Renaissance Studies program, a combined Ph.D. in Classics and Renaissance Studies. For further details, see Renaissance Studies.

Master's Degrees

M.Phil. See Graduate School requirements, pages 397–98.
M.A. (en route to the Ph.D.). Students enrolled in the Ph.D. program qualify for the M.A. degree upon completion of seven courses, ordinarily with a High Pass average in two successive terms.

Program materials are available upon request to the Director of Graduate Studies, Department of Classics, Yale University, PO Box 208266, New Haven CT 06520-8266.

Courses

GREK 730b[u], Aristophanes. William Desmond.
MW 2.30–3.45
A study of Aristophanes' plays in their social and intellectual context — Athenian society from 425 to 405 B.C.E. Reading of most of the *Knights, Clouds,* and *Frogs* in ancient Greek; other plays in translation. Topics include Athenian democracy and imperialism; rhetoric and demagogues; the Sophistic movement and "new education"; the dramatic festivals and Old Comedy; varieties of humor and Aristophanes' literary versatility.

GREK 736a[u], Herodotus and Thucydides. Michael Anderson.
TTH 9–10.15
Close examination of the two major Greek historical works of the fifth century, Herodotus' account of the Persian Wars and Thucydides' account of the Peloponnesian War, with discussion of language, historiography, ethnography, and political thought and with special attention to critical differences between the two historians, their interests, and their methods.

GREK 771b[u], Plutarch. Carlos Noreña.
TTH 2.30–3.45
A study of Plutarch and his writings on the theme of monarchy. Close readings of selections from the *Lives* (Numa, Artaxerxes, Alexander) and the *Moralia* ("Fortune and Virtue in Alexander the Great," "Philosophers and Princes," "The Uneducated Prince"), with attention to Plutarch's political, moral, and philosophical thought and to the historical and cultural contexts in which he wrote.

GREK 790b[u], Syntax and Stylistics. Victor Bers.
TTH 1–2.15
A review of accidence and syntax, stylistic analysis of Greek prose of the fifth and fourth centuries B.C., including a comparison of "prosaic" and "poetic" syntax, and composition in various styles.

GREK 798a[u]/799b[u], Survey for the Major in Classics: History of Greek Literature. Michael Anderson [F], Victor Bers [Sp].
TTH 11.30–12.45, 1 HTBA [F]
TTH 9–10.15, 1 HTBA [Sp]
A comprehensive treatment of Greek literature from Homer to the imperial period. The student is expected to read extensively in the original language, working toward familiarity with the range and variety of the literature.

LATN 704a[u], Epic Successors: Lucan and Statius. Shilpa Raval.
MWF 10.30–11.20
A study of the epic tradition in the early empire with particular attention to issues such as politics, representation, repetition and imitation, the body and identity, and "Silver Age" aesthetic.

LATN 706b[u], Cicero's Philosophical and Religious Treatises. Celia Schultz.
MW 1–2.15
Readings are selected from Cicero's *De Natura Deorum* and *De Divinatione*. Class discussion focuses on not only the philosophical arguments presented but also the value of these texts as evidence for Roman religious practice and attitudes in the Republic. Students are encouraged to investigate further aspects of religious life touched on by Cicero. Items from secondary scholarship (e.g., articles by Elizabeth Rawson, Mary Beard, and Jerzy Linderski) are assigned throughout the term.

LATN 762a[u], Tacitus. Carlos Noreña.
TTh 1–2.15
A literary and historiographical study of Tacitus, with emphasis on theme, rhetoric, narrative patterning, and style. Close readings of selections from the *Agricola, Historiae* (Book I), and *Annales* (Book IV).

LATN 770b[u], Medieval Latin. Robert Babcock.
MW 9–10.15
An introduction to the study of medieval Latin based on selections from a wide range of texts from the fourth century to the fourteenth. For students in classics as well as in other fields.

LATN 790b[u], Latin Syntax and Style. William Metcalf.
TTh 11.30–12.45
A systematic review of syntax and an introduction to Latin style. Selections from Latin prose authors are read and analyzed, and students compose short pieces of Latin prose. The course is designed for students with some experience reading Latin literature who desire a better foundation in forms, syntax, idiom, and style.

LATN 798a[u]/799b[u], Survey for the Major in Classics: History of Latin Literature. Celia Schultz [F],Shilpa Raval [Sp].
TTh 11.30–12.45, 1 HTBA [F]
TTh 9–10.15, 1 HTBA [Sp]
A wide-ranging treatment of Latin literature from its beginnings through the late imperial period. Students are expected to read extensively in the original language in order to gain familiarity with literature of various genres from different periods.

HIST 514b[u], Athenian Imperial Democracy. Donald Kagan.
T 1.30–3.20
A history of Greece in the years between the Persian invasion and the Peloponnesian War, with emphasis on Athens. Prerequisite: HIST 205a or equivalent.

HIST 518a[u], The Spartan Hegemony. Donald Kagan.
T 2.30–4.20
A history of Greece during the period 404–362 B.C. Focus on the relationship between domestic constitutions and politics and diplomacy and war. Prerequisite: HIST 205a or equivalent.

CLSS 610a[u], The Historical Geography of the Graeco-Roman World. John Matthews.
M 2.30–4.20
Through readings in the ancient literary and geographical sources, archaeological examples, and a selection of case studies, the course surveys the geographical factors that shaped Graeco-Roman culture and its expansion through the Mediterranean, Near Eastern, and northern European worlds, from the period of the Greek colonization to the later Roman Empire. Prerequisites: proficiency in Greek and Latin.

CLSS 620a[u], Textual Criticism. Robert Babcock.
Th 2.30–4.20
The transmission of classical Latin texts from ancient times to modern printed edition; the principles of an *apparatus criticus;* and types of corruption that occur in manuscripts. Introduction to editorial methodology and stemmatics. Prerequisites: advanced proficiency in Latin; reading knowledge of French, German, or Italian desirable.

CLSS 630b[u], The Hippocratic Corpus. Ann Ellis Hanson.
W 2.30–4.20
Juxtaposes treatises from the medical writers of the Hippocratic Corpus with works of Greek literature dealing with similar topics, for medicine provides an interesting lens through which to filter social and cultural preferences of fifth- and fourth-century Greece. Topics include the role of the healer (*iatros*); constructs of gender and female nature; conception, childbirth, and notions of legitimacy; Greek ideas about the interface between environment and human health and behavior; the mechanics of madness and sudden seizures. Prerequisites: Greek; reading knowledge of French, German, or Italian.

CLSS 831b, Thucydides. Donald Kagan.
Th 1.30–3.20
Selected problems in Thucydides' aims and methods. Ancient Greek required; German, French, and Italian are also helpful. *Also HIST 517b.*

CLSS 835b, Early Roman Religion. Celia Schultz.
M 2.30–4.20
A detailed examination of major issues and problems in the study of Roman religion in the archaic period through the early and middle Republic. What is the nature of our sources? How do we reconcile conflicting sources (e.g., literary texts and archaeological material)? What is really Roman, versus what is Greek, Italic, or Etruscan? What are the major trends in the history of the field? It is expected that students will have a strong command of both Latin and ancient Greek. Course readings of ancient materials include epigraphic texts as well as extensive selections from the first decade of Livy's *AUC,* relevant works of Cicero, Festus, Plutarch, and others. Students must also possess reading knowledge of at least one modern language sufficient to handle select items of recent scholarship.

CLSS 850b, Topics in Roman History and Culture. John Matthews.
F 4–6
A weekly program of research papers on various topics, given by faculty members, graduate students, and visitors to Yale, followed by formal and informal discussion. Graduate students may acquire a course credit by presenting a paper to the seminar or by writing a term paper on one of the topics chosen, together with regular participation and contributions to discussion. Suggestions for and offers of papers are welcome. *Also HIST 525b.*

CLSS 876a, Traduttore Traditore? Latin Poetry Englished: Theory and Practice. Susanna Braund.
T 2.30–4.20
Is the act of translation a recovery, a conversion, an adaptation, or a transplantation of the original? What are the different aims and uses of translations? Is the translator inevitably a

"traitor," as the Italian expression *traduttore traditore* implies? This course studies the theory and practice of translating classical Latin poetry into English by tracing translation histories, by evaluating different translations, and by composing new translations. The course involves the close study of passages from Latin poetry. Authors studied include Catullus, Vergil, Lucan, Plautus, Seneca, Lucretius, Horace, Ovid, Persius, and Juvenal. Prerequisites: at least two years of college-level Latin.

CLSS 878b,The City of Rome. Björn Ewald,Christopher Wood.
T 1.30–3.20
This seminar is structured around a trip to Rome during spring break. Class meetings address the history, topography, urban politics, architecture, and art of Rome from antiquity to the eighteenth century, with some attention to late-nineteenth- and early-twentieth-century urbanism and restoration policy as well. Topics include the myth of Rome's origins; urban planning; Roman sculpture and architecture; the city as spectacle; imperial spaces and monuments; temple and church construction; the relic cult and pilgrimages; civic icons; the survival of pagan artifacts in the Middle Ages; tombs and cemeteries; early travel guides; palaces and villas; the use of spolia and the construction of a monumental memory. We explore how changes in the architectural organization of public space reflect Rome's political, social, and economic changes over the centuries. The questions of continuity and change, transformation and adaptation, will be leitmotifs of the course. The course is designed for all students of Western art and culture, not only for those focusing on Roman archaeology and art history. *Also HSAR 525b.*

CLSS 900a/b,Directed Reading.
By arrangement with faculty.

CLSS 910a/b,Directed Reading.
By arrangement with faculty.

COMPARATIVE LITERATURE

451 College, Rm 202, 432.2760
M.A., M.Phil., Ph.D.

Chair
David Quint

Director of Graduate Studies
Cyrus Hamlin (cyrus.hamlin@yale.edu)

Professors
Dudley Andrew, Peter Brooks, Katerina Clark, Shoshana Felman, Roberto González Echevarría, Cyrus Hamlin, Benjamin Harshav, Michael Holquist, Carol Jacobs, David Quint, Katie Trumpener

Associate Professors
Ann Gaylin, Pericles Lewis

Assistant Professors
Ala Alryyes, Alexander Beecroft, Vilashini Cooppan, Catherine Labio

Fields of Study

The Department of Comparative Literature introduces students to the study and understanding of literature beyond linguistic or national boundaries; the theory, interpretation, and criticism of literature; and its interactions with adjacent fields like history, culture, language, psychology, law, and philosophy. The comparative perspective invites the exploration of such transnational phenomena as literary or cultural periods and trends (Renaissance, Romanticism, Modernism, Postcolonialism) or genres and modes of discourse. Students may specialize in any cultures or languages, to the extent that they are sufficiently covered at Yale. The Ph.D. degree qualifies the candidate to teach Comparative Literature as well as the national literature(s) of her or his specialization.

Special Admissions Requirements

Applicants must hold a B.A. or equivalent degree and should normally have majored in Comparative Literature, English, a classical or foreign literature, or in an interdepartmental major that includes literature. They must be ready to take advanced courses in two foreign literatures in addition to English upon admission. The GRE General Test is required. A ten- to twenty-page writing sample should be submitted with the application.

Special Requirements for the Ph.D. Degree

Students must successfully complete fourteen term courses, including at least seven listed under the departmental heading. The student's overall schedule must fulfill the following requirements: (1) at least one course in medieval or classical European literature, philology, or linguistics (or their equivalents in other cultures); one course in the Renais-

sance or Baroque (or equivalents); and one course in the modern period; (2) three courses in literary theory or methodology; (3) course work dealing with texts from three literatures, one of which may be English or American. Any course may be counted for several requirements simultaneously.

Languages: Literary proficiency in four languages (including English, at least one other modern language, and one classical or ancient language, such as Latin, Sanskrit, Provençal, or Biblical Hebrew). The fulfillment of this requirement will be demonstrated by a written exam consisting of a translation of a literary or critical text, to be held by the end of the sixth term; or by an equivalent level in the student's course work.

Orals: An oral examination in two parts, to be taken in the third year of studies, demonstrating both the breadth and specialization as well as the comparative scope of the student's acquired knowledge. The first part consists of six topics that include texts from three national literatures and several historical periods (at least one modern and one before the Renaissance). The topics should also include representatives of the three traditional literary genres (poetry, drama, narrative fiction) and one question on theory or criticism. The second part consists of the student's presentation of a topic based on his or her original work.

The Ph.D. dissertation, supervised by a dissertation director (or directors) and approved by the departmental faculty, completes the degree. Its initial step is a dissertation prospectus, to be submitted and approved by the dissertation director and the faculty in the course of the seventh term of study. Admission to candidacy for the Ph.D. is granted after six terms of residence and the completion of all requirements (courses, languages, orals, prospectus) except the dissertation.

Teaching: Training in teaching, through teaching fellowships, is an important part of every student's program. Normally students will teach in their third and fourth years.

Combined Ph.D. Programs

COMPARATIVE LITERATURE AND CLASSICS

The Department of Comparative Literature also offers, in conjunction with the Department of Classical Languages and Literatures, a combined Ph.D. in Comparative Literature and Classics. For further details, see Classics.

COMPARATIVE LITERATURE AND FILM STUDIES

The Department of Comparative Literature also offers, in conjunction with the Program in Film Studies, a joint Ph.D. in Comparative Literature and Film Studies. For further details, see Film Studies. Applicants to the joint program must indicate on their application that they are applying both to Film Studies and to Comparative Literature. All documentation within the application should include this information.

COMPARATIVE LITERATURE AND RENAISSANCE STUDIES

The Department of Comparative Literature also offers, in conjunction with the Renaissance Studies program, a combined Ph.D. in Comparative Literature and Renaissance Studies. For further details, see Renaissance Studies.

Master's Degrees

M.Phil. See Graduate School requirements, pages 397–98. Alternatively, the Department of Comparative Literature offers, in conjunction with the Medieval Studies program, a joint M.Phil. degree. For further details, see Medieval Studies.
M.A. (en route to the Ph.D.). Students enrolled in the Ph.D. program may receive the M.A. upon completion of ten courses with at least two grades of Honors and a maximum of three grades of Pass, and the demonstration of proficiency in *two* of the languages, ancient or modern, through course work or departmental examinations.
No student is admitted to a terminal M.A.

Program materials are available upon request to the Director of Graduate Studies, Department of Comparative Literature, Yale University, PO Box 208299, New Haven CT 06520-8299.

Courses

CPLT 501,Introduction to Renaissance Studies. David Quint [F], Lawrence Manley [Sp].
TH 1.30–3.20 [F], W 3.30–5.20 [Sp]
An introduction to major texts, issues, bibliography, and methods in the interdisciplinary study of the Renaissance. Emphasis in the first term on the literature of Italy and in the second on northern Europe. *Also ENGL 565a/b, RNST 500a,b.*

CPLT 511b[u], Introduction to Theory of Literature. Paul Fry.
TTH 11.30–12.20, 1 HTBA
An examination of concepts and assumptions present in contemporary views of literature. Theory of meaning, interpretation, and representation. Critical analysis of formalist, psychoanalytic, structuralist, post-structuralist, Marxist, and feminist approaches to theory and literature. Graduate students meet at same times and are required to do a term paper.

CPLT 515a,Problems in the Theory of Literature. Benjamin Harshav.
M 1.30–3.20
Introductory proseminar for all first-year graduate students in Comparative Literature. Critical readings of basic texts in modern literary theory on questions such as the discipline of comparative literature; theory, history, and criticism; interpretation and evaluation; theories of "the language of poetry," narrative, and "fictional worlds"; literature and ideology; periods and genres; postmodernism and feminism.

CPLT 529a,American Literary Globalism. Wai Chee Dimock.
W 10.30–12.20
What is the relation between American literature and world culture? How important are cross-time translations, and what does it mean for Emerson, Thoreau, Margaret Fuller, Ezra Pound, Robert Lowell, and W. S. Merwin to be practitioners in this genre? How important are global roots to authors such as Maxine Hong Kingston, Toni Morrison, and Leslie Silko? This course explores "globalism" as the broadest possible frame for American literature, bringing together authors across centuries, across racial divisions, and across the customary division between poetry and prose. *Also AMST 925a, ENGL 925a.*

CPLT 530b[u], The Drama and Theater of Bertolt Brecht. Cyrus Hamlin.
TTh 11.30–12.45
The major plays by Bertolt Brecht are studied in the context of their performance in the theater under his direction, specifically in Berlin during the 1920s and after World War II from 1949 to 1956. Among the works to be studied are *Baal, Drums in the Night, In the Jungle of the Cities, Man is Man, Threepenny Opera, Rise and Fall of the City of Mahagonny, The Measures Taken, Saint Joan of the Stockyards, Mother Courage and Her Children, Life of Galileo, The Good Woman of Setzuan,* and *Caucasian Chalk Circle.* Reading and discussion in English. Occasional viewing of video materials. *Also GMAN 613b[u].*

CPLT 531a, Poetics of Representation: Sebald,Rilke, Yeats. Carol Jacobs.
T 1.30–3.20
Readings of the works of three twentieth-century authors who, in very different ways, challenge conventional modes in which to consider the relationship between literature and what we tend to call reality. Inevitably we have to take into account on the one hand Sebald's and Yeats's difficult stances toward what we tend to call the political, as well as Rilke's apparent withdrawal from the realm of such worldly concerns. We necessarily also ask how to think the performance of art and its implicit theorizations as crucial to these questions. *Also GMAN 560a.*

CPLT 538b,The Galaxy of Modernisms: Ideologies and Poetics. Benjamin Harshav.
M 1.30–3.20
An interdisciplinary seminar on the ideologies and principles of poetics of the major trends in twentieth-century literature and the arts. Italian and Russian Futurism, Expressionism, Acmeism, Imagism, Dada, Surrealism, Postmodernism in German, Italian, Russian, French, English, Hebrew, and other cultures. The discourse of Modernist trends, their similarities and divergences. Readings of manifestos and recent scholarly books. Emphasis on art and literature, with several trends in film theory (Eisenstein) and architecture (Bauhaus vs. Postmodernism). Slides and films are shown.

CPLT 571a,Promised Lands: Slavery, Literature,and Modernity in Russia and the United States. John MacKay.
T 1.30–3.20
Close, comparative, contextualized examination of literary and other forms of cultural production associated with U.S. slavery and Russian serfdom. Special attention is paid to the relation between bondage and national, cultural, and personal identity; the role of bondage in definitions of "aesthetic experience" in the pre- and post-emancipation periods; the relation between literacy and the literary; literature of protest in the two countries; and connections between geographical and subjective space within cultures of enslavement. We examine works by Pushkin, Aksakov, Gogol, Simms, Cooper, Crèvecoeur, Radishchev, Karamzin, Goncharov, Tolstoy, Kennedy, and the "plantation novelists," Stowe, Melville, Turgenev, slave and serf autobiographers, freedman's textbooks, Fet, Lanier, Page, Chesnutt, and Bunin; historical treatments by Kolchin, Genovese, and others; theoretical works by Said, Jameson, Saidiya Hartman, Bakhtin, and others. Requirements: in-class presentations; research paper. No knowledge of Russian required. *Also AMST 926a, RUSS 675a.*

CPLT 583b[u], Mania and Mass Psychology. Eric Schwab.
W 3.30–5.20
Exploration of the correlation between traditional concepts of mania (from enthusiasm to bipolar disorder) and the psychology of human masses (from groups and crowds to mass culture and religious and political movements). Readings from theoretical and literary works (including Freud, Kant, Benjamin, Brecht, Reich, Schreber, Canetti, Theweleit) as well as films (*Metropolis, Triumph of the Will, Kuhle Wampe*) that attempt to describe, explain, and/or transform the "mass" mentality in some way. Topics include rhetoric and propaganda, communism and fascism, violence and sexuality, schizophrenia and mass media. *Also GMAN 583b[u].*

CPLT 677b, Performing Arts in the Twentieth Century: The Russian Stage. Katerina Clark.
W 1.30–3.20
Covers most of the performing arts: ballet, opera, theater, mass spectacle, and film. Theory of the performing arts, including selections from the writings of some of the most famous Russian directors such as Stanislavsky, Meierhold, Eisenstein, and Balanchine. Their major productions and some of the major Russian plays of the twentieth century (e.g., by Chekhov, Mayakovsky, Bulgakov, and contemporary dramatists). No knowledge of Russian is required. Students taking the course for credit in Comparative Literature can write their papers on texts in other languages. *Also RUSS 699b.*

CPLT 681a, The Mock-Heroic Moment: Milton to Eliot. Claude Rawson.
M 1.30–3.20
The course begins with Milton's critique of military epic in *Paradise Lost.* It deals with the changes in the status of the heroic following the decline of the traditional military epic in the seventeenth century, partly under the pressure of increasing anti-war sentiment, and of the domestication of subject matter which led to the so-called "rise of the novel." Deals with Boileau, Dryden, Swift (*Battle of the Books*), Pope, Gay, Fielding, Byron, Shelley, Eliot, Joyce, and Auden. *Also ENGL 681a.*

CPLT 687b, Tragic and Sacred Drama in the Seventeenth Century. Blair Hoxby.
M 3.30–5.20
Authors include late Shakespeare, Beaumont and Fletcher, Corneille, Calderon, Dryden, Racine, and Otway. Topics include conditions of performance; the representation of the passions on stage; the relationship of the tragic, the sacred, and the ritual; and the place of the theater in seventeenth-century society. *Also ENGL 700b.*

CPLT 772b, The Jungle Books. Roberto González Echevarría.
W 4–6
Journeys to the jungle in poetry, fiction, autobiography, anthropology, travel narrative, and popular culture and their relation to imperialism. Particular attention is given to the origins and evolution of the social sciences and their reflection in fiction, as well as to popular culture versions of the journey to the jungle in literature and films, such as those about Tarzan and Indiana Jones. Texts: Charles Baudelaire, "Le voyage"; Alvar Núñez Cabeza de Vaca, *Castaways;* Alejo Carpentier, *The Lost Steps;* André Malraux, *La voie royale;* Sir Arthur Conan Doyle, *The Lost World;* Joseph Conrad, *Heart of Darkness;* Claude Lévi-Strauss, *Tristes tropiques;* Rómulo Gallegos, *Canaima;* Mario Vargas Llosa, *The Storyteller;* Rudyard Kipling, *The Jungle Books;* William Henry Hudson, *Green Mansions;* Jules Verne, *Superbe Orénoque* and *La jangada;* and others. In English; knowledge of Spanish and French desirable. *Also SPAN 949b.*

CPLT 789a, Testimony: Crises of Witnessing in Literature, Psychoanalysis, and History. Shoshana Felman.
W 3.30–5.20
The course looks at various instances of testimony (literary, historical, legal, poetical, political, and psychoanalytic) as part of a general investigation of memory and trauma through narratives of individual and collective limit-experiences. In analyzing art's relation both to death and to survival, the course probes (in texts and films) the limits of what can be said and the limits of representation in the face of events whose reality unsettles common sense, defies imagination, and resists assimilation. Topics include the tension between violence and speech, truth and denial, judgment and forgiveness, and the concrete interrelations between language, silence, mourning, injury, identity, and cross-cultural exchanges (texts by Plato, Jacques Lacan, Emile Zola, Oscar Wilde, Virginia Woolf, Hannah Arendt; syllabus to be posted on the Web in August). Requirements: two short papers in the course of the term; oral presentations and ongoing active participation. *Also FREN 789a.*

CPLT 812b, Jane Austen and the British Empire. Katie Trumpener.
M 10.30–12.20
Describing the linked emergence of feminism and nationalism in British-governed Ceylon, Sam Selvadurai's recent historical novel, *Cinnamon Gardens,* underlines the transformative effect of Jane Austen's fiction (especially *Mansfield Park*) on indigenous readers. Over the last decade, Western scholars have debated whether *Mansfield Park* is implicitly imperial(ist) or explicitly critical of imperial power. This course seeks to reopen those debates through a broader examination of Austen's late fiction (*Emma, Persuasion, Mansfield Park, Sanditon*) in relationship to other Romantic novels concerned with empire and abolition (including works by Maria Edgeworth, Walter Scott, Mary Hays, Amelia Opie, Elizabeth Hamilton), and through an examination of Austen's formative influence on nineteenth-century "colonial" fiction, particularly the emerging English-language novelistic traditions of Canada, Australia, and British India (including works by Margaret Oliphant, Rudyard Kipling, Ada Cambridge, Sara Jeanette Duncan, Rabindranath Tagore, George Moore, James Joyce). *Also ENGL 812b.*

CPLT 900, Directed Reading. Faculty.

CPLT 901, Individual Research. Faculty.

CPLT 917a, Films and Their Study. Dudley Andrew.
T 10.30–12.20
"Films and Their Study" sets in place some undergirding for graduate students in various disciplines who plan to develop a subspecialty or who want to anchor their particular film interest to something like the "professional discourse" of this field. Providing a coordinated set of topics under the rubrics of (a) spectacle, (b) narrative, (c) realism, and (d) signification, the flow of this survey is interrupted first by the often discordant relation of history to theory and second by the obtuseness of the films examined each week. As the title of this seminar is meant to convey, films themselves take the lead in our discussions. *Also FILM 601a.*

CPLT 924b^{u}, Readings in Hebrew Poetry. Benjamin Harshav.
W 1.30–3.20
Modernism in Hebrew poetry: close readings of the poetry of Nathan Alterman, Lea Goldberg, Nathan Zach, Yona Volakh, Avot Yeshurun. Advanced undergraduate course, open to graduate students. Prerequisite: a high level of reading Hebrew texts in poetry and criticism, and permission of instructor.

CPLT 932a^{u}, German Cinema 1945–1965: Cold War Film Culture. Katie Trumpener.
TTh 11.30–12.45
Juxtaposing East and West German films, this course explores their diverging accounts of Nazi and postwar life; the theory and practice of socialist filmmaking; cinema culture; questions of genre; the emerging New Waves. *Also FILM 729a^{u}, GMAN 730a.*

CPLT 934b, The Archive of Popular Front France. Dudley Andrew.
T 1.30–3.20; screenings TBA
In 1930s Paris, novelists (Céline, Malraux), intellectuals (Gide, Benjamin), and filmmakers (Renoir) found themselves recruited by politics. Using cinema to bracket the Popular Front (Surrealism on one side, Poetic Realism on the other), this seminar examines publishing, the art scene, and radical groups such as the Collège de Sociologie to track the social changes visible in French culture at the end of the Third Republic. In English. *Also FILM 843b, FREN 931b.*

CPLT 950b, Walter Benjamin's Literary Criticism. Winfried Menninghaus.
T 3.30–5.20
Walter Benjamin's literary criticism provides a critical transformation of both aesthetic concepts (beauty, semblance, the sublime), and rhetorical figures (irony, allegory). It puts into question the relations of myth, literature, philosophy, dream, and history. The seminar

focuses on a discussion of Benjamin's highly influential basic concepts while at the same time drawing on some of the literary works he deals with. The second half of the class is devoted to the way the later Benjamin of the "Arcades Project" transforms his modes of literary readings into a new kind of reading societal "dream energies" in fashion, technology, architecture, interior design, and trends of the visual arts. *Also GMAN 675b.*

CPLT 956b,Modernism and Sexuality: A Literary Approach. Laura Frost.

T 10.30–12.20

This course examines the representation of sexuality in modern fiction through a formal and historical approach. We consider how literary constructions of sexuality reflect modernist aesthetics and formal innovation as well as historical preoccupations such as pseudo-scientific discourses of sexuality from the turn of the century to the mid-twentieth century. Topics include sexology and psychoanalysis, Victorianism and the "repressive hypothesis," theories of "perversion," female sexuality and feminism, modernism and mass culture, eroticism and pornography, and the politics of pleasure. Primary authors include T.S. Eliot, Djuna Barnes, Radclyffe Hall, Henry James, James Joyce, D.H. Lawrence, Mina Loy, Thomas Mann, Marcel Proust, Oscar Wilde, and Virginia Woolf. Other critical readings include Bersani, Boone, Butler, Carpenter, Ellis, Foucault, Laqueur, Rubin, and Sedgwick. *Also ENGL 956b, WGST 720b.*

CPLT 979b[u], Text,Memory, Identity. Michael Holquist.

TTh 11.30–12.45

The course examines three key concepts that are increasingly used in literary and cultural studies. We analyze relations between them as they work together to authorize religions, create works of art, national imaginaries, and personal identities. Readings are divided between two kinds of works. Some are theoretical (on literacy/orality, concept of text in various ancient and modern thinkers, theories of memory). In addition, we examine exemplary texts (primarily literary, but also religious and historical). Theoretical readings include those arguing "the Homer question," Jurij Lotman and Mikhail Bakhtin, Roland Barthes on different textually defined culture systems, and Plato, Burnett, Halbwachs, Freud, Wertsch on memory. Exemplary texts include several "simple forms" (epigraphs, parables), selections from the Bible, short stories by von Kleist, Gogol, Hawthorne, and Kafka, plus excerpts from nationalist ideologies (Fichte, Dostoevsky, Emerson). In addition to a ten-page paper at midterm and a ten-page final essay, each student is expected to e-mail a one-page précis of reactions to reading assignments each week.

COMPUTATIONAL BIOLOGY AND BIOINFORMATICS

Bass 432A, 432.8189
M.S., Ph.D.

Directors of Graduate Studies
Mark Gerstein (Bass 432A, 432.6105. mark.gerstein@yale.edu)
Perry Miller (300 George St, Suite 501, 737.2903, perry.miller@yale.edu)

Professors
Joseph Chang (*Statistics*), Ronald Coifman (*Mathematics*), Donald Engelman (*Molecular Biophysics & Biochemistry*), William Jorgensen (*Chemistry*), Perry Miller (*Anesthesiology; Molecular, Cellular & Developmental Biology*), Anna Pyle (*Molecular Biophysics & Biochemistry*), Martin Schultz (*Computer Science*), Gordon Shepherd (*Neurobiology*), Avi Silberschatz (*Computer Science*), Michael Snyder (*Molecular, Cellular & Developmental Biology*), Günter Wagner (*Ecology & Evolutionary Biology*), Steven Zucker (*Computer Science*)

Associate Professors
James Aspnes (*Computer Science*), Mark Gerstein (*Molecular Biophysics & Biochemistry; Computer Science*), Elias Lolis (*Pharmacology*), Heping Zhang (*Epidemiology & Public Health; Statistics*), Hongyu Zhao (*Epidemiology & Public Health; Genetics*)

Assistant Professors
Andrew Miranker (*Molecular Biophysics & Biochemistry*), Valerie Reinke (*Genetics*), David Tuck (*Pathology*), Kevin White (*Genetics*)

Fields of Study

Computational biology and bioinformatics (CB&B) is a rapidly developing multidisciplinary field. The systematic acquisition of data made possible by genomics and proteomics technologies has created a tremendous gap between available data and their biological interpretation. Given the rate of data generation, it is well recognized that this gap will not be closed with direct individual experimentation. Computational and theoretical approaches to understanding biological systems provide an essential vehicle to help close this gap. These activities include computational modeling of biological processes, computational management of large-scale projects, database development and data-mining, algorithm development and high-performance computing, as well as statistical and mathematical analyses.

To enter the Ph.D. program, students apply to an interest-based track within the interdepartmental program in the Biological and Biomedical Sciences.

Special Admissions Requirements

Applicants are expected (1) to have a strong foundation in the basic sciences, such as biology, chemistry, and mathematics, and (2) to have training in computing/informatics, including significant computer programming experience. The Graduate Record Examination (GRE) General Test is required, and the GRE Subject Test in cell and molecular

biology, biology, biochemistry, chemistry, computer science, or other relevant discipline is recommended. Applicants for whom English is not their native language are required to submit results from the Test of English as a Foreign Language (TOEFL).

Special Requirements for the Ph.D. Degree

With the help of a faculty advisory committee, each student plans a program that includes courses, seminars, laboratory rotations, and independent reading. Students are expected to gain competence in three core areas: (1) computational biology and bioinformatics, (2) biological sciences, and (3) informatics (including computer science, statistics, and applied mathematics). The courses taken to satisfy the core areas of competency may vary considerably. A typical program will include nine courses. Completion of the core curriculum will typically take three to four terms, depending in part on the prior training of the student. Students will typically take two to three courses each term and three research rotations during the first year. After the first year, students will start working in the laboratory of their Ph.D. thesis supervisor. Students must pass a qualifying examination normally given at the end of the second year or the beginning of the third year. There is no language requirement. Students will serve as teaching assistants in two term courses.

Master's Degree

M.S. (en route to the Ph.D.). To qualify for the awarding of the M.S. degree a student must (1) complete two years (four terms) of study in the Ph.D. program, (2) complete the required course work for the Ph.D. program with an average grade of High Pass, (3) successfully complete three research rotations, and (4) meet the Graduate School's Honors requirement.

Courses

Students normally take at least three of the following four core courses.

MB&B 752a[u], Genomics and Bioinformatics.

MCDB 750b,Core Topics in Biomedical Informatics.

STAT 645b,Statistical Methods in Genetics and Bioinformatics.

CHEM 526a[u], Computational Chemistry and Biochemistry.

Additional courses focused on the biological sciences and on areas of informatics are selected by the student in consultation with CB&B faculty.

COMPUTER SCIENCE

A.K. Watson Hall, 432.1246
M.S., M.Phil., Ph.D.

Chair
Paul Hudak

Director of Graduate Studies
Drew McDermott (508 AKW, 432.1283, drew.mcdermott@yale.edu)

Professors
Dana Angluin, Ronald Coifman (*Mathematics*), Julie Dorsey, Stanley Eisenstat, Joan Feigenbaum, Michael Fischer, David Gelernter, Paul Hudak, Ravindran Kannan, Drew McDermott, A. Stephen Morse (*Electrical Engineering*), Zhong Shao (*on leave*), Martin Schultz, Abraham Silberschatz, Steven Zucker

Associate Professor
James Aspnes (*on leave*)

Assistant Professors
Daniel Friendly (*Electrical Engineering*), Mark Gerstein (*Molecular Biophysics & Biochemistry*), Arvind Krishnamurthy, Yorgis Makris (*Electrical Engineering*), Brian Scassellati, Carsten Schürmann (*on leave*), Yang Richard Yang

Adjunct Professor
Willard Miranker

Lecturer
Robert Dunne

Fields of Study

Artificial intelligence (vision, robotics, planning, computational neuroscience, neural networks); programming languages and systems (functional programming, parallel languages and architectures, programming environments, formal semantics, software engineering, compilation techniques, modern computer architecture, theorem proving and proof assistants, type theory/systems, logical frameworks, and meta-programming); scientific computing (numerical linear and nonlinear algebra, numerical solution of partial differential equations, mathematical software, parallel algorithms); theory of computation (algorithms and data structures, complexity, distributive systems, learning, online algorithms, graph algorithms, geometric algorithms, fault tolerance, reliable communication, cryptography, security, and electronic commerce); and topics of discrete mathematics with application to computer science (combinatorics, graph theory, combinatorial optimization).

Research Facilities

The department operates a high-bandwidth, local-area computer network based mainly on distributed workstations and servers, with connections to worldwide networks. Workstations include Sun SPARCstations and Workstation PCs (NT and/or Linux). A vision laboratory contains specialized equipment for vision and robotics research. Various printers, including color printers, as well as image scanners, are also available. The primary educational facility consists of thirty-seven PC workstations supported by a large Intel PC server. This facility is used for courses and unsponsored research by computer science majors and first-year graduate students. Access to computing, through both the workstations and remote login facilities, is available to everyone in the department.

Special Admissions Requirements

Applicants for admission should have strong preparation in mathematics, engineering, or science. They should be competent in programming but need no computer science beyond that basic level. The GRE General Test and a pertinent Subject Test are required.

Special Requirements for the Ph.D. Degree

There is no foreign-language requirement. To be admitted to candidacy, a student must: (1) pass twelve courses (including CPSC 690 and CPSC 691) with at least two grades of Honors, the remainder at least High Pass, including three advanced courses in an area of specialization; (2) successfully complete a research project in CPSC 690, 691, and submit a written report on it to the faculty; (3) pass written comprehensive examinations covering basic material in the major subareas of computer science; (4) pass a qualifying examination in an area of specialization; (5) be accepted as a thesis student by a regular department faculty member; (6) serve as a teaching assistant for two terms; and (7) submit a written dissertation prospectus, with a tentative title for the dissertation. At least six courses and two parts of the comprehensive examination must be completed by the end of the first year, and the remainder of the first four requirements must normally be completed by the end of the second year. In order to gain teaching experience, all graduate students are required to serve as teaching assistants for two terms during their first three years of study. All requirements for admission to candidacy must be completed prior to the end of the third year.

Master's Degrees

M.Phil. See Graduate School requirements, pages 387–98.

M.S. (en route to the Ph.D.). To qualify for the M.S., the student must pass eight courses at the 500 level or above from an approved list. An average grade of at least High Pass is required, with at least one grade of Honors.

Master's Degree Program. Students may also be admitted to a terminal master's degree program directly. The requirements are the same as for the M.S. en route to the Ph.D. This program is normally completed in one year, but a part-time program may be spread over as many as four years.

A brochure providing additional information about the department, faculty, courses, and facilities is available from the Graduate Coordinator, Department of Computer Science, Yale University, PO Box 208285, New Haven CT 06520-8285; e-mail, cs-admissions@cs.yale.edu.

Courses

CPSC 521a[u], Compilers and Interpreters. Zhong Shao.
MWF 1.30–2.20
Compiler organization and implementation: lexical analysis, formal syntax specification, parsing techniques, execution environment, storage management, code generation and optimization, procedure linkage, and address binding. The effect of language-design decisions on compiler construction.

CPSC 522b[u], Operating Systems. Arvind Krishnamurthy.
MWF 1.30–2.20
The design and implementation of operating systems. Topics include synchronization, deadlocks, process management, storage management, file systems, security, protection, and networking.

[**CPSC 524a[u], Parallel Programming Techniques.**]

CPSC 525a[u], Theory of Distributed Systems. Arvind Krishnamurthy.
MWF 11.30–12.20
Models of asynchronous distributed computing systems. Fundamental concepts of concurrency and synchronization, communication, reliability, topological and geometric constraints, time and space complexity, and distributed algorithms.

[**CPSC 529a[u], Functional Programming.**]

CPSC 530a[u], Formal Semantics. Paul Hudak.
TTh 1–2.15
Introduction to formal approaches to programming language design and implementation. Topics include the lambda-calculus, type theory, denotational semantics, type-directed compilation, higher-order modules, and application of formal methods to systems software and Internet programming.

[**CPSC 533b, Computer Networks.**]

CPSC 534b[u], Mobile Computing and Wireless Networking. Yang Richard Yang.
MW 2.30–3.45
An introduction to the principles of mobile computing and its enabling technologies. Topics include principles of mobile computing; wireless systems; information management; location-independent and location-dependent computing models; disconnected and weakly connected operation models; human-computer interactions; mobile applications and services; security; power management; and sensor networks.

CPSC 537a[u], Introduction to Databases. Abraham Silberschatz.
MWF 10.30–11.20
An introduction to database systems. Data modeling. The relational model and the SQL query language. Relational database design, integrity constraints, functional dependencies, and natural forms. Object-oriented databases. Implementation of databases:file structures, indexing, query processing, transactions, concurrency control, recovery systems, and security.

CPSC 539b[u], Computer Systems. Staff.
MW 2.30–3.45
The organization of computer systems as hardware and software systems. Instruction-set architecture, assembly programming, computer arithmetic, data-path architecture and control, pipelining, memory hierarchy. Concepts illustrated by exploration of an instructional RISC microprocessor. *Also ENAS 907b[u].*

CPSC 540b[u], Numerical Computation I. Vladimir Rokhlin.
TTh 2.30–3.45
Algorithms for numerical problems in the physical, biological, and social sciences: solution of linear and nonlinear systems of equations, interpolation and approximation of functions, numerical differentiation and integration, optimization.

[CPSC 555b[u], Economics and Computation.]

CPSC 557a[u], Sensitive Information in a Wired World. Joan Feigenbaum.
TTh 2.30–3.45
An examination of issues of ownership, control, privacy, and accuracy of the huge amount of sensitive information about people and organizations that is collected, stored, and used by today's ubiquitous information systems. Readings in research papers that explore both the power and the limitations of existing privacy-enhancing technologies such as encryption and "trusted platforms."

CPSC 560b[u], Theoretical Methods in Computer Science. Ravindran Kannan.
TTh 1–2.15
Basic topics in theoretical computer science: machine models; fundamental algorithms and their design, implementation, and analysis; data structures; the complexity of computation, communication, and data storage.

CPSC 564b[u], Quantum Computing. Willard Miranker.
TTh 11.30–12.45
A tutorial introduction to quantum mechanics and computer science in the context of quantum computation. Hardware (quantum gates and data representation) and algorithms (the quantum Fourier transform, the Shor factorization algorithm, and the Grover search algorithm) are described. Discussion of topics for research.

CPSC 565a[u], Topics in Algorithms. Ravindran Kannan.
TTh 1–2.15
Introduction to the fundamental tools used in approximation algorithms:linear, convex, and semi-definite programming; dynamic programming; and geometric tools. Recent progress in the design of approximation algorithms for graph problems, combinatorial problems, and other NP-hard optimization problems. Results on the hardness of approximation based on probabilistically checkable proofs.

CPSC 567a[u], Cryptography and Computer Security. Michael Fischer.
MWF 10.30–11.20
A survey of such private and public key cryptographic techniques as DES, RSA, and zero-knowledge proofs, and their application to problems of maintaining privacy and security in computer networks. The main focus is on technology, but the course also considers such societal issues as balancing individual privacy concerns against the needs of law enforcement, vulnerability of societal institutions to electronic attack, export regulations and international competitiveness, and development of secure information systems.

CPSC 570a[u], Artificial Intelligence. Drew McDermott.
MWF 2.30–3.20
An introduction to artificial intelligence research, focusing on reasoning and perception. Topics include knowledge representation, predicate calculus, temporal reasoning, vision, robotics, planning, and learning.

[**CPSC 572a, AI Programming Techniques.**]

CPSC 573b,Intelligent Robotics. Brian Scassellati.
MWF 11.30–12.20
An introduction to the basic principles of building a purposeful autonomous robotic system, with an emphasis on human-machine interaction and cognitive modeling. (Not taught every year.)

[**CPSC 574b,Autonomous Systems.**]

CPSC 575b,Computational Vision and Biological Perception. Steven Zucker.
MW 2.30–3.45
An overview of computational vision with a biological emphasis. Suitable as an introduction to biological perception for computer science and engineering students, as well as an introduction to computational vision for mathematics, psychology, and physiology students. *Also ENAS 575b[u].*

CPSC 577a[u], Neural Networks for Computing. Willard Miranker.
TTh 11.30–12.45
Artificial neural networks as a computational paradigm studied with application to problems in associative memory, learning, pattern recognition, perception, robotics, and other areas. Models for the dynamics of neurons and methods such as learning for designing neural networks are developed. Concepts, designs, and methods compared and tested in software simulation. Brain and consciousness studies are optional topics.

CPSC 578b[u], Computer Graphics. Julie Dorsey.
MW 1–2.15

CPSC 579a[u], Advanced Computer Graphics: Rendering Techniques. Julie Dorsey.
MW 1–2.15
A broad overview of the theory and practice of rendering. Topics include appearance capture and models; local and global illumination; surface reflection; lighting simulation algorithms; efficient rendering; image-based rendering; procedural approaches; and texture generation and rendering. Prerequisite: CPSC 478b.

CPSC 690a or b,Independent Project I.
By arrangement with faculty.

CPSC 691a or b,Independent Project II.
By arrangement with faculty.

CPSC 692a or b,Independent Project.
Individual research for students in the M.S. program. Requires a faculty supervisor and the permission of the director of graduate studies.

CPSC 752a[u], Genomics and Bioinformatics. Dieter Söll,Mark Gerstein, Michael Snyder.
MW 1–2.15
Genomics describes the determination of the nucleotide sequence and many further analyses to discover functional and structural information on all the genes of an organism. Topics

include the methods and results of functional and structural gene analysis on a genome-wide scale as well as a discussion of the implications of this research. Bioinformatics describes the computational analysis of genomes and macromolecular structures on a large scale. Topics include sequence alignment, biological database design, geometric analysis of protein structure, and macromolecular simulation. *Also MB&B 752a^{u}, MCDB 752a^{u}.*

CPSC 820a or b,Directed Readings in Programming Languages and Systems.
By arrangement with faculty.

CPSC 840a or b,Directed Readings in Numerical Analysis.
By arrangement with faculty.

CPSC 860a or b,Directed Readings in Theory.
By arrangement with faculty.

CPSC 870a or b,Directed Readings in Artificial Intelligence.
By arrangement with faculty.

EAST ASIAN LANGUAGES AND LITERATURES

308 Hall of Graduate Studies, 432.2860
M.A., M.Phil., Ph.D.

Chair
John Whittier Treat

Directors of Graduate Studies
Kang-i Sun Chang [F] (306 HGS, 432.2865, kang-i.chang@yale.edu)
Edward Kamens [Sp] (310 HGS, 432.2862, edward.kamens@yale.edu)

Professors
Kang-i Sun Chang, Edward Kamens, Hugh Stimson, John Whittier Treat

Associate Professor
Charles Laughlin

Assistant Professors
Aaron Gerow, Christopher Hill, Carlos Rojas (*Visiting*)

Lecturers
Pauline Lin, Xinmin Liu

Senior Lectors
Wen-tao Cheng, Seungja Choi, Koichi Hiroe, Zhengguo Kang, Yoshiko Maruyama, John Montanaro, Ling Mu, Michiaki Murata, Masahiko Seto, Mari Stever, Wei Su, William Zhou

Lectors
Angela Lee-Smith, Rongzhen Li, Ninghui Liang, Hiroyo Nishimura, Jianhua Shen, Li-li Teng, Peisong Xu

Fields of Study

Fields for doctoral study are Chinese literature and Japanese literature. Although the primary emphasis is on these East Asian subjects, the department welcomes applicants who are seeking to integrate their interests in Chinese or Japanese literature with interdisciplinary studies in such fields as history, history of art, linguistics, religious studies, comparative literature, film studies, literary theory and criticism, and the social sciences.

Special Admissions Requirements

The department requires entering students in Chinese or Japanese to have completed at least three years of study, or the equivalent, of either Chinese or Japanese. Students applying in Chinese are expected to have completed at least one year of literary Chinese. Students applying in premodern Japanese are expected to have completed at least one year of literary Japanese. This is a doctoral program; no students are admitted for master's degrees.

Special Requirements for the Ph.D. Degree

During the first three years of study, students are required to take at least fourteen term courses. Two of these courses must be seminars or tutorials taken in the third year of study. (If a student's qualifying exam is scheduled in the sixth term, both of the third-year courses should be taken in the fifth term.) Students concentrating in Chinese or Japanese literature are encouraged to take at least one term course in Western literature or literary theory. All students must prove their proficiency in French, German, Russian, or another European language that the director of graduate studies deems appropriate by the beginning of their second year. In some cases, with the approval of the director of graduate studies, students in Chinese literature may substitute Japanese and students in Japanese literature may substitute Chinese (modern or literary Chinese) for a European language.

At the end of each academic year until a student is admitted to candidacy, a faculty committee will review the student's progress.

At the end of the second full academic year, the student must take a written examination in the language of his or her specialization, including both its modern and premodern forms. The faculty will also conduct a review of each student's progress and promise by the end of the second year. By the end of the third year, students specializing in premodern Japanese literature must pass a reading test in literary Chinese. Ideally, by the end of the sixth term, but in no case later than the end of the seventh term, each student will be required to complete a dissertation prospectus and two research papers, and submit them for review by the faculty as part of a qualifying oral examination ranging over the entire field (Chinese language and literature or Japanese language and literature), with emphasis on the student's area of concentration, dissertation topic, and course work.

In order to be admitted to candidacy for the Ph.D. (normally by the end of the third year), students must earn at least four grades of Honors during the first two years of study and must complete all predissertation requirements, including the prospectus.

Opportunities to obtain experience in teaching language and literature form an important part of this program. Students in East Asian Languages and Literatures normally teach in their third and fourth years in the Graduate School.

Joint Ph.D. Program

The Department of East Asian Languages and Literatures also offers, in conjunction with the Program in Film Studies, a joint Ph.D. in East Asian Languages and Literatures and Film Studies. For further details, see Film Studies on page 177. Applicants to the joint program must indicate on their application that they are applying both to Film Studies and to East Asian Languages and Literatures. All documentation within the application should include this information.

Master's Degrees

M.Phil. The successful completion of all predissertation requirements, including the qualifying examination, will make a student eligible for an M.Phil. degree.

M.A. (en route to the Ph.D.). The successful completion of twelve term courses and languages required in the first two years of study will make a student eligible for an M.A. degree.

Program materials are available upon request to the Director of Graduate Studies, Department of East Asian Languages and Literatures, Yale University, PO Box 208236, New Haven CT 06520-8236, and at the department Web site, www.yale.edu/eall/.

Courses

CHNS 500a[u], Man and Nature in Chinese Poetry. Kang-i Sun Chang.
TTh 1–2.15
An exploration of concepts of man and nature in traditional Chinese poetry and criticism, with special attention to historical contexts and cultural meanings. Topics include the centrality of lyricism and Taoism; depictions of nature and self-cultivation; travel in literature; the relation of poetry to painting; images of utopian communities as compared to the Western notion of Utopia; poets' strategies of self-canonization and identity. All readings are in translation; no knowledge of Chinese is assumed. For those who read the language, additional readings in Chinese are assigned.

[**CHNS 501b[u], Men, Women,and Gender in Chinese Poetry.**]

CHNS 515[u], Elementary Modern Chinese. John Montanaro, William Zhou.
515–1: MTWThF 9.30–10.20
515–2: MTWThF 9.30–10.20
515–3: MTWThF 10.30–11.20
515–4: MTWThF 10.30–11.20
515–5: MTWThF 11.30–12.20
515–6: MTWThF 11.30–12.20
Intended for students with no background in Chinese. An intensive course with emphasis on spoken language and drills. Pronunciation, grammatical analysis, conversation practice, and introduction to the reading and writing of Chinese characters. To be followed by CHNS 530.

CHNS 518[u], Elementary Modern Chinese for Advanced Learners. Ninghui Liang, William Zhou.
518–1: MTWThF 9.30–10.20
518–2: MTWThF 10.30–11.20
First level of the advanced learner sequence. Intended for students with some background in Chinese. An intensive course with emphasis on spoken languages and drills. Pronunciation, grammatical analysis, conversation practice, and introduction to reading and writing Chinese characters. To be followed by CHNS 533. Placement confirmed by placement test on first day of class and by instructors.

CHNS 530[u], Intermediate Modern Chinese. Ling Mu and staff.
530–1: MTWThF 10.30–11.20
530–2: MTWThF 10.30–11.20
530–3: MTWThF 11.30–12.20
530–4: MTWThF 11.30–12.20
An intermediate course that continues intensive training in listening, speaking, reading, and writing, and consolidates what students have achieved in the first year of study, allowing students to improve oral fluency, study more complex grammatical structures, and enlarge both reading and writing vocabulary. To be followed by CHNS 550. Prerequisite: CHNS 515 or equivalent.

CHNS 533u, Intermediate Modern Chinese for Advanced Learners. Peisong Xu, Ling Mu.
533–1: MTWThF 8.30–9.20
533–2: MTWThF 9.30–10.20
The second level of the advanced learner sequence. Intended for students with intermediate to advanced oral proficiency and high elementary reading and writing proficiency. Students receive intensive training in listening, speaking, reading, and writing, supplemented by audio and video materials. The objective of the course is to balance these four skills and attain an advanced level in all of them. To be followed by CHNS 553. Prerequisite: CHNS 518 or equivalent.

CHNS 545u, Cantonese. Wei Su.
MWF 9.30–10.20
Introduction to the Cantonese language for learners of (Mandarin) Chinese. Expands students' knowledge of the Chinese language through study of one of its most influential regional variations. Focus on listening and speaking skills, from practical daily communication to the discussion of topics of general interest. Prerequisite: CHNS 530, CHNS 518, or equivalent.

CHNS 548,Directed Reading of Scholarly Materials. Wen-tao Cheng.
For Ph.D. students working toward dissertations or master's candidates working on special interests that involve original materials from classical Chinese, as well as modern sources.

CHNS 550u, Advanced Modern Chinese. Li-li Teng.
550–1: MTWThF 10.30–11.20
550–2: MTWThF 11.30–12.20
Third level of the standard foundational sequence of modern Chinese language study in the areas of speech, listening, reading, and writing. Use of audio-visual materials, oral presentations, skits, and longer and more frequent writing assignments to assimilate more sophisticated grammatical structures. Introduction to a wide variety of written forms and styles. Use of both traditional and simplified forms of Chinese characters. After CHNS 530.

[**CHNS 551bu, Chinese Modernism.**]

CHNS 553u, Advanced Modern Chinese for Advanced Learners. Zhengguo Kang.
553–1: MWF 9.30–10.20
553–2: MWF 10.30–11.20
Third level of the advanced learner sequence in Chinese. Intended for students with advanced speaking and listening skills (able to conduct conversations fluently on broad topics) but with high intermediate reading and writing skills (able to write 1,000 to 1,200 characters). Readings on contemporary life in China and Taiwan, supplemented with authentic video and other selected reading materials. Class discussion, presentations, and regular written assignments. Texts in simplified characters with vocabulary in both simplified and traditional characters. After CHNS 533 or equivalent.

CHNS 556u, Readings in Contemporary Chinese Texts. Wei Su.
556–1: MW 11.30–12.45
556–2: TTh 11.30–12.45
Completes the standard sequence in Chinese. Selected readings in Chinese fiction, essays, and articles of the past twenty years. Lectures, discussion, and written work in Chinese aim at integrated mastery of the modern language. Prerequisite: CHNS 550 or equivalent.

CHNS 557u, Readings in Modern Chinese Short Stories. Wen-tao Cheng.
TTh 9–10.15
An advanced language course designed to further develop students' overall language skills through reading and discussion of modern short stories. Focus on Lu Xun, Lao She, Shen Congwen, and Zhang Ailing. Conducted in Chinese. After CHNS 550 or equivalent.

CHNS 560[u], Introduction to Literary Chinese. Pauline Lin.
TTh 2.30–3.45
Reading and interpretation of texts in various styles of literary Chinese (*wenyan*), with attention to basic problems of syntax and literary style. After CHNS 533 or 550.

CHNS 562[u], Intermediate Literary Chinese: Old Chinese Prose and Poetry. Hugh Stimson.
Close reading of texts of the first millennium B.C.E. with attention to syntax and style. Prerequisite: CHNS 560 or equivalent.

CHNS 565[u], Chinese Composition. Zhengguo Kang.
TTh 2.30–3.45
Intended for advanced students with solid oral and reading proficiency but who want to improve their writing skills. The course offers a systematic writing program, from simple assignments like descriptions, narratives, and expositions to more sophisticated critical essays. Prerequisite: CHNS 553, 556, 557, or equivalent.

CHNS 574a[u], The Revolutionary Tradition in Modern Chinese Literature. Ximin Liu.
MW 2.30–3.45
An introduction to modern Chinese literary culture from the perspective of its central, revolutionary tradition. Exploration of ways that Chinese writers have attempted to change society through writing; the relationships between realism, romanticism, and revolution; and the consequences of the Chinese Communist Party's institutionalization of revolutionary literature. No knowledge of Chinese required.

[**CHNS 575, Wenxin Diaolong: Literary and Cultural Readings.**]

[**CHNS 578a, *Shishuo xinyu* and Six Dynasties Aesthetics.**]

[**CHNS 580,Chinese Poetry from Ancient Times to the Song Dynasty.**]

[**CHNS 600,Seminar in Tang Poetry.**]

[**CHNS 605a[u], Materials and Methods for Research in Chinese Literature and Art.**]

[**CHNS 634,The Canon of Poetry (Shi Jing).**]

[**CHNS 635,The Tradition of the Song Lyric (Ci).**]

[**CHNS 638b, Chinese Love Poetry: From Six Dynasties to the Qing.**]

CHNS 639a,Canon and Gender in Ming-Qing Poetry and Drama. Kang-i Sun Chang.
T 2.30–4.30
A seminar on the problems of canon-formation with regard to Ming-Qing literati and women writers, especially on how aesthetic, power, and cultural principles have influenced canonical inclusions and exclusions. Readings from the poetic works of Qian Qianyi, Liu Rushi, Wu Weiye, Shang Jinglan, Wang Shizhen, Wang Duanshu, Yuan Mei, Xi Peilan, Gong Zizhen, Gu Taiqing. Two dramatic plays, *Mudan ting* (*Peony Pavilion*) and *Taohua shan* (*Peach Blossom Fan*), are also included.

CHNS 660b[u], The Visual Imagination in Chinese Art. Pauline Lin.
W 2.30–4.20
A study of Chinese visual and cultural materials from the Shang bronzes of the twelfth century B.C. to modern film. Exploration of the aesthetic values, social realities, and cultural aspirations represented by these works. Topics include depictions of ancestral portraits, paradise and hell in Buddhist cosmology, fictive landscapes, garden designs, imperial architecture and city planning, and everyday life.

[**CHNS 671b,Anti-Romanticism: The Tradition of Irony in Twentieth-Century Chinese Women's Writing.**]

[**CHNS 672a,Modern and Contemporary Chinese Poetry.**]

CHNS 673b,The Chinese Body Politic. Carlos Rojas.
M 3.30–5.20
Science, politics, subjectivity, and corporeality in modern China. Readings of literary texts and consideration of nonfictional writings, cinema, graphic art, and performance art.

[**CHNS 692a,Rereading the Six Dynasties Anthology, the *Wen Xuan*.**]

[**CHNS 693b,Seminar on Anthologies of Tang and Song Poetry.**]

[**CHNS 695a,The Poetics of Place in Modern Chinese Literature.**]

[**CHNS 696a,Chinese Literary Criticism.**]

[**CHNS 697b,Critical Debates in Modern Chinese Literary Studies.**]

[**CHNS 698, Women Poets of the Qing: Methodological and Critical Inquiry.**]

[**CHNS 704,Ming-Qing Literary Theory and Poetics.**]

[**CHNS 706b,Du Fu: Poetic Innovations and Influences.**]

[**CHNS 707a,Literature,Culture,and Myth in Ancient China: From *Chuci* to Han Poetry.**]

[**CHNS 728,Six Dynasties Poetry.**]

[**CHNS 840,Seminar in Qing Poetry.**]

CHNS 900a, Chinese Seminar. Hugh Stimson.

JAPN 501b[u], *The Tale of Genji* and *The Pillow Book*. Edward Kamens.
TTh 2.30–3.45
Close study of nearly contemporaneous and distinctive works by the two outstanding women writers of Japan's classical age — Murasaki Shikibu's *The Tale of Genji* and Sei Shonagon's *Pillow Book*. All readings in English, including many critical studies. Formerly JAPN 572b.

JAPN 515[u], Elementary Japanese. Michiaki Murata,Mari Stever.
515–1: MTWThF 8.30–9.20
515–2: MTWThF 8.30–9.20
515–3: MTWThF 9.30–10.20
515–4: MTWThF 9.30–10.20
515–5: MTWThF 9.30–10.20
An introductory course in spoken Japanese. Drills in pronunciation and conversation; lectures on grammar; and an introduction to reading and writing, including *hiragana, katakana,* and 200 *kanji*.

JAPN 540[u], Intermediate Japanese. Yoshiko Maruyama,Masahiko Seto, and staff.
540–1: MTWThF 10.30–11.20
540–2: MTWThF 10.30–11.20
540–3: MTWThF 10.30–11.20
540–4: MTWThF 11.30–12.20
540–5: MTWThF 11.30–12.20
Emphasis on continued development in both written and spoken Japanese with reinforcement of previously learned patterns and structures. Besides the text, teaching materials include

audio and video tapes for listening comprehension and speaking practice, as well as multimedia materials. Prerequisite: JAPN 515 or equivalent.

JAPN 550u, Advanced Japanese. Koichi Hiroe and staff.
MWF 1–2.15
An advanced Japanese language course designed to develop further students' proficiency in aural and reading comprehension, as well as speaking and writing skills. Reading and discussion of short stories, essays, and journal articles. Listening to and discussion of television and radio broadcasts. Writing practice includes diary, letters, essays, and criticism. Prerequisite: JAPN 540 or equivalent.

[**JAPN 551bu, Japanese Literature after 1970.**]

[**JAPN 552au, The Atomic Bombings of Japan in World Culture.**]

[**JAPN 553au, Modern Japanese Fiction and Its Margins.**]

JAPN 557u, Readings in Contemporary Media and Literature. Masahiko Seto.
TTh 1–2.15
Close reading in modern Japanese writings in current affairs, social science, cultural history, and modern literature. Students develop their speaking, listening, and writing skills through discussion and written exercises. Conducted in Japanese. After JAPN 550 or equivalent.

JAPN 559au, Readings in Literature and the Humanities. John Whittier Treat.
TTh 11.30–12.45
Canonical Japanese short stories and essays read in line-by-line translation. Use of reference works and the Internet to research structures and vocabulary. Intended for those at the fourth-year level in their study of modern Japanese, this course is designed to help students prepare for either graduate-level courses in Japanese literature or independent study of written Japanese.

JAPN 560bu, Introduction to Literary Japanese. Edward Kamens.
MW 2.30–3.45
Introduction to the grammar and style of the premodern literary language (*bungotai*) through a variety of texts. Prerequisite: JAPN 550 or equivalent.

[**JAPN 561bu, Readings in Literary Japanese.**]

[**JAPN 576bu, Popular Culture from Late Edo to the Present.**]

JAPN 578au, Modern Japanese Fiction. Christopher Hill.
TTh 1–2.15
An introduction to Japanese fiction from the 1890s to 1960s. Novels and stories by such writers as Natsume Soseki, Tanizaki Junichiro, and Oe Kenzaburo, and discussion of major trends such as modernism and writing by women. No knowledge of Japanese is required.

JAPN 585bu, Naturalist Literature in the Global Frame. Christopher Hill.
W 2.30–4.20
The dissemination of naturalist literature worldwide, from France in the 1850s to Asia and the Americas in the 1900s. Main focus on France, the United States, Japan. Local and global socioeconomic conditions supporting naturalist schools. Major writers include Zola, Maupassant, Dreiser, Norris, Katai, Toson.

JAPN 587bu, Japanese Cinema after 1970. Aaron Gerow.
MW 11.30–12.45
The development of Japanese cinema after the breakdown of the studio system, through the revival of the late 1990s, to the present.

JAPN 700b, Readings in Premodern Japanese Literature. Edward Kamens.
F 1.30–3.20
Close reading of Japanese prose and/or poetry of various periods; research in traditional commentary and contemporary criticism.

[**JAPN 830b, Literature, Culture, and Thought in Modern Japan.**]

JAPN 835b, Modernity and Culture in Imperial Japan. Christopher Hill.
T 4–6
Formations of modernity in Japan from the late Meiji to the early Shôwa period and their political and economic contexts. Materials include literature, essays, philosophy, and other sources such as visual texts according to student interest.

JAPN 885b, Modern Japanese Novel. John Whittier Treat.
W 2–4.30
A seminar primarily designed as a three-year course in which graduate students specializing in Japanese literature are required to read major works of modern Japanese fiction in the original.

KREN 515[u], Elementary Korean. Angela Lee-Smith and staff.
515–1: MTWThF 9.30–10.20
515–2: MTWThF 10.30–11.20
A beginning course in modern Korean. Pronunciation, lectures on grammar, conversation practice, and introduction to the writing system (*Hankul*). Section 515–2 is for students with elementary aural proficiency but little training in written Korean.

KREN 535[u], Intermediate Korean. Seungja Choi and staff.
535–1: MTWThF 9.30–10.20
535–2: MTWThF 10.30–11.20
Continued development of skills in modern Korean, spoken and written, leading to intermediate-level proficiency. Students admitted to section 535–1 after KREN 515–1; students admitted to section 535–2 after KREN 515–2 or with permission of instructor.

KREN 550[u], Advanced Modern Korean. Seungja Choi and staff.
TTh 11.30–12.45
An advanced Korean language course designed to further develop students' aural and reading comprehension, as well as speaking and writing skills. Reading and discussion of short stories, essays, and journal articles. Writing practice includes letters and essays. After KREN 535 or equivalent.

EAST ASIAN STUDIES

320 Luce Hall, 34 Hillhouse, 432.3426
M.A.

Chair
Mimi Yiengpruksawan (*History of Art*) (206 OAG, 56 High, 432.2682, mimi.yiengpruksawan@yale.edu)

Director of Graduate Studies
Deborah Davis [F] (140 Prospect, 432.3327, deborah.davis@yale.edu)
Frances Rosenbluth [Sp] (124 Prospect, 432.5256, frances.rosenbluth@yale.edu)

Professors
Richard Barnhart (*Emeritus, History of Art*), Beatrice Bartlett (*History*), Kang-i Sun Chang (*East Asian Languages & Literatures*), James Crowley (*Emeritus, History*), Deborah Davis (*Sociology*), Koichi Hamada (*Economics*), Valerie Hansen (*History*), Edward Kamens (*East Asian Languages & Literatures*), William Kelly (*Anthropology*), Edwin McClellan (*Emeritus, East Asian Languages & Literatures*), Frances Rosenbluth (*Political Science*), Helen Siu (*Anthropology*), Jonathan Spence (*History*), Hugh Stimson (*East Asian Languages & Literatures*), Conrad Totman (*Emeritus, History*), John Whittier Treat (*East Asian Languages & Literatures*), Stanley Weinstein (*Emeritus, East Asian Languages & Literatures; Religious Studies*), Mimi Yiengpruksawan (*History of Art*)

Associate Professor
Charles Laughlin (*East Asian Languages & Literatures*)

Assistant Professors
Michael Auslin (*History*), Aaron Gerow (*East Asian Languages & Literatures; Film Studies*), Christopher Hill (*East Asian Languages & Literatures*), Sharon Kinsella (*Sociology*), Pierre-François Landry (*Political Science*), Lillian Lanying Tseng (*History of Art*)

Fields of Study

The Master of Arts program in East Asian Studies offers a concentrated course of study designed to provide a broad understanding of the Chinese or Japanese people, their culture, historical development, and contemporary problems. This program is designed for students wishing to go on to the doctorate in one of the disciplines listed above, as well as for those students seeking a terminal M.A. degree before entering the business world, the media, government service, or a professional school.

Course of Study for the M.A. Degree

The program is designed to be completed by successfully taking eight courses approved for graduate credit by the director of graduate studies over the course of one academic year. Normally, students entering the program are expected to have already completed the equivalent of at least two years of Chinese or Japanese language, so that the three-year language requirement can be completed in the two terms spent at Yale. A program

of study for completion of the degree in one year consists of at least eight term courses and would normally include two terms of language study at Yale's third-year level (unless the language requirement has already been met through previous study) and six other term courses selected from the current year's offerings of advanced language courses and lecture courses or seminars in any relevant subject area, with the approval of the director of graduate studies.

Special Requirements for the M.A. Degree

Students must earn two Honors grades ("H") over the course of their two terms at Yale. Honors grades earned in any Chinese or Japanese language class cannot be counted toward satisfying this requirement, except with the permission of the director of graduate studies.

Course of Study for the Joint Degree in East Asian Studies and Management

The joint master's degree program in East Asian Studies and Management is designed for students considering careers in public or private organizations that deal with East Asia. Normally a three-year program, it awards a master's degree in business administration and a Master of Arts degree in East Asian studies.

Special Requirements for the Joint Degree

The East Asian component of this degree is the same as that of the regular M.A. program except that the time period for the completion of the degree is extended to accommodate work at the School of Management. The Management component of this degree requires joint-degree candidates to complete thirteen courses at the School of Management. These include nine in the disciplines essential to management and three in integrative management courses.

Program materials are available upon request to the Council on East Asian Studies, Yale University, PO Box 208206, New Haven CT 06520-8206; e-mail, eastasian.studies@yale.edu; Web site, www.yale.edu/ycias/ceas/. Applications are available from the Admissions Office, Graduate School, Yale University, PO Box 208236, New Haven CT 06520-8236; e-mail, graduate.admissions@yale.edu.

ECOLOGY AND EVOLUTIONARY BIOLOGY

Osborn Memorial Laboratories, Rm 101, 165 Prospect Street, 432.3837, www.eeb.yale.edu
M.S., Ph.D.

Chair
Stephen Stearns

Director of Graduate Studies
Günter Wagner

Professors
Leo Buss, Michael Donoghue, Jacques Gauthier (*Geology & Geophysics*), Willard Hartman (*Emeritus*), Gene Likens (*Cary Arboretum*), Alvin Novick, Jeffrey Powell (*on leave*), Charles Remington (*Emeritus*), Oswald Schmitz (*Forestry & Environmental Studies*), Stephen Stearns, J. Rimas Vaisnys (*Electrical Engineering*), Günter Wagner

Associate Professors
Vivian Irish (*Molecular, Cellular & DevelopmentalBiology*), Sean Rice, Margaret Riley, David Skelly (*Forestry & Environmental Studies; on leave*), Anne Yoder (*on leave* [F])

Assistant Professors
David Post, Melinda Smith, Paul Turner

Lecturers
Adalgisa Caccone, L. Kealoha Freidenburg, Dianella Howarth, Theodora Pinou, Nancy Rosenbaum, Marta Martinez Wells

Fields of Study

The Department of Ecology and Evolutionary Biology (E&EB) offers training programs in organismal biology, ecology, and evolutionary biology including molecular evolution, phylogeny, molecular population genetics, developmental evolution, and evolutionary theory.

Special Admissions Requirements

Applicants should have had training in one of the following fields: biology, mathematics, chemistry, physics, statistics, and/or geology. Candidates are selected, regardless of their major, based on overall preparation for a career in research in ecology and evolutionary biology. Some, planning for careers in applied fields, may have prepared with courses in public policy, economics, and agriculture.

Special Requirements for the Ph.D. Degree

Each entering student, in consultation with the director of graduate studies, develops a specific program of courses, seminars, laboratory research, and independent reading tailored to the student's interests, background, and goals. There are normally no foreign-language requirements. Each student is required to undertake laboratory research in the

form of two research rotations in the first year. Students must also attend the advanced research topics course E&EB 502 and participate in (1) a program of ethics of research and authorship; (2) weekly E&EB seminars; and (3) symposia of faculty and graduate student research. In addition, during their first two years of study, graduate students must enroll in a minimum of three additional graduate-level courses (numbered 500 and above). Teaching experience is regarded as an integral part of the graduate training program. All students are required to teach two courses, normally at the TF 2 level, during their first two years of study.

In the third term of study each student takes a comprehensive examination in ecology and evolutionary biology. By the end of the third term, each student organizes a formal preprospectus consultative meeting with his/her advisory committee to discuss the planned dissertation research. By the end of the fourth term, students present and defend their planned dissertation research at a prospectus meeting, where the department determines the viability and appropriateness of the student's Ph.D. proposal. A successful prospectus meeting and completion of course requirements result in admission to candidacy for the Ph.D. The remaining requirements include completion, presentation, and successful defense of the dissertation, and submission of copies of the dissertation to the Graduate School and to the Kline Science Library.

In cases where the dissertation committee decides that preliminary field work during the summer after the fourth term is necessary prior to the prospectus, the prospectus meeting can be delayed by one term. A request for a delay has to come from the dissertation committee and needs to be approved by the DGS. In these exceptional cases admission to candidacy may not be required for registration for the third year of graduate study.

Honors Requirement

Students must meet the Graduate School's requirement of Honors in two courses by the end of the fourth term of study. The E&EB department also requires an average grade of at least High Pass in course work during the first two years of study.

Master's Degree

M.S. (en route to the Ph.D.). Satisfactory completion of the first two years of study leading to the Ph.D. up to, but not necessarily including, the prospectus.

Additional material providing information on the department, faculty, courses, and facilities is available from Maureen Cunningham, Office of the Director of Graduate Studies, Department of Ecology and Evolutionary Biology, Yale University, PO Box 208106, New Haven CT 06520-8106 (maureen.cunningham@yale.edu).

Courses

E&EB 502,Advanced Research Topics in Ecology and Evolutionary Biology. Günter Wagner.

MWF 10–12

This course is an introduction to cutting-edge research topics in ecology and evolutionary biology. Each topic is taught by a different faculty member who leads the course for three

weeks. At the end of each term the students are expected to write a paper on a topic of their choice.

E&EB 510a[u], Introduction to Statistics: Life Sciences. John Hartigan, Günter Wagner.
TTh 1–2.15
Statistical and probabilistic analysis of biological problems is presented with a unified foundation in basic statistical theory. A general lecture covering statistical theory and a discipline-based lecture covering statistical modeling of biological problems drawn from genetics, ecology, epidemiology, and bioinformatics. Graduate students are expected to finish a course project in addition to regular homework and exams. *Also STAT 501a[u].*

[**E&EB 515a[u], ConservationBiology and the Environment.**]

E&EB 520a[u], General Ecology. David Post.
MWF 10.30–11.20
An introduction to the theoretical context and empirical grounding of the science of population ecology. Emphasis is placed on the determinants of patterns of distribution and abundance from demographic and population perspectives. Animal behavior is treated in an ecological context, as exemplars of life history consequences of demography, and as modulators of competitive and predatory responses.

E&EB 525b[u], Evolutionary Biology. Sean Rice.
TTh 11.30–12.45
An introduction to the study of evolution from both a macro- and microevolutionary perspective. Principles of population genetics, systematics, paleontology, and molecular evolution are addressed as well as application of evolutionary thinking to issues in animal behavior, ecology, and molecular biology.

E&EB 526Lb[u], Laboratory for Evolutionary Biology. Marta Martinez Wells.
W 1.30
The companion laboratory to E&EB 525b. Study of patterns and processes of evolution, including collection and interpretation of molecular and morphological data in a phylogenetic context. Focus on methods of analysis of species-level and population-level variation in natural populations.

E&EB 530a[u], Field Ecology. David Post.
Th 1–5
A field-based introduction to methodology used by ecologists in field studies. Descriptive studies, comparative analysis, modeling, and experimental approaches are explored using class or small-group projects relevant to major topics in ecology.

E&EB 540a[u], AIDS and Society. Alvin Novick.
MWF 10.30–11.20
The natural history, biology, and epidemiology of AIDS; social, ethical, public policy, and political aspects of AIDS and of the ways societies address a medical crisis.

[**E&EB 540b[u], Animal Behavior.**]

[**E&EB 545b[u], Problems in Bioethics.**]

E&EB 550a[u], Biology of Terrestrial Arthropods. Marta Martinez Wells.
TTh 11.30–12.45
Evolutionary history and diversity of terrestrial arthropods (body plan, phylogenetic relations, fossil record); physiology and functional morphology (water relations, thermoregulation, energetics of flying and singing); reproduction (biology of reproduction, life cycles, metamorphosis, parental care); behavior (migration, communication, mating systems, evolution of sociality); ecology (parasitism, mutualism, predator-prey interactions, competition, plant-insect interactions).

E&EB 551La[u], Laboratory for Biology of Terrestrial Arthropods. Marta Martinez Wells.
W 1.30
Comparative anatomy, dissections, identification, and classifications of terrestrial arthropods; specimen collection; field trips.

[**E&EB 555b[u], The Invertebrates.**]

[**E&EB 556Lb[u], Laboratory for the Invertebrates.**]

[**E&EB 560b[u], The Vertebrates.**]

[**E&EB 561Lb[u], Laboratory for the Vertebrates.**]

[**E&EB 565a[u], The Biology of Birds.**]

[**E&EB 566La[u], Laboratory for the Biology of Birds.**]

E&EB 567a[u], Biology of Fishes. L. Kealoha Freidenburg.
TTh 9–10.15
Topics include diversity, phylogenetic relationships, functional morphology, physiology, life history, behavior, ecology, and conservation.

E&EB 568La[u], Laboratory for Biology of Fishes. L. Kealoha Freidenburg.
T 1.30
Lab focuses on examination of morphology of living taxa and field trips to local freshwater and marine environments.

[**E&EB 570b[u], Herpetology.**]

[**E&EB 571Lb[u], Laboratory for Herpetology.**]

E&EB 575b[u], Evolution of the Mammals. Anne Yoder.
TTh 2.30–3.45
Review of the evolutionary history and defining characteristics of mammals. Topics include the fossil record, phylogenetic reconstruction, morphological transitions, and ecological and physiological specializations. Topics are viewed in a synthetic context that presents mammalian characteristics as solutions to a variety of evolutionary challenges.

E&EB 576Lb[u], Laboratory for Evolution of the Mammals. Anne Yoder.
W 1.30
Review of the morphological characteristics of living mammals. Examination of representative skeletons and skins for all major mammalian groups. A comparative study of morphological transitions and specializations within and among groups.

[**E&EB 601a, Biocomplexity.**]

[**E&EB 610b[u], Evolutionary Genetics.**]

E&EB 615La[u], Laboratory in Molecular Systematics. Adalgisa Caccone.
M 1.30–5.30
A practical introduction to molecular techniques used in systematics (DNA extraction, PCR, sequencing) and their application to field studies in natural history, population genetics, mating systems, paternity, and the historical analysis of lineages. Research projects apply the methodologies.

[**E&EB 620b[u], Seminar in Conservation Genetics.**]

[**E&EB 628a[u], Comparative Physiology.**]

[**E&EB 629La^{u}, Laboratory for Comparative Physiology.**]

E&EB 646b^{u}, Plant Diversity and Evolution. Dianella Howarth.
MW 9–10.15
In recent years great progress has been made toward understanding the evolutionary relationships of plant lineages. This course explores the relationships and characteristics of the major plant groups including the green algae, mosses, ferns, conifers, and flowering plants within a phylogenetic context. The course addresses the depths of our understanding of ecology and development in the formation of the complexity and diversity among these plant groups. Students should have a general understanding of introductory biology and evolution.

E&EB 647Lb^{u}, Laboratory for Plant Diversity and Evolution. Dianella Howarth.
T 1
Laboratory sessions include local flora field research. Labs include hands-on experience in the plant groups examined in the course. Students should have a general understanding of introductory biology and evolution.

[**E&EB 650b^{u}, Plant Ecology.**]

[**E&EB 651Lb^{u}, Laboratory for Plant Ecology.**]

E&EB 660b^{u}, Wildlife Conservation Ecology. Oswald Schmitz.
3 HTBA; discussion 2 HTBA
An exploration of the evolutionary ecological basis for animal behavior and life history. Topics include how behavior evolves and what factors ultimately shape animal decision making and life histories; the link between animal behavior and population dynamics (demographic models that translate behavior into life-history strategies are used); and how environmental perturbations influence animal life histories to alter population structure and dynamics.

E&EB 665a^{u}, Landscape Ecology. Ofer Ovadia.
An introduction to the study of large-scale ecological patterns and processes. Through lectures and the completion of a project, students learn how to integrate a spatial perspective into consideration of major ecological questions. *Also F&ES 760a^{u}.*

[**E&EB 670a^{u}, Aquatic Ecology.**]

[**E&EB 671La^{u}, Laboratory for Aquatic Ecology.**]

E&EB 675b^{u}, Molecular Approaches to Systematics, Conservation Genetics, and Behavioral Ecology.
M 3–5

[**E&EB 680a, Advanced Introduction to Evolutionary Theory.**]

E&EB 685b^{u}, Evolutionary Developmental Biology. Günter Wagner, Vivian Irish, Kevin White.
TTh 2.30–3.45
This course is an introduction into an emerging biological discipline, evolutionary developmental biology. The course provides an introduction to the evolutionary biology of developmental processes as well as the developmental underpinnings of major evolutionary transformations. Topics include the evolution of Hox genes and other developmental genes, the origin of multicellular organisms, the evolution of flowers, and the origin of the arthropod and vertebrate Bauplan. The course has a mixed lecture/seminar format and thus engages the student to do independent study and prepare papers. Entering graduate students are expected to complete a unique research project and present in a lecture format to the class. *Also MCDB 685b^{u}.*

E&EB 722b, Topics in Microbial Toxin Evolution and Ecology. Margaret Riley.
3 HTBA

E&EB 728b[u], Ecology and Evolution of Infectious Diseases. Paul Turner.
TTh 11.30–12.45
Overview of the ecology and evolution of pathogens (bacteria, viruses, protozoa) and their impact on host populations, one of the greatest challenges facing humankind today. Scope is comprehensive, including theoretical concepts, ecological and evolutionary dynamics, molecular biology, and epidemiology of ancient and emerging diseases. Relevant for pre-med and medical students, as well as students in E&EB, F&ES, and EPH. *Also EMD 728b.*

E&EB 810a, Dynamics of Evolving Systems. J. Rimas Vaisnys.
TTh 11.30–12.45
An introduction to the ways in which the structure and behavior of evolving biological systems can be described, modeled, and analyzed. Examination of model systems as well as modeling of laboratory and field phenomena.

[**E&EB 845a, Advanced Evolutionary Theory.**]

E&EB 900a–b, First-Year Introduction to Research and Rotations. Günter Wagner.

E&EB 930a, Seminar in Systematics. Jacques Gauthier.
3 HTBA
Also G&G 703a.

E&EB 950a or b, Second-Year Research.
By arrangement with faculty.

Related University Courses of Interest

EMD 630a, Modeling Infectious Diseases: Theory and Applications. Edward Kaplan.
This course provides an introduction to some of the mathematical modeling methods that have developed over the years for the description and control of infectious diseases, and also considers applications of such models to standard problems in epidemiology (e.g., estimating disease incidence, determining the transmission potential of an infectious agent) and more broadly in contemporary public health (e.g., evaluating control options/intervention programs for HIV, West Nile, SARS, potential bioterror agents such as smallpox or anthrax, etc.). The course emphasizes the formulation of basic models, the insight that derives from the formal analysis of such models, and the translation of such insights into the world of real problems. By the end of the course, students will be able to formulate and solve their own models for disease progression, transmission, and control. Prerequisites: EMD 508 or permission of the instructor. Familiarity with basic epidemiological principles and familiarity with basic calculus, algebra, and probability theory.

ECONOMIC HISTORY

Graduate Adviser
Timothy Guinnane

The program in economic history is designed to train a limited number of students who desire to be well grounded in the concepts of both history and economics and also of other relevant areas of social science in order to carry on research and teaching in economic history. Studies encompass (1) the economic development of Europe from the medieval period to the present; (2) the development of the American economy; and (3) the evolution of selected non-Western economies and their relation to the West.

Special Admissions Requirements

GRE scores in accordance with the requirements of either the Economics or the History department must be submitted as part of the application for admission.

Special Requirements for the Ph.D. Degree

In addition to the dissertation and language requirements (at least one European language is required), candidates must satisfy the course requirements and the qualifying examinations of either the Economics or the History department and must complete the equivalent of one additional year's work in the other discipline. Interested students should apply as regular Ph.D. candidates in either History or Economics, indicating on their application their interest in the program. Admission to this Ph.D. program is normally offered midway during a student's second year. In recognition of the student's extra year of graduate study, the Graduate School charges five years of tuition but also considers the Economic History student eligible to apply for five years of financial aid. The Ph.D. degree is awarded by the department in which the student has been admitted for that degree.

The course program is chosen by the student in consultation with the Graduate Adviser. Courses are selected from the offerings of the Economics and History departments in accordance with the requirements of the program selected by the student.

ECONOMICS

28 Hillhouse, 432.3575
M.A., M.Phil., Ph.D.

Chair
David Pearce (28 Hillhouse, 432.3571)

Director of Graduate Studies
Truman Bewley (30 Hillhouse, Rm 30, 432.3719, truman.bewley@yale.edu)

Professors
Joseph Altonji, Donald Andrews, Dirk Bergemann, Steven Berry, Truman Bewley, William Brainard, Donald Brown, Stephen Coate, Eduardo Engel, Robert Evenson, Ray Fair, John Geanakoplos, Pinelopi Goldberg, Timothy Guinnane, Philip Haile, Koichi Hamada, Gerald Jaynes, Michael Keane, Alvin Klevorick, Richard Levin, Robert Mendelsohn, Stephen Morris, Barry Nalebuff, William Nordhaus, David Pearce, Peter Phillips, Benjamin Polak, Gustav Ranis, John Roemer, Herbert Scarf, T. Paul Schultz, Robert Shiller, Martin Shubik, T. N. Srinivasan, Christopher Udry

Associate Professors
George Hall, Carolyn Moehling, Giuseppe Moscarini, Christopher Timmins

Assistant Professors
Patrick Bayer, Hanming Fang, Donato Gerardi, Galina Hale, Justine Hastings, Rohini Pande

Fields of Study

Fields include economic theory, including microeconomics, macroeconomics, mathematical economics; econometrics; economic history; labor economics; market organization; money and banking; financial economics; economics of the public sector; international trade and finance; economic development; demography; history of economic thought; comparative economic systems.

Special Admissions Requirements

The GRE General Test is required of all applicants to the program. Students whose native language is not English must take the Test of English as a Foreign Language (TOEFL).

Special Requirements for the Ph.D. Degree

The following requirements must be satisfied in addition to those prescribed by the Graduate School.

1. *Prior to Registration for the Second Year.* (a) Students must have taken for credit and passed at least six economics graduate courses. (b) Students must pass written comprehensive examinations in micro- and macroeconomics. These examinations, which are given in May and late August of each year, must be taken in the spring term of the first

year. Each exam will be graded separately, and in the event of failure, students will retake only the part of the exam they did not pass. Students may take the comprehensive examination no more than two times.

2. *Prior to Registration for the Third Year.* (a) Students must have met the two Honors requirement specified by the Graduate School. (b) Students must have taken at least fourteen term courses in Economics and have received a grade of at least Pass– in each of them. With the permission of the director of graduate studies, courses in related fields and independent reading courses can be used to fulfill this requirement. Workshops may not be used to satisfy it. (c) Students must have received an average of at least High Pass in the courses they have taken. The admissibility of courses for this requirement is the same as for the fourteen-course requirement mentioned above.

3. *Admission to Candidacy.* The Graduate School requires that students be admitted to candidacy prior to registration for the fourth year of study. Students are recommended to the Graduate School for admission to candidacy by vote of department faculty after having completed department requirements (1) and (2) above, the Graduate School's prospectus requirement, and the following additional requirements: (a) Students must have completed two one-term prospectus workshops. Prospectus workshops have the word "prospectus" in their title. (There are other workshops.) If students can find no workshop corresponding to their interests, they may substitute other workshops for this requirement. If students can find no workshop whatsoever in their areas of interest, they may substitute independent study guided by a faculty member, provided the independent study leads to a dissertation prospectus that is accepted. (b) Students must receive a grade of High Pass– or better in ECON 551b (Econometrics II) or 552b (Econometrics III). More advanced courses may be substituted for these with special permission of the director of graduate studies. (c) Students must receive a grade of Satisfactory on an applied econometrics paper, which is evaluated by the faculty adviser of the paper and another faculty member. In the paper, the student should (i) specify an economic model useful for the investigation of an interesting economic problem, (ii) select data and econometric methods appropriate to the question, (iii) conduct proper statistical analysis, and (iv) interpret the results in an intelligent way. (d) Students must complete with a grade of at least High Pass– a term of economic history, drawn from a list of courses approved by the director of graduate studies and economic history instructors. (e) Students must pass an oral examination.

4. *Submitting the Dissertation.* A student's dissertation research is guided by a committee of two Graduate School faculty members, at least one of whom must be a member of the Economics department. One of the committee members is designated as chair. When a first draft of the dissertation is completed, the director of graduate studies appoints, on request of the committee chair, a third reader.

Programs in Law and Economics

The Economics department participates in the J.D./M.A. and J.D./Ph.D. programs, which are described on page 400 of this publication.

Master's Degrees

M.Phil. The M.Phil. degree is awarded to students in the Ph.D. program upon completion of fourteen term courses, with at least two grades of Honors. In addition, students must satisfy the qualifying requirements in economic theory, econometrics, economic history, and two special fields, as well as the oral examination.

M.A. (en route to the Ph.D.). The M.A. degree is awarded upon completion of eight term courses with an average grade of High Pass, and satisfactory completion of one of the following: the comprehensive examination in economic theory, the course requirement in econometrics, or the course requirement in economic history.

The M.A. in International and Development Economics is described on page 233 of this publication.

Program materials are available on our Web site: www.econ.yale.edu/.

Courses

ECON 500a,General Economic Theory: Microeconomics. Stephen Morris.
Introduction to optimization methods and partial equilibrium. Theories of utility and consumer behavior production and firm behavior. Introduction to uncertainty and the economics of information, and to noncompetitive market structures.

ECON 501b,General Economic Theory: Microeconomics. Dirk Bergemann, Truman Bewley.
General equilibrium and welfare economics. Allocation involving time. Public sector economics. Uncertainty and the economics of information. Introduction to social choice.

ECON 510a,General Economic Theory: Macroeconomics. Robert Shiller, Eduardo Engel.
Analysis of short-run determination of aggregate employment, income, prices, and interest rates in closed and open economies. Stabilization policies.

ECON 511b,General Economic Theory: Macroeconomics. George Hall, Giuseppe Moscarini.
Theories of saving, investment, portfolio choice, and financial markets. Longer-run developments; economic growth, capital accumulation, income distribution.

ECON 520a,Advanced Microeconomic Theory I. Donato Gerardi,Itzhak Gilboa.
A formal introduction to game theory and information economics. Alternative noncooperative solution concepts are studied and applied to problems in oligopoly, bargaining, auctions, strategic social choice, and repeated games.

ECON 521b,Advanced Microeconomic Theory II. Stephen Morris, Andrew Postlewaite.
Contracts and the economics of organization. Topics may include dynamic contracts (both explicit and implicit), career concerns, hierarchies, Bayesian mechanism design, renegotiation, and corporate control.

ECON 522a and 523b, Topics in Game Theory. Stephen Morris [F], Donato Gerardi [Sp].
A forum for advanced students to examine critically recent papers in the literature and present their own work.

[**ECON 524a,Behavioral Applied Theory.**]

ECON 525a,Advanced Macroeconomics: I. Eduardo Engel,Robert Shiller.
Aggregation, inventory models, externalities, spillovers, information and adjustment. Time series models, expectations, models of financial markets, risk management, monetary policy, term structure of interest rates.

ECON 526b,Advanced Macroeconomics: II. William Brainard,Giuseppe Moscarini.
Selected empirical topics.

ECON 530a,Mathematical Economics I. Truman Bewley.
The focus of the class is intertemporal problems in general equilibrium theory. One set of topics is the links between the theories of general equilibrium, overlapping generations models, and economic growth. Another topic is the link between the permanent income hypothesis and general equilibrium analysis. A third topic is the stability of equilibrium with and without the permanent income hypothesis.

ECON 531b,Mathematical Economics II. John Geanakoplos.
This course examines the foundations of money and finance from the perspective of general equilibrium with incomplete markets. The relevant mathematical tools from elementary stochastic processes to differential topology are developed in the course. Topics include asset pricing, variations of capital asset pricing model, the "Hahn paradox" on the value of flat money, default and bankruptcy, collateral equilibrium, market crashes, adverse selection and moral hazard with perfect competition, credit card equilibrium, and general equilibrium with asymmetric information.

[**ECON 532a^{u}, General Equilibrium under Uncertainty.**]

[**ECON 533a and b, Workshop on Discrete Mathematics and Applications.**]

ECON 537a and 538b,Microeconomic Theory Workshop. Staff.
Presentations by research scholars and participating students.

ECON 540a and 541b,Student Workshop in Macroeconomics. Staff.
A course for third- and fourth-year students doing research in macroeconomics to prepare their prospectuses and to present their dissertation work. Each student is required to make at least two presentations per term. For third-year students and beyond, at least one of the presentations in the first term should be a mock job talk.

ECON 542a and 543b,Macroeconomics Workshop. Staff.
A forum for presentation and discussion of state-of-the-art research in macroeconomics. Presentations by research scholars and participating students of papers in closed economy and open economy macroeconomics and monetary economics.

ECON 544a,Economic Analysis. Cheryl Doss.
MW 9–10.15
An introduction for International Relations students to more advanced concepts of micro- and macroeconomic analysis in an applied context. Different economies in different stages of development are used as illustrations of these concepts. Areas covered include employment, income, and interest rate determination as well as theories of consumption, investment, pricing, money, and production. *Also INRL 560a.*

ECON 545a,Microeconomics. Michael Boozer.
A survey of the main features of current economic analysis and of the application of the theory to a number of important economic questions, covering microeconomics and demand theory, the theory of the firm, and market structures. *For IDE Students.*

ECON 546a,Macroeconomics. Richard Agenor.
This course presents a basic framework to understand macroeconomic behavior and the effects of macroeconomic policies. Topics include consumption and investment, labor market, short-run income determinations, unemployment, inflation, growth, and the effects of monetary and fiscal policies. The emphasis is on the relation between the underlying assumptions of macroeconomic framework and policy implications derived from it. *For IDE students.*

ECON 550a,Econometrics I. Donald Andrews.
Probability: concepts and axiomatic development. Data: tools of descriptive statistics and data reduction. Random variables and probability distributions; univariate distributions (continuous and discrete); multivariate distributions; functions of random variables and transformations; the notion of statistical inference; sampling concepts and distributions; asymptotic theory; point and interval estimation; hypothesis testing.

ECON 551b,Econometrics II. Michael Keane.
Provides a basic knowledge of econometric theory, and an ability to carry out empirical work in economics. Topics include linear regression and extensions, including regression diagnostics, generalized least squares, statistical inference, dynamic models, instrumental variables and maximum likelihood procedures, simultaneous equations, nonlinear and qualitative-choice models. Examples from cross-section, time series, and panel data applications.

ECON 552b,Econometrics III. Donald Andrews.
The treatment of the subject is rigorous, attentive to modern developments, and proceeds to research level in several areas. Linear models from core curriculum. Topics include linear estimation theory, multiple and multivariate regressions, Kruskal's theorem and its applications, classical statistical testing by likelihood ratio, Lagrange multiplier and Wald procedures, bootstrap methods, specification tests, Stein-like estimation, instrumental variables, and an introduction to inferential methods in simultaneous stochastic equations.

ECON 553a,Econometrics IV: Time Series Econometrics. Peter Phillips.
A sequel to ECON 552, the course proceeds to research level in time series econometrics. Topics include an introduction to ergodic theory, Wold decomposition, spectral theory, martingales, martingale convergence theory, mixing processes, strong laws and central limit theory for weak dependent sequences with applications to econometric models and model determination.

ECON 554a,Econometrics V. Guido Kuersteiner.
The first half of this course is about nonlinear parametric models. Specification, estimation, and testing within the Likelihood and Generalized Method of Moments frameworks. First-order asymptotics for both smooth and non-smooth objective functions. Efficiency and robustness. A short account of high-order asymptotics for smooth problems. The second part is on nonparametric and semiparametric methods. Nonparametric estimation by kernels, series, splines, and other methods. Bias reduction and bandwidth selection. The curse of dimensionality and additive models. Specification and estimation of semiparametric models. U-statistics and asymptotic properties. Efficiency and adaptation.

ECON 555a,Applied Econometrics II: Microeconometrics. Michael Boozer.
This course develops the concepts needed to approach empirical problems in microeconomics with econometrics. The focus is less on developing a catalogue of econometric methods than on developing a conceptual basis for understanding how data, econometric methodology, and assumptions combine to produce statistical inference.

ECON 557b, Time Series Econometrics II: Unit Roots and Co-Integration. Peter Phillips.
This course is an introduction to nonstationary time series and econometric applications covering the following topics. Weak convergence and functional central limit theory with unit

root model illustrations. An introduction to stochastic calculus, and weak convergence to stochastic integrals. Unit root tests and applications. Testing stationarity. Spurious regression. General regression asymptotics for integrated processes with Hilbert projection geometry. Co-integration, tests for co-integration and reduced rank regression. Regression estimation of co-integrated systems and VARs with some unit roots. Bayesian approaches to unit root and co-integration analysis. Nonlinear functions of integrated processes and econometric applications. Fractional processes and long memory. Theory and empirical applications are discussed. Computer exercises in Gauss. Credit is obtained from a take-home examination and an empirical computer application.

ECON 558a,Statistics and Econometrics. Michael Boozer.
Application of statistical analysis to economic data. Basic probability theory, linear regression, specification and estimation of economic models, time series analysis and forecasting. The computer is used. *For IDE students.*

ECON 567a and 568b,Econometrics Workshop. Donald Andrews, Peter Phillips.
A forum for state-of-the-art research in econometrics. Its primary purpose is to disseminate the results and the technical machinery of ongoing research in theoretical and applied fields.

ECON 570a and 571b,Prospectus Workshop in Econometrics. Donald Andrews, Peter Phillips.
A course for third- and fourth-year students doing research in econometrics to prepare their prospectus and present dissertation work.

ECON 580b,General Economic History: Western Europe. Timothy Guinnane.
A survey of some major events and issues in the economic development of Western Europe during the eighteenth and nineteenth centuries, stressing the causes, nature, and consequences of the industrial revolution in Britain and on the Continent, and the implications of the historical record for modern conceptions of economic growth. Prerequisites: simultaneous enrollment in or successful completion of ECON 500a and ECON 510a; or permission of the instructor.

[**ECON 581a,American Economic History.**]

[**ECON 582b,General Economic History:Latin America.**]

ECON 583a, Topics in Economic History. Valery Lazarez, William Nordhaus.
The first part of the course discusses issues in American macroeconomic history, focusing on the Gold Standard and the Great Depression. The second part analyzes Russian economic development since the 1850s in comparative perspective. Topics include the impact of institutions on the patterns of industrialization; labor incentives and productivity; centrally planned economy (1929–1980s); economic analysis of autocracy/dictatorship and political transitions.

ECON 588a and 589b,Economic History Workshop. Staff.
A forum for discussion and criticism of research in progress. Presenters include graduate students, Yale faculty, and visitors. Topics concerned with long-run trends in economic organization are suitable for the seminar. Special emphasis given to the use of statistics and of economic theory in historical research.

ECON 600a,Industrial Organization I. Steven Berry, Philip Haile, Justine Hastings.
Begins by locating the study of industrial organization within the broader research traditions of economics and related social sciences. Alternative theories of decision making, of organizational behavior, and of market evolution are sketched and contrasted with standard neoclassical theories. Then turns to a detailed examination of the determinants and consequences of industrial market structure.

ECON 601b,Industrial Organization II. Steven Berry, Philip Haile, Justine Hastings.
Examination of alternative modes of public control of economic sectors with primary emphasis on antitrust and public utility regulation in the U.S. economy. Public policy issues in sectors of major detailed governmental involvement.

ECON 606a and 607b,Prospectus Workshop in Microeconomics. Staff.
For third-year students in microeconomics, intended to guide students in the early stages of theoretical and empirical dissertation research. Emphasis on regular writing assignments and oral presentations.

ECON 608a and 609b, Workshop in Applied Microeconomics. Staff.
For advanced graduate students in applied microeconomics, serving as a forum for presentation and discussion of work in progress of students, Yale faculty members, and invited speakers.

ECON 630a,Labor Economics. Joseph Altonji.
Topics include static and dynamic approaches to demand, human capital and wage determination, wage income inequality, unemployment and minimum wages, matching and job turnover, immigration and international trade, unions, implicit contract theory, and efficiency wage hypothesis.

ECON 631b,Labor Economics. Michael Keane.
Topics include static and dynamic models of labor supply, human capital wage function estimation, firm-specific training, compensating wage differentials, discrimination, household production, bargaining models of household behavior, intergenerational transfers, and mobility.

ECON 638a and 639b, Labor and Population Workshop. Staff.
A forum primarily for graduate students to exposit their research plans and findings. Discussions encompass empirical microeconomic research relating to both high- and low-income countries.

ECON 670a,Financial Economics I. Zhiwu Chen.
Current issues in theoretical financial economics addressed through the study of current papers. Focuses on the development of the problem-solving skills essential for research in this area. *Also MGMT 740a.*

ECON 671b,Financial Economics II. Jonathan Ingersoll.
Current issues in theoretical financial economics are addressed through the study of current papers. Focuses on the development of the problem-solving skills essential for research in this area. *Also MGMT 741b.*

ECON 680a,Public Finance: I. Patrick Bayer, Christopher Timmins.
Theoretical and empirical topics in public finance. Some emphasis on the relation between taxation and the following problems: efficiency, equity, and income distribution, uncertainty in capital markets, and aggregate capital accumulation.

ECON 681b,Public Finance: II. Patrick Bayer, Christopher Timmins.
Topics include theory of public goods, an introduction to preference revelation, the problem of externalities and their control, and the methodology of cost-benefit analysis and some applications.

ECON 702b,International Economics. Koichi Hamada.
International monetary theory and its implications for economic policy. Topics include mechanisms of adjustment in the balance of payments; fiscal, monetary, and exchange rate policy for internal and external balance; international movements of capital. *For IDE students.*

ECON 708b,International Economic Analysis. Guillermo Mondino.
M 1–3.20
A continuation of ECON 544a/INRL 560a. It extends the use of economic analysis to international trade and monetary policy including exchange rates and balance of payments with an emphasis on their relation to international trade, cross-border capital flows, and national economic policies. Introduction to quantitative tools and analysis as a way to determine the effects of various policies, building on concepts introduced in ECON 544a and the first part of this course. *Also INRL 561b.*

[**ECON 709a,International Economics and Open Economy Macroeconomics.**]

ECON 720a,International Trade I. T. N. Srinivasan,Pinelopi Goldberg, Irene Brambilla.
The course covers the theory of international trade, policy, and institutions. Classical, Neoclassical, and more recent Imperfect-Competition-Scale-Economies based static models of trade are discussed. Dynamic extensions of some of the models that explore the relations between trade, innovation, and growth are presented. The analytics of trade policy issues, such as gains from trade, tariffs and quotas, customs unions and free trade areas, and political economy of trade policy making, are discussed. The economic foundations of multilateral institutions governing world trade, i.e. GATT and its successor the WTO, are analyzed.

ECON 721b,International Trade II. T. N. Srinivasan,Pinelopi Goldberg, Irene Brambilla.
This course covers empirical topics in International Trade with particular emphasis on current research areas. Topics include tests of international trade theories; studies of the relationship between international trade, labor markets, and income distribution; recent trade liberalization episodes in developing countries; empirical assessment of various trade policies, such as VERs and Anti-Dumping; productivity (and its relation to international trade liberalization); exchange rates, market integration, and international trade. Methodologically, the course draws heavily on empirical models used in the fields of Industrial Organization and to a lesser degree Labor Economics; these courses are thus recommended (though not required).

ECON 724b,International Finance. Galina Hale.
International monetary economics covering the following topics: the balance of payments and the foreign exchange market; the elasticities, absorption, and monetary approaches to the foreign exchange market; the elasticities, absorption, and monetary approaches to the adjustment mechanism; long-term and short-term capital flows; Euro-dollars, portfolio and asset market approaches, policies for internal balance, flexible exchange rates, international reserves, and the monetary system.

ECON 730a,Economic Development. Rohini Pande.
Development theory at both aggregate and sectoral levels; analysis of growth, employment, poverty, and distribution of income in both closed and open developing economy contexts.

ECON 731b,Economic Development. Christopher Udry.
Analysis of development experiences since World War II. Planning and policy making across countries and time. Models of development, growth, foreign trade, and investment. Trade, capital, and technology flows and increasing interdependence. The political economy of policy making and policy reform.

ECON 732b,Economic Development. Christopher Timmins.
Examines the models of classical and modern economists to explain the transition of developing economies into modern economic growth, as well as their relevance to income distribution, poverty alleviation, and human development. *For IDE students.*

[**ECON 735b[u], Economics of Agriculture.**]

ECON 736a[u], Economics of Technology. Robert Evenson.
Focus on an analysis of the microeconomic incentives for the discovery and adoption of new technology and on the macroeconomic implications of technical change. Topics include the incentives to conduct research and development; patents and other means of appropriating the returns from R&D investment; measuring the effects of technical change; national policies for directing technical change.

ECON 737a[u], Economics of Natural Resources. Robert Mendelsohn.
Linking of abstract economic concepts to concrete policy and management decisions. Application of theoretical tools of economics to global warming, pollution control, fisheries, forestry, recreation, and mining.

ECON 738a/b, Workshop on Environmental and Natural Resources.
William Nordhaus,Christopher Timmins,and Robert Mendelsohn.

ECON 749a and 750b, Trade and Development Workshop. Staff.
A forum for graduate students and faculty with an interest in the economic problems of developing countries. Faculty, students, and a limited number of outside speakers discuss research in progress.

ECON 776b[u], Economics of Population. T. Paul Schultz.
Analysis of economic aspects of population change, including fertility, mortality and health, composition of households, migration, and labor force behavior. Microeconomic models of household behavior and demographic measurement theory used to account for economic and demographic behavior of persons in low- and high-income countries.

[**ECON 788a, Political Competition.**]

ECON 790b, Political Economy. Stephen Coate.
Political economy is the study of public policy making from an economics perspective. This course provides an introduction to the field. The first part focuses on tools, providing an overview of theories of policy determination via the political process. Topics include voter behavior, electoral competition, legislative decision making, and interest group influence. The second part discusses applications, focusing on questions of interest to public economists. Topics include political failure, the implications of alternative electoral systems, campaign finance reform, citizens' initiatives, and political transitions.

ECON 802a[u], Economic Development of Japan. Koichi Hamada.
Economic performance of Japan: historical development since Meiji Restoration, postwar reconstruction and rapid growth including the industrial policy, government policy, the political economy of U.S./Japan economic relations.

ECON 804a[u], Economic Policies in Latin America. Eduardo Engel.
Study of historical and current economic problems of Latin America, with particular attention to the most important countries of the region: Argentina, Brazil, and Mexico. Focus on the results of the implementation of economic reforms and the impact of macroeconomic and trade policies adopted by the different countries over time.

ECON 899a or b,Individual Reading and Research.
By arrangement with faculty.

ELECTRICAL ENGINEERING

Dunham Laboratory, 432.4250
M.Eng., M.S., M.Phil., Ph.D.

Chair
Tso-Ping Ma

Professors
Richard Barker (*Emeritus*), Andrew Barron, Richard Chang, W. J. Cunningham (*Emeritus*), James Duncan, Peter Kindlmann (*Adjunct*), Roman Kuc, Tso-Ping Ma, A. Stephen Morse, Kumpati Narendra, Mark Reed, Peter Schultheiss (*Emeritus*), J. Rimas Vaisnys, Jerry Woodall, Steven Zucker

Associate Professors
Jung Han, Lawrence Staib, Hemant Tagare

Assistant Professors
Hur Koser, Richard Lethin (*Adjunct*), Yiorgos Makris, Janet Pan, Sekhar Tatikonda, Edmund Yeh

FIELDS OF STUDY

Fields include control systems, neural networks, communications and signal processing, wireless networks, intelligent sensors, biomedical image processing, microelectronic materials and semiconductor devices, nanoelectronic science and technology, optoelectronic materials and devices, computer engineering, computer architecture, VLSI design and testing, and computer vision.

For admissions and degree requirements, and for course listings, see Engineering and Applied Science, pages 132–45.

ENGINEERING AND APPLIED SCIENCE

Dunham Laboratory, 432.4250
M.Eng., M.S., M.Phil., Ph.D.

Dean
Paul Fleury

Director of Graduate Studies
Jerry M. Woodall

Programs of study are offered in the areas of applied mechanics and mechanical engineering, applied physics, chemical engineering, electrical engineering, biomedical engineering, and environmental engineering. All programs are under the Faculty of Engineering.

Applied Physics

Chair
Daniel Prober

Professors
William Bennett, Jr. (*Emeritus*), Richard Chang, Michel Devoret, Joseph Dillon, Jr. (*Adjunct*), Paul Fleury, Steven Girvin, Robert Grober, Victor Henrich, Arvid Herzenberg (*Emeritus*),PierreHohenberg (*Adjunct*),MarshallLong, Tso-Ping Ma, Daniel Prober, Nicholas Read, Mark Reed, Subir Sachdev, Ramamurty Shankar, Mitchell Smooke, A. Douglas Stone, John Tully, Robert Wheeler (*Emeritus*), Werner Wolf (*Emeritus*), Jerry Woodall

Associate Professors
Sean Barrett, Robert Schoelkopf

Assistant Professors
Charles Ahn, Janet Pan

FIELDS OF STUDY

Fields include areas of theoretical and experimental condensed-matter physics, optical and laser physics, and material physics. Specific programs include surface science, microlithography and quantum transport, optical properties of micro-cavities, spectroscopy at the nanoscale, near-field microscopy, atomic force microscopy and ferroelectronic materials, molecular beam epitaxy, mesoscopic physics, and medical instrumentation.

Biomedical Engineering

Professors
James Duncan, Robert Grober, Csaba Horváth, Steven Segal, Mark Saltzman, Fred Sigworth, Steven Zucker

Associate Professors
Lawrence Staib, Hemant Tagare

Assistant Professors
Jacek Cholewicki, Erin Lavik

FIELDS OF STUDY

Fields include the physics of image formation (MRI, ultrasound, nuclear medicine, and X-ray), NMR spectroscopy, digital image analysis and processing, computer vision, biological signals and sensors, biomechanics, physiology and human factors engineering, biotechnology, biochemical engineering, and tissue engineering.

Chemical Engineering

Chair
John Walz

Professors
Eric Altman, Daniel Crothers (*Adjunct*), Menachem Elimelech, Abbas Firoozabadi (*Adjunct*), Thomas Graedel, Gary Haller, Csaba Horváth, Lisa Pfefferle, Joseph Pignatello (*Adjunct*), Daniel Rosner, John Walz, L. Lee Wikstrom (*Adjunct*), Kurt Zilm (*Adjunct*)

Associate Professors
Gaboury Benoit, Michael Loewenberg, Paul Van Tassel

Assistant Professor
William Mitch

FIELDS OF STUDY

Fields include combustion, separation processes, catalysis, statistical mechanics of adsorption, high-temperature chemical reaction engineering, convective heat and mass transfer, chromatography, biochemical and biomedical engineering, biotechnology, molecular beams, aerosol science and technology, materials processing, surface science, and environmental engineering.

Electrical Engineering

Chair
Tso-Ping Ma

Professors
Richard Barker (*Emeritus*), Andrew Barron, Richard Chang, W. J. Cunningham (*Emeritus*), James Duncan, Peter Kindlmann (*Adjunct*), Roman Kuc, Tso-Ping Ma, A. Stephen Morse, Kumpati Narendra, Mark Reed, Peter Schultheiss (*Emeritus*), J. Rimas Vaisnys, Jerry Woodall, Steven Zucker

Associate Professors
Jung Han, Lawrence Staib, Hemant Tagare

Assistant Professors
Hur Koser, Richard Lethin (*Adjunct*), Yiorgos Makris, Janet Pan, Sekhar Tatikonda, Edmund Yeh

FIELDS OF STUDY

Fields include control systems, neural networks, communications and signal processing, wireless networks, intelligent sensors, biomedical image processing, microelectronic materials and semiconductor devices, nanoelectronic science and technology, optoelectronic materials and devices, computer engineering, computer architecture, VLSI design and testing, and computer vision.

Mechanical Engineering

Chair
Marshall Long

Professors
Ira Bernstein (*Emeritus*), Boa-Teh Chu (*Emeritus*), Juan Fernández de la Mora, Alessandro Gomez, Robert Gordon, Amable Liñan-Martinez (*Adjunct*), Marshall Long, Manohar Panjabi, Lisa Pfefferle, Daniel Rosner, Ronald Smith, Mitchell Smooke, Katepalli Sreenivasan (*Adjunct*), George Veronis, Peter Wegener (*Emeritus*), Forman Williams (*Adjunct*)

Associate Professors
Jacek Cholewicki, Udo Schwarz, Wei Tong

Assistant Professors
Jerzy Blawzdziewicz, Corey O'Hern, Ainissa Ramirez, David Wu, Bjong Yeigh (*Adjunct*)

Lecturers
Beth Anne Bennett, Natalie Jeremijenko, Kailasnath Purushothaman, Glenn Weston-Murphy

FIELDS OF STUDY

Mechanics of Fluids: Dynamics and stability of drops and bubbles; dynamics of thin liquid films; macroscopic and particle-scale dynamics of emulsions, foams, and colloidal suspensions; experimental, theoretical, and computational studies of turbulence; chaos; fractals; aerodynamics; kinetic theory of gases and mixtures; electrospray theory and characterization; combustion and flames; computational methods for fluid dynamics and reacting flows; laser diagnostics of reacting and nonreacting flows; atmospheric turbulence, climate, theoretical and laboratory modeling of large-scale ocean circulation.

Mechanics of Solids/Material Science: Mechanisms of deformation, mass transport, and nucleation within material systems through experimental, analytic, and computational studies; mechanical testing of small-scale structures; characterization of microscale inhomogeneities in plastic flow; impact loading of materials; diffusion of dopants within semiconductor films; evolution of surface roughness during plastic deformation; ion implantation-induced disorder in crystalline films; incorporation of microstructural information into constitutive laws; biomechanics of the heart; electromigration in metallic interconnects; transient nucleation in multicomponent systems; jamming in particulate systems such as glasses, colloids, and granular materials.

Program in Environmental Engineering

Professors
Gaboury Benoit, Menachem Elimelech, Thomas Graedel, Lisa Pfefferle, Joseph Pignatello (*Adjunct*), Daniel Rosner, Karl Turekian, John Walz

Associate Professor
James Saiers

Assistant Professors
Ruth Blake, William Mitch

Lecturers
James Wallis, L. Lee Wikstrom

FIELDS OF STUDY

Fields include aquatic and environmental chemistry, physical and chemical processes for water quality control, transport and fate of pollutants in the environment, transport of microbial particles in groundwater, colloidal and interfacial phenomena in aquatic systems, environmental engineering microbiology, environmental molecular biology, fate of hormones and pharmaceutically active compounds in aquatic environments and engineering systems, removal and reactivity of emerging trace organic pollutants in advanced water reuse, membrane separations for water quality control, industrial ecology, geochemistry and geomicrobiology, and chemical reactions at the mineral-water interface.

Special Requirements for the Ph.D. Degree

A pamphlet titled *Qualification Procedures for a Ph.D. Degree in Engineering and Applied Science* describes the requirements in detail. The student is strongly encouraged to read it carefully. Here, key requirements are briefly summarized.

The student plans his/her course of study in consultation with faculty advisers (the student's advisory committee). A minimum of ten term courses is required, normally completed in the first two years. Mastery of the mathematical topics, as covered, for example, in ENAS 500a, is expected and generally required (for exceptions, consult the individual department/program). Students may take an examination to place out of ENAS 500a. Placing out of the course will meet the mathematical topics requirement but will not reduce the total number of required courses In addition, core courses, as identified by each department/program, should be taken in the first year. No more than two courses should be Special Investigations, and at least two should be outside the area of the dissertation. The student will take a competence examination in departmentally specified core areas by the end of September in the third term. If the student passes, with a grade of Honors, the relevant course(s) in a given core area and if there is unanimous approval of the student's advisory committee, the DGS may waive the portion of the competence examination requirement in that particular core area. Periodically, the faculty reviews the overall performance of the student to determine whether he/she may continue for the Ph.D. degree. At the end of the first year, a faculty member typically agrees to accept the student as a research assistant. By October 5 of the third year, an area

examination must be passed and a written prospectus submitted before dissertation research is begun. These events result in the student's admission to candidacy. Subsequently, the student will report orally each year to the full advisory committee on progress. When the research is nearing completion, but before the thesis writing has commenced, the full advisory committee will advise the student on the thesis plan. A final oral presentation of the dissertation research is required to be given during term time. There is no foreign-language requirement.

Honors Requirement

Students must meet the Graduate School's Honors requirement in at least two term courses (excluding Special Investigations) by the end of the second term of full-time study. An extension of one term may be granted at the discretion of the DGS.

Master's Degrees

M.Phil. See Graduate School requirements, pages 397–98.

M.S. (en route to the Ph.D.). To qualify for the M.S., the student must pass eight term courses; no more than two may be Special Investigations. An average grade of at least High Pass is required, with at least one grade of Honors.

Master's Degree Program. Students may also be admitted directly to a terminal master's degree program. The requirements are the same as for the M.S. en route to the Ph.D. This program is normally completed in one year, but a part-time program may be spread over as many as four years. Some courses are available in the evening, to suit the needs of students from local industry.

Master of Engineering. This degree is designed to be taken in conjunction with Yale undergraduate B.S. degrees in Engineering. For details please see the Engineering entry in the *Yale College Programs of Study,* and www.eng.yale.edu/Select/.

Program materials are available upon request to the Director of Graduate Studies, Engineering and Applied Science, Yale University, PO Box 208267, New Haven CT 06520-8267; e-mail, engineering@yale.edu; Web site, www.eng.yale.edu/.

Courses

The list of courses may be slightly modified by the time term begins. Please check the Web site www.eng.yale.edu/GIF/grad/courses.html for the most updated course listing.

ENAS 500a, Mathematical Methods I. Staff.
TTh 10.30–12
Vector analysis in three dimensions (2 weeks), linear algebra (4 weeks), functions of a complex variable (4 weeks), topics at the discretion of the instructor (3 weeks), e.g., (1) specific examples to reinforce the material already presented and (2) new topics (to choose among: Fourier series in one and more dimensions, Laplace transforms, Fourier integrals in one and more dimensions, optimization, elements of ODE).

ENAS 501b,Mathematical Methods II. Jerzy Blawzdziewicz.
TTh 1–2.20
Special functions, the Laplace transformations, Fourier series, Fourier integrals, and partial differential equations including separation of variables, methods of characteristics, variational techniques, and the brief discussion of numerical methods.

ENAS 502b[u], Stochastic Processes. Staff.
TTh 10.30–11.45
Elements of set and measure theory. Probability distributions, moments, characteristic functions. The central limit theorem. Basic properties of random processes. Stationarity and ergodicity. Correlation functions and power spectra. Linear and nonlinear operations on random processes.

ENAS 505a,Advanced Engineering Mathematics. Paul Van Tassel.
TTh 2.30–3.45
A beginning graduate-level introduction is given to ordinary and partial differential equations, vector and tensor analysis, and linear algebra. Laplace transform, series expansion, Fourier transform, and matrix methods are given particular attention. Applications to problems frequently encountered by chemical, biomedical, and environmental engineers are stressed throughout.

ENAS 506a[u], Basic Quantum Mechanics. Daniel Prober.
TTh 9–10.15
Basic concepts and techniques of quantum mechanics essential for solid state physics and quantum electronics. Topics include the Schrödinger treatment of the harmonic oscillator, atoms and molecules and tunneling, matrix methods and perturbation theory.

ENAS 507b[u], Digital Systems Testing and Design for Testability. Yiorgos Makris.
MW 1–2.15
Introduction to the fundamental concepts, algorithms, and design techniques for testing digital systems. Topics include: test issues and economics, fault modeling, logic and fault simulation, test generation algorithms for combinational and sequential circuits, testability analysis, design for testability, built-in self-test, delay fault test, functional test, and case studies (memory test, FPGA test, system-on-chip test, etc.). Lab work consists of projects employing logic and fault simulation, automatic test pattern generation, and design for testability software tools. Prerequisite: EENG 462a/CPSC 338a. Understanding of algorithms and data structures is desirable but not essential.

ENAS 509a[u], Electronic Materials: Fundamentals and Applications. Jung Han.
MW 11.30–12.45
Survey and review of fundamental issues associated with modern microelectronic and optoelectronic materials. Topics include band theory, electronic transport, surface kinetics, diffusion, materials defects, elasticity in thin films, epitaxy, and Si integrated circuits.

ENAS 510a[u], Physical and Chemical Basis Biosensing. Douglas Rothman.
TTh 1–2.15
Basic principles and technologies for sensing the chemical, electrical, and structural properties of living tissues and biological macromolecules. Topics include magnetic resonance spectroscopy, microelectrodes, flourescent probes, chip-based biosensors, X-ray and electron tomograph, and MRI.

ENAS 511b[u], Physics and Devices of Optical Communication. Jung Han.
MW 11.30–12.45
A survey of the enabling components and devices that constitute modern optical communication systems. Focus on the physics and principles of each functional unit, its current technological status, design issues relevant to overall performance, and future directions. Permission of instructor required.

ENAS 521a,Classical and Statistical Thermodynamics. Abbas Firoozabadi.
TTh 9–10.15
A unified approach to bulk-phase equilibrium thermodynamics, bulk-phase irreversible thermodynamics, and interfacial thermodynamics in the framework of classical thermodynamics,

and an introduction to statistical thermodynamics. Both the activity coefficient and the equations of state are used in the description of bulk phases. Emphasis on classical thermodynamics of multicomponents, including concepts of stability and criticality, curvature effect, and gravity effect. The choice of Gibbs free energy function covers applications to a broad range of problems in chemical, environmental, biomedical, and petroleum engineering. The introduction includes theory of Gibbs canonical ensembles and the partition functions, fluctuations, and Boltzmann's statistics, Fermi-Dirac and Bose-Einstein statistics. Application to ideal monatomic and diatomic gases is covered.

ENAS 550a[u], Physiological Systems. Steven Segal and staff.
MWF 9.30–10.20
Regulation and control in biological systems, emphasizing human physiology and principles of feedback. Biomechanical properties of tissues emphasizing the structural basis of physiological control. Conversion of chemical energy into work in light of metabolic control and temperature regulation. *Also C&MP 550a, MCDB 550a[u].*

ENAS 554b[u], Biochemical Engineering: Biotechnology. James Wilkins.
TTh 1–2.15
Biotechnology treated from the point of view of chemical engineering. Basics of microbiology, microbial genetics and control, and genetic engineering, followed by enzyme kinetics and biochemical reactors. Fermentation technologies: biochemical separation processes with emphasis on chromatography. Field trips to fermentation facilities.

ENAS 557b[u], Biomechanics. Jacek Cholewicki.
TTh 2.30–3.45
An introduction to the application of mechanical engineering principles to biological materials and systems. Topics include ligaments, tendons, bones, muscles; joints, gait analysis; exercise physiology. The basic concepts are directed toward an understanding of the science of orthopaedic surgery and sports medicine.

ENAS 575b[u], Computational Vision and Biological Perception. Steven Zucker.
MW 2.30–3.45
An overview of computational vision with a biological emphasis suitable as a introduction to biological perception for computer science and engineering students, as well as an introduction to computational vision for mathematics, psychology, and physiology students. After MATH 120a or b and CPSC 112a or b, or with permission of instructor. *Also CPSC 575b.*

ENAS 580a[u], Seminars in Biomedical Engineering. Staff.
Tutorial seminars illustrating applications of physics and engineering to biomedical problems. Students are required to attend the seminars, to do the readings assigned after each seminar, to ask questions, and to participate in the discussions. Four to five short papers are required on issues arising from selected topics. The final papers may be presented to the rest of the class.

[**ENAS 589a,Introduction to Information Technology for Management.**]

[**ENAS 600a[u], Computer-Aided Engineering.**]

ENAS 602a,Chemical Reaction Engineering. Dragos Ciuparu.
M 4–6.30
Applications of physical-chemical and chemical-engineering principles to the design of chemical process reactors. Ideal reactors treated in detail in the first half of the course, practical homogeneous and catalytic reactors in the second.

ENAS 603b,Energy Mass and Momentum Processes. Michael Loewenberg.
MW 9–10.15
Application of continuum mechanics approach to the understanding and prediction of fluid flow systems that may be chemically reactive, turbulent, or multiphase.

[**ENAS 604b,Bioseparations: Science and Engineering.**]

ENAS 605b,Colloidal Chemical Engineering. Paul Van Tassel.
TTh 1–2.15
A graduate-level introduction is given to modern colloid science as practiced by engineers. Topics include self-assembly in solution and at surfaces, surface chemistry, the electric double layer, colloidal forces, and polymers. Applications to problems frequently encountered by chemical, biomedical, and environmental engineers are stressed throughout.

[**ENAS 607b[u], Microhydrodynamics.**]

ENAS 608b,Surface and Surface Processes. Eric Altman.
TTh 9–10.45
The chemistry and physics of solid surfaces. Emphasis on fundamental aspects of the following areas of surface science: surface crystallography and reconstruction; kinetics of gas-solid interactions; adsorption; heterogeneous catalysis by transition metal surfaces; oxidation and corrosion; and nucleation and growth of thin films by physical and chemical vapor deposition.

[**ENAS 610a,Advanced Topics in Bioseparations.**]

ENAS 611a[u], Separation Processes. John Walz.
MW 2.30–3.45
Theory and design of separation processes for multicomputer and/or multiphase mixtures via equilibrium and rate phenomena. Included are single-stage and cascaded absorption, adsorption, extraction, distillation, filtration, and crystallization processes.

[**ENAS 612a,Colloidal Separations.**]

[**ENAS 614a,Surface Spectroscopy.**]

[**ENAS 618b,Catalysis: An Integrated Approach.**]

[**ENAS 619b,Advanced Transport: Topics in Multiphase Chemical Reaction Engineering.**]

ENAS 626a[u], Chemical Engineering Process Control. Eric Altman.
MW 1–2.15
Modeling of steady- and unsteady-state behavior of chemical processes; optimal control strategies for processes of particular interest to chemical engineers; discussion of both classical and modern control theory, with applications.

ENAS 640b,Aquatic Chemistry. Gaboury Benoit.
TTh 11.30–12.45
A detailed examination of the principles governing chemical reactions in water. Emphasis is on developing the ability to predict the aqueous chemistry of natural and perturbed systems based on a knowledge of their biogeochemical setting. Focus is on inorganic chemistry, and topics include elementary thermodynamics, acid-base equilibria, alkalinity, speciation, solubility, mineral stability, redox chemistry, and surface complexation reactions. Illustrative examples are taken from the aquatic chemistry of estuaries, lakes, rivers, wetlands, soils, aquifers, and the atmosphere. A standard software package used to predict chemical equilibria may also be presented. *Also F&ES 544b.*

[**ENAS 641a,Biological Processes in Environmental Engineering.**]

ENAS 642a,Physical and Chemical Processes in Environmental Engineering. Menachem Elimelech.
TTh 2.30–3.45
Fundamental and applied concepts of physical and chemical ("physicochemical") processes relevant to water quality control. Topics include chemical reaction engineering, overview of

water and wastewater treatment plants, colloid chemistry for solid-liquid separation processes, physical and chemical aspects of coagulation, coagulation in natural waters, filtration in engineered and natural systems, adsorption, membrane processes, disinfection and oxidation, disinfection by-products.

ENAS 643a, Transport and Fate of Organic Chemicals in the Environment. Joseph Pignatello.
TTh 4–5.15
Fundamental chemical and physical processes controlling the distribution, transport, and transformation of anthropogenic organic chemicals in aqueous environments including soils, sediments, and groundwater. The course provides basic knowledge about the following: (1)the use of chemical and physical principles to quantify the thermodynamics and kinetics of individual processes, (2) the use of chemical structure to understand these processes at the molecular level, and (3) a framework for evaluating the relative importance of these processes so that the fate of a particular chemical in a particular environment may be predicted.

[**ENAS 644b,Geographic Information Systems (GIS) in Water Resources and Environmental Engineering.**]

ENAS 645b,Industrial Ecology. Thomas Graedel, William Ellis.
MW 1–2.20
Industrial ecology is an organizing concept that is increasingly applied to define various interactions of today's technological society with both natural and altered environments. Technology and its potential for modification and change are central to this topic, as are implications for government policy and corporate response. The course discusses how industrial ecology is being applied in corporations to minimize the environmental impacts of products, processes, and services, and shows how industrial ecology serves as a technological framework for science, policy, and management in government and society. *Also F&ES 501b.*

ENAS 646a,Environmental Hydrology. Jeffrey Albert.
MW 11.30–12.50
An introduction to the essential elements of hydrogeologic processes. Course topics include groundwater flow, occurrence and movement of water in the vadose zone, streamflow generation, groundwater contamination, and transport of chemicals in groundwater. Computer software packages are used to reinforce concepts presented in class. A modest background in general physics and calculus is required. *Also F&ES 540a.*

ENAS 647b,Hydrological Modeling. James Saiers.
MW 10–11.20
Application of computer models to solve problems related to water movement and chemical migration in subsurface environments. Unsaturated and saturated flow phenomena are considered, and the role of geochemical and microbiological processes in chemical fate and transport are examined.

[**ENAS 649a,Selected Topics in Environmental Engineering Science.**]

ENAS 650a[u], Instrumentation and Product Design. Peter Kindlmann.
WF 2.30–3.45
Survey of broadly applicable design methods with initial emphasis on analog electronics: review of op amps and other integrated circuits and their specifications, data conversion fundamentals, the use of simulation and an online engineering database, exposure to such broader issues as user-interface design, user participation in design, and the transforming role of products at work and in the home.

ENAS 704a[u], Theoretical Fluid Dynamics. Staff.
TTh 1–2.15
Derivation of the equations of fluid motion from basic principles. Potential theory, viscous flow, with vorticity. Topics in hydrodynamics, gas dynamics, stability, and turbulence.

ENAS 705a,Numerical Simulations of Liquids. Corey O'Hern.
TTh 2.30–3.45
Review of equilibrium Molecular Dynamics and Monte Carlo simulation methods in various thermodynamic ensembles. Introduction to non-equilibrium molecular dynamics techniques especially to study shear flow and heat transport in liquids. The application of novel nonequilibrium Molecular Dynamics and Monte Carlo methods to the study of supercooled liquids and glasses and sheared granular materials and foams.

ENAS 708b,Fundamentals of Combustion. Alessandro Gomez.
TTh 2.30–3.45
Review of relevant aspects of chemical thermodynamics and chemical kinetics. Explosion and oxidation of fuels. Laminar premixed fuels. Detonations. Diffusion flame and droplet burning.

ENAS 709a,Special Topics in Combustion. Staff.
TTh 2.30–3.45
An advanced course in combustion with an emphasis on turbulent combustion in both premixed and non-premixed systems. We review modern approaches to the subject including both experimental and theoretical aspects. Prerequisite: ENAS 708b.

[**ENAS 713a[u], Acoustics.**]

ENAS 718a[u], Heterojunction Devices. Mark Reed.
TTh 9–10.15
Survey of the physics, technology, and fabrication of semiconductor heterojunction materials and devices. Topics include contemporary compound semiconductor material properties and epitaxial growth techniques; high-speed analog and digital devices; microwave and millimeter wave devices for radar and wireless communications; the physics and device properties of quantum wells and superlattices; HEMTs and modulation-doped structures; resonant tunneling physics and devices; and device modeling using computer simulation tools. Lab includes fabrication of GAAs, FETs, and HBTs; fabrication and measurement of quantum Hall effect standards; LEDs; and resonant tunneling devices.

[**ENAS 745a,Optical Diagnostics for Reacting and Nonreacting Flows.**]

ENAS 747a[u], Applied Numerical Methods I. Beth Anne Bennett.
TTh 2.30–3.45
A variety of numerical methods applied to problems in engineering and applied science. Topics include solutions of linear and nonlinear equations, interpolation and approximation, eigenvalue determination, and numerical integration.

[**ENAS 748b[u], Applied Numerical Methods II.**]

ENAS 750b[u], Mechanics of Deformable Solids. Staff.
Unified presentation of the equilibrium behavior of structural and machine elements, including the solution of a variety of representative engineering problems. Tensorial description of stress and strain. Elementary introduction to elastic, plastic, and viscoelastic behavior of solids. Failure theories. Two-dimensional boundary value problems in elasticity. Energy methods in solid mechanics. Stability problems.

[**ENAS 751a, Vibration Problems in Engineering.**]

ENAS 761a,Introduction to Continuum Mechanics. Jerzy Blawzdziewicz.
TTh 9–10.15
Foundations of fluid and solid mechanics presented from a unified viewpoint. Usefulness and limitations of continuum approximation. A review of types of mechanical behavior. Ideal and real substances. Mathematical preliminaries: vector and tensor calculus. Kinematics of deformation. Basic thermodynamics. Conservative laws. Relation to particle mechanics and

the kinetic theory of matter. Modeling of real systems. Constitutive equations and their formulation. Selected applications: waves and heat transfer in fluids and solids.

[**ENAS 763a,Introduction to Polymer Science and Engineering.**]

ENAS 785a[u], Microstructural Development of Materials. David Wu.
MW 1–2.15
An advanced course in the development of microstructure in a material. Topics include the nature of solids; thermodynamics of solids; atomic diffusion; solidification; the structure of internal interfaces; and diffusive and nondiffusive phase transformations.

[**ENAS 786a,Mechanical Behavior of Material.**]

[**ENAS 789a, Turbulence and Related Problems.**]

[**ENAS 810b,Nonlinear Optics.**]

[**ENAS 815b,Detection of Radiation.**]

ENAS 818a,Mesoscopic Physics. Michel Devoret.
TTh 9–10.30
Introduction to the physics of nanoscale solid-state systems which are large and disordered enough to be described in terms of simple macroscopic parameters like resistance, capacitance, and inductance, but small and cold enough that effects usually associated with microscopic particles, like quantum-mechanical coherence and/or charge quantization, dominate. Emphasis is placed on transport and noise phenomena in the normal and superconducting regimes. *Also PHYS 634a.*

ENAS 821b[u], Physics of Medical Imaging. Todd Constable.
MW 11.30–12.45
The physics of image formation with special emphasis on techniques with medical applications. Concepts that are common to different types of imaging are emphasized, along with an understanding of how information is limited by the basic physical phenomena involved. Mathematical concepts of image analysis, the formation of images by ionizing radiation, ultrasound, NMR, and other energy forms, and methods of evaluating image quality.

ENAS 850a[u] and 851b[u], Solid State Physics I and II. Victor Henrich [F], Robert Schoelkopf [Sp].
TTh 1–2.15
A two-term sequence covering the principles underlying the electrical, thermal, magnetic, and optical properties of solids, including crystal structures, phonon, energy bands, semiconductors, Fermi surfaces, magnetic resonance, phase transitions, and superconductivity. *Also PHYS 548a[u] and 549b[u].*

ENAS 852b,Many-Body Theory of Solids. A.Douglas Stone.
TTh 10.30–12
Solids as many-particle systems. Second quantization. Green's functions, quantum statistical mechanics, linear response theory. Hartree-Fock theory, perturbation theory, Feynman diagrams at finite temperature. Theory of the electron gas, electron-phonon coupling, BCS theory of superconductivity. *Also PHYS 610b.*

ENAS 856a,Theory of Solids I. Sohrab Ismail-Beigi.
WF 10.30–12
Theoretical techniques for the study of the structural and electronic properties of solids, with applications. Topics include band structure, phonons, defects, transport, magnetism, and superconductivity. *Also PHYS 650a.*

[**ENAS 857b,Theory of Solids II.**]

[**ENAS 858a,Asymptotic Methods.**]

ENAS 859a,Special Topics in Optics. Richard Chang.
TTh 2.30–3.45
A survey of the principles of optics. Topics include geometrical optics, optical imaging, interference, and diffraction. The course is taught from the experimentalist perspective and emphasizes real applications. *Also PHYS 675a.*

ENAS 860b, Special Topics in Condensed Matter Physics: Nonequilibrium Dynamics and Pattern Formation. Pierre Hohenberg.
HTBA
Stationary and time-dependent spatial patterns are studied in extended systems driven away from equilibrium. A variety of mathematical models are introduced to describe phenomena such as bifurcations, ordered spatial patterns, defect patterns, excitability, and spatiotemporal chaos. The predictions of the models are compared to experiments in fluids (Rayleigh-Benard convection), oscillatory chemical reactions, electrical excitation of heart tissue, and other systems. Prerequisites: graduate courses in statistical physics and mathematical methods. *Also PHYS 667b.*

[**ENAS 863b,Introduction to Superconductivity.**]

[**ENAS 866a, MOS Device Physics and Technology.**]

ENAS 875a[u], Introduction to VLSI System Design. Richard Lethin.
Th 1.30–3.20
Chip design. Provides background in integrated devices, circuits, and digital subsystems needed for design and implementation of silicon logic chips. Historical context, scaling, technology projections, physical limits. CMOS fabrication overview, complementary logical circuits, design methodology, computer-aided design techniques, timing, and area estimation. Case studies of recent research and commercial chips. Objectives of the course are (1) to give students the ability to complete the course project (design of a digital CMOS subsystem chip through layout), and (2) to understand the directions that future chip technologies may take. Selected projects are fabricated and packaged for testing by student. Prerequisite: circuits at the level of introductory physics and computer programming.

ENAS 887a[u], Dynamic Programming and Reinforcement Learning. Sekhar Tatikonda.
MW 11.30–12.45
Sequential decision making via dynamic programming. Unified approach to optimal control of stochastic dynamic systems and Markovian decision problems. Applications in communications, control, and networking. Infinite horizon problems. Value and policy iteration. Approximations and reinforcement learning.

ENAS 902a,Linear Systems. A.Stephen Morse.
MW 1.30–3
Background linear algebra; finite-dimensional, linear-continuous, and discrete dynamical systems; state equations, pulse and impulse response matrices, weighting patterns, transfer matrices. Stability, Lyapunov's equation, controllability, observability, system reduction, minimal realizations, equivalent systems, McMillan degree, Markov matrices. Recommended for all students interested in robotics, systems, and information sciences.

ENAS 907b[u], Computer Systems. Staff.
MW 2.30–3.45
The organization of computer systems as hardware and software systems. Instruction-set architecture, assembly programming, computer arithmetic, data-path architecture and control, pipelining, memory hierarchy. Concepts illustrated by exploration of an instructional RISC microprocessor. *Also CPSC 539b[u].*

ENAS 908a,Advanced Topics in Computer Architecture. Daniel Friendly.
TTh 1–2.15
Survey and critical review of the state of the art in microprocessor design. Topics include instruction level parallelism, dependency analysis, instruction fetch, branch prediction and predication, trace caches, instruction scheduling, memory bandwidth, cache organization, value and dependence prediction, and prefetching.

[**ENAS 910a,Adaptive Control and Neural Networks.**]

[**ENAS 912a[u], Digital Image Processing.**]

[**ENAS 913a,Advanced Topics in Medical Imaging and Computer Vision.**]

[**ENAS 917b[u], Optical Properties of Semiconductors.**]

[**ENAS 918b,Data/Telecommunication Technology.**]

[**ENAS 919b,Advanced Heterojunction Devices.**]

[**ENAS 928b,Compound Semiconductor Materials Science,Processing,Devices,and Characterization.**]

[**ENAS 929b,Advanced Semiconductors and Related Devices.**]

ENAS 936b[u], Systems and Control. Kumpati Narendra.
TTh 2.30–3.45
State-variable analysis of linear time-invariant systems formulated in both continuous and discrete time. Topics include model building, state-space diagrams, equilibrium, stability, controllability, observability, transfer functions, various kinds of transformations. Several exercises use a digital computer.

ENAS 944a[u], Digital Communications Systems. Edmund Yeh.
MW 1–2.15
An introduction to the rapidly expanding field of mobile and fixed, voice and data, communications systems. A review of analog and digital signals and their time and frequency domain representations. Topics include modulation methods, including amplitude; frequency and time division multiplexing for continuous and discrete/digital signals; an overview of modern voice and data communications networks; and an overview of information theory, including entropy, the quantification of information, data rates, coding, and compression. Examples and demonstrations are drawn from radio, telephone, television, computer, cellular, and satellite communications networks.

ENAS 954b[u], Information Theory. Andrew Barron.
TTh 9–10.15
Foundations of information theory in communications, statistical inference, statistical mechanics, probability, and algorithmic complexity. Quantities of information and their properties: entropy, conditional entropy, divergence, mutual information, channel capacity. Basic theorems of data compression and coding for noisy channels. Applications in statistics, communication networks, and finance.

ENAS 974a,Math Tools/Biomed Signal Process. Elvir Causevic.
Th 4–7
Application-intensive approach to biomedical signal processing and application of mathematical tools. Review of signals and systems theory. Fourier analysis, sampling theorem, discrete signal processing. Noise characteristics of real-world biosignals — biologic, sensor, electronics, and digital processing noise. Linear and adaptive filtering. Wavelet representation, including wavelet packet decomposition. Denoising, compression, classification/feature extraction

applications to 1D and image biosignals. Review of practical considerations in medical device design as relates to signal processing, scalability, robustness, testability, algorithm complexity, and regulatory issues. *Also MATH 974a.*

ENAS 986b[u], Semiconductor Silicon Devices and Microelectronics. Tso-Ping Ma.
MW 9–10.15
Fundamentals of integrated circuit technology, theory of solid-state devices, and principles of device design and fabrication. Laboratory involves the fabrication and analysis of semiconductor devices, including Ohmic contacts, Schottky diodes, p-n junctions, MOS capacitors, MOSFETs, and integrated circuits.

ENAS 990a and b,Special Investigations. Faculty.
Faculty-supervised individual projects with emphasis on research, laboratory, or theory. Students must define the scope of the proposed project with the faculty member who has agreed to act as supervisor, and submit a brief abstract to the director of graduate studies for approval.

ENAS 995b, Technology Management Seminar Series. Natalie Jeremijenko.
The seminars are given by speakers from industry who present their direct experience in managing technological change. Students are required to select one of the areas discussed and to develop a final presentation and report. The report must address the specific technological and management challenges of that area.

ENAS 996a and b,SynThesis: Product Design for Entrepreneurial Teams. Natalie Jeremijenko.
TTh 2.30–4
The SynThesis course is a product-based graduate course in product design and the management of innovation. During the two terms of the course the students work in entrepreneurial teams to research, develop, create, and market a viable, real-world product. The teams consist of exceptional Engineering students, drawn primarily from the Select Program, as well as School of Management students. The entrepreneurial teams work independently—with the guidance of industry mentors, faculty coaches, and a user community—to develop their prototypes, business plans, and final product. The teams are assessed by juries composed of industry representatives, venture capitalists, and product development experts.

ENGLISH LANGUAGE AND LITERATURE

Linsly-Chittenden Hall, 432.2233
M.A., M.Phil., Ph.D.

Chair
Ruth Bernard Yeazell

Directors of Graduate Studies
Roberta Frank [F] (107A LC, 432.2226, roberta.frank@yale.edu)
Jill Campbell [Sp] (107A LC, 432.2226, jill.campbell@yale.edu)

Professors
Harold Bloom, Leslie Brisman, Richard Brodhead, David Bromwich, Jill Campbell, Michael Denning, Wai Chee Dimock, Roberta Frank, Paul Fry, Sara Suleri Goodyear, Langdon Hammer, Margaret Homans, Vera Kutzinski, Traugott Lawler, Lawrence Manley, J.D. McClatchy (*Adjunct*), Annabel Patterson, Lee Patterson, Linda Peterson, David Quint, Claude Rawson, Joseph Roach, John Rogers, Robert Stepto, Katie Trumpener, Alexander Welsh, Ruth Bernard Yeazell

Associate Professors
Murray Biggs (*Adjunct*), Elizabeth Dillon, Blair Hoxby, David Krasner, Pericles Lewis, Thomas Otten, Marc Robinson (*Adjunct*), Michael Trask

Assistant Professors
Tanya Agathocleous, Nigel Alderman, Ala Alryyes, Jennifer Baker, Jessica Brantley, Wes Davis, William Deresiewicz, Laura Frost, El Mokhtar Ghambou, Matthew Giancarlo, Amy Hungerford, James Kearney, Sanda Lwin, Stefanie Markovits, Christopher R. Miller, Diana Paulin, Lloyd Pratt, Nicole Rice, Elliott Visconsi

Fields of Study

Fields include English from Old English to the present and American literature and language.

Special Requirements for the Ph.D. Degree

In order to fulfill the basic requirements for the program, a student must:

1. Complete thirteen courses — six courses with at least one grade of Honors and a maximum of one grade of Pass by July 15 following the first year; at least twelve courses with grades of Honors in at least four of these courses and not more than one Pass by July 15 following the second year. One of these thirteen courses must be The Teaching of English, ENGL 990.

2. Satisfy the language requirement. The requirement can be satisfied in two ways and is to be completed by the end of the second year.

The two-language option: two languages, one to be completed by passing two advanced literature courses (graduate or undergraduate courses taught in and requiring papers in the language in question) with a grade of Honors or High Pass; the other to be passed by

departmental exam. One of these two to be Latin or Greek. Students specializing in periods after 1750 may, with the permission of the director of graduate studies, substitute a second modern language.

The three-language option: three languages, all to be passed by departmental exam (in the case of the ancient language, by exam or by a year of successful Yale course work), selected from among the following: (a) Latin or Greek; (b) French or German; (c) one of the preceding languages, or Biblical Hebrew, Italian, Russian, Spanish, or another language agreed upon by the director of graduate studies. Students specializing in periods after 1750 may, with the permission of the director of graduate studies, substitute a third language for selection (a). Two terms of Old English (or one term of Old English and one of the History of the English Language) may be substituted for selection (c). The three-language requirement is to be completed by passing two exams by the end of the first year and the third by the end of the second year.

3. Pass the oral examination (before or as early as possible in the fifth term of residence).

4. Teach a minimum of two terms.

5. Submit a dissertation prospectus from three to six months after passing orals (depending on when these were taken).

6. Submit a dissertation.

Upon completion of all predissertation requirements, including the prospectus, students are admitted to candidacy for the Ph.D. Admission to candidacy must take place by the end of the third year of study.

Combined Ph.D. Programs

ENGLISH AND AFRICAN AMERICAN STUDIES

A combined Ph.D. degree is available with African American Studies. Consult departments for details.

ENGLISH AND RENAISSANCE STUDIES

The Department of English Language and Literature also offers, in conjunction with the Renaissance Studies program, a combined Ph.D. in English Language and Literature and Renaissance Studies. For further details, see Renaissance Studies.

Master's Degrees

M.Phil. See Graduate School requirements, pages 397–98. Alternatively, the Department of English Language and Literature offers, in conjunction with the Medieval Studies program, a joint M.Phil. degree. For further details, see Medieval Studies.

M.A. (en route to the Ph.D.). Students enrolled in the Ph.D. program may receive the M.A. upon completion of six courses with at least one grade of Honors and a maximum of one grade of Pass, and the passing of *two* of the languages, ancient or modern, by departmental examinations.

Master's Degree Program

Students enrolled in the master's degree program must complete either seven term courses or six term courses and a special project within the English department (one or two of these courses may be taken in other departments with approval of the director of graduate studies). There must be at least one grade of Honors and there may not be more than one grade of Pass. Students must also pass examinations in two languages, ancient or modern. Full-time students normally complete the program in one year.

Program materials are available upon request to the Graduate Registrar, English Department, Yale University, PO Box 208302, New Haven CT 06520-8302.

Courses

ENGL 500a, Old English. Roberta Frank.
M 11–12.20, W 9–10.20
Introduction to Old English language and style as well as reading and critical analysis of representative Old English poems (heroic narratives, elegies, religious meditations) and a few prose selections.

ENGL 500b, *Beowulf*. Roberta Frank.
MW 9–10.20
A close reading of the Old English poem *Beowulf* and related verse such as *Deor* and *The Finnsburg Fragment*. Attention is given to the general qualities of the Northern heroic tradition, and class members are asked to sample *Beowulf* scholarship and criticism, early and late. The course includes a final examination and a short paper.

ENGL 516b,Research Seminar in Medieval Literature. Lee Patterson.
TH 3.30–5.20
This seminar is designed for students specializing in medieval literature. Its purpose is to supervise each member of the seminar in the preparation of a single major research project. We meet as a group for several weeks as we work out the individual projects; students then meet individually with the instructor for the middle part of the term; and the class then meets together for the final several weeks as each student presents an oral report on his or her project (these presentations take the form of a twenty-minute talk, a rehearsal for reading a paper at a scholarly conference).

ENGL 546a,Chaucer. Traugott Lawler.
T 10.30–12.20
The dream poems and the *Troilus,* with some attention to Chaucer's sources.

ENGL 549b,Medieval Texts and Modern Theory. Matthew Giancarlo.
W 10.30–12.20
This seminar centers on Chaucer and Langland as textual focal points for modern critical debates. Each week, keying off of particular works or passages, we read a series of scholarly articles demonstrating the specific give-and-take, as well as the more general contours, of literary criticism in Middle English studies for the last thirty years or so. Subjects and schools to be covered may include: exegetics/Augustinianism; textual criticism; post-structuralism; old historicism; new historicism; feminism; postcolonialism; intellectual history; and others. The topics and issues, obviously, are most directly related to medieval studies, but they should offer some insight for other fields as well.

ENGL 550b[u], Spenser's *Faerie Queene* and English Renaissance Romance. John Rogers.

F 1.30–3.20

A study of the function of the Renaissance romance genre as a means of exploring questions of identity and sexuality amid the rapidly changing institutions of celibacy, courtship, and marriage. Readings include Spenser's *The Faerie Queene,* as well as Sidney's *Old Arcadia,* Fletcher's *The Faithful Shepherdess,* Mary Wroth's *Urania,* and Milton's *Comus*.

ENGL 565a/b,Introduction to Renaissance Studies. David Quint [F], Lawrence Manley [Sp].

Th 1.30–3.20 [F], W 3.30–5.20 [Sp]

An introduction to major texts, issues, bibliography, and methods in the interdisciplinary study of the Renaissance. Emphasis in the first term on Italy and in the second on northern Europe. *Also CPLT 501, RNST 500a,b.*

ENGL 606a,History and Historical Drama in the Age of Shakespeare. Lawrence Manley.

W 3.30–5.20

A study of the imagination of history on the English stage in the reigns of Elizabeth I and James I. Plays by Shakespeare, Marlowe, Peele, Dekker, Webster, Ford, and others in relation to both non-dramatic forms of historical writing and contemporary affairs.

ENGL 681a,The Mock-Heroic Moment: Milton to Eliot. Claude Rawson.

M 1.30–3.20

The course begins with Milton's critique of military epic in *Paradise Lost.* It deals with the changes in the status of the heroic following the decline of the traditional military epic in the seventeenth century, partly under the pressure of increasing anti-war sentiment, and of the domestication of subject matter which led to the so-called rise of the novel. Deals with Boileau, Dryden, Swift (*Battle of the Books*), Pope, Gay, Fielding, Byron, Shelley, Eliot, Joyce, and Auden. *Also CPLT 681a.*

ENGL 700b, Tragic and Sacred Drama in the Seventeenth Century. Blair Hoxby.

M 3.30–5.20

Authors include late Shakespeare, Beaumont and Fletcher, Corneille, Calderon, Dryden, Racine, and Otway. Topics include conditions of performance; the representation of the passions on stage; the relationship of the tragic, the sacred, and the ritual; and the place of the theater in seventeenth-century society. *Also CPLT 687b.*

ENGL 756b,Byron,Shelley, Keats. Paul Fry.

W 1.30–3.20

Poetry and prose of Byron, Shelley, and Keats with emphasis on both their differences and their common qualities. Special attention is given to the complex interactions of these poets with Wordsworth and Coleridge. Especially in the case of Byron and Shelley—in tandem with such writers as Moore, Rogers, and Campbell—we attempt to define a "Regency manner" and discuss its oblique connection with Romanticism.

ENGL 812b, Jane Austen and the British Empire. Katie Trumpener.

M 10.30–12.20

Describing the linked emergence of feminism and nationalism in British-governed Ceylon, Sam Selvadurai's recent historical novel, *Cinnamon Gardens,* underlines the transformative effect of Jane Austen's fiction (especially *Mansfield Park*) on indigenous readers. Over the last decade, Western scholars have debated whether *Mansfield Park* is implicitly imperial(ist) or explicitly critical of imperial power. This course seeks to reopen those debates through a broader examination of Austen's late fiction (*Emma, Persuasion, Mansfield Park, Sanditon*) in

relationship to other Romantic novels concerned with empire and abolition (including works by Maria Edgeworth, Walter Scott, Mary Hays, Amelia Opie, Elizabeth Hamilton), and through an examination of Austen's formative influence on nineteenth-century "colonial" fiction, particularly the emerging English-language novelistic traditions of Canada, Australia, and British India (including works by Margaret Oliphant, Rudyard Kipling, Ada Cambridge, Sara Jeanette Duncan, Rabindranath Tagore, George Moore, James Joyce). *Also CPLT 812b.*

ENGL 864b,American Romanticism,1799–1826. Alexander Nemerov.
TH 1.30–3.20
This course focuses on American visual and literary production in the Early Republic. Artists, writers, and other figures to be discussed include the Peale family, John Vanderlyn, Charles Brockden Brown, Benjamin Rush, William Rush, and Benjamin West. Attention throughout the course is on close analysis of paintings, sculpture, and literature. A term paper and a major in-class presentation are required. *Also AMST 864b, HSAR 735b.*

ENGL 874b,Henry James,Novel Theory, and Critical Practice. Ruth Bernard Yeazell.
M 1.30–3.20
A close reading of selected novels and tales by Henry James in light of critical and theoretical commentary from James's day to ours. Focus both on James's development as a novelist and on the history of novel criticism in the twentieth century.

ENGL 897b, Postmodern Fiction, Postmodern Theory. Amy Hungerford.
F 10–11.50
Study of novels and theoretical works of the second half of the twentieth century, focusing on the conjunction of belief and meaninglessness in literary and critical practice. Novelists (about three-quarters of the syllabus) include Flannery O'Connor, William Burroughs, Thomas Pynchon, Philip Roth, Toni Morrison, Don DeLillo, Cormac McCarthy, John Edgar Wideman, and Myla Goldberg. Theorists (one-quarter of the syllabus) include W. K. Wimsatt, Walter Benn Michaels and Steven Knapp, Richard Rorty, David Tracy, and others. *Also AMST 897b.*

ENGL 904b[u], The Agon of American Poetry with the European Tradition. Harold Bloom.
TH 1.30–3.20
A study of the relationships of American poetry with its European predecessors. Poets studied include Dickinson, Whitman, Stevens, Eliot, Frost, Hart Crane, Elizabeth Bishop, Ann Carson, and John Ashbery.

ENGL 920a,Rereading Faulkner. Vera Kutzinski.
T 9.30–11.20
This course (and it is not a survey course) explores the potential and the limitations of both traditional and revisionary readings of some of the novels on which Faulkner's reputation has come to rest. In addition to engaging in close textual work with the novels as a basis for broader theoretical discussions concerning canon formation and literary history, we also consider book reviews and scholarly essays to get a good sense of just how differently critics have assessed Faulkner's literary achievement during the course of the twentieth century. Readings include *The Sound and the Fury, Absalom, Absalom!, Intruder in the Dust* (1948), *Selected Letters;* Malcolm Cowley, ed., *The Portable Faulkner;* Toni Morrison, *Song of Solomon;* Juan Rulfo, *Pedro Paramo;* Edouard Glissant, *Faulkner, Mississippi;* and a host of critical essays.

ENGL 925a,American Literary Globalism. Wai Chee Dimock.
W 10.30–12.20
What is the relation between American literature and world culture? How important are cross-time translations, and what does it mean for Emerson, Thoreau, Margaret Fuller, Ezra

Pound, Robert Lowell, and W. S. Merwin to be practitioners in this genre? How important are global roots to authors such as Maxine Hong Kingston, Toni Morrison, and Leslie Silko? This course explores "globalism" as the broadest possible frame for American literature, bringing together authors across centuries, across racial divisions, and across the customary division between poetry and prose. *Also AMST 925a, CPLT 529a.*

ENGL 940b,Problems in the Study of African American Literature. Robert Stepto.
M 1.30–3.20
A consideration of nineteenth- and twentieth-century texts and the following critical problems: slave narratives as literary texts; regionalism, dialect, folklore, and the vernacular; oral to written transformations; the genre definition and practice; women writers, non-U.S. writers, and canon definition; period definition, e.g., the New Negro Renaissance; politics, aesthetics, and the modern writer; points of contact between African American and American letters. *Also AFAM 595b, AMST 640b.*

ENGL 953b,The American Avant-Garde. Marc Robinson.
Th 10–12
Topics include the Living Theater, Happenings, Cunningham/Cage, Open Theater, Judson Dance Theater, Grand Union, Bread and Puppet Theater, Ontological-Hysteric Theater, Theater of the Ridiculous, Meredith Monk, Robert Wilson, and the Wooster Group. *Also DRAM 376b.*

ENGL 956b,Modernism and Sexuality: A Literary Approach. Laura Frost.
T 10.30–12.20
This course examines the representation of sexuality in modern fiction through a formal and historical approach. We consider how literary constructions of sexuality reflect modernist aesthetics and formal innovation as well as historical preoccupations such as pseudo-scientific discourses of sexuality from the turn of the century to the mid-twentieth century. Topics include sexology and psychoanalysis, Victorianism and the "repressive hypothesis," theories of "perversion," female sexuality and feminism, modernism and mass culture, eroticism and pornography, and the politics of pleasure. Primary authors include T. S. Eliot, Djuna Barnes, Radclyffe Hall, Henry James, James Joyce, D. H. Lawrence, Mina Loy, Thomas Mann, Marcel Proust, Oscar Wilde, and Virginia Woolf. Critical readings include Bersani, Boone, Butler, Carpenter, Ellis, Foucault, Laqueur, Rubin, and Sedgwick. *Also CPLT 956b, WGST 720b.*

ENGL 962a,Drama, Performance,Mass Culture. Joseph Roach.
W 1.30–3.20
Taking account of the genealogy of modern drama in eighteenth-century performance, this seminar considers critical theories of the culture industry in relationship to selected canonical plays and popular theater-historical events from *The Beggar's Opera* (1728) to *The Threepenny Opera* (1928). Topics include the transformation of classical genres into the *drame,* the commercialization of leisure through the mass-marketing of vicarious experience, and the emerging culture of celebrity. Critical readings include selections from the Frankfurt School, Walter Benjamin, Bertolt Brecht, Raymond Williams, Roland Barthes, and Jean Baudrillard. Plays are drawn from popular comedies, Sheridan to Shaw (*Pygmalion* and *My Fair Lady*), and long-running bourgeois dramas, beginning with Lillo's *The London Merchant.*

ENGL 970a,British Fiction,1890–1915. William Deresiewicz.
Th 10.30–12.20
Studies in the first generation of modern British fiction, with special emphasis on the works of Joseph Conrad. Issues of literary form, subjectivity, and the nature of the self; imperialism, Englishness, mass culture, and bureaucracy. Broader consideration of the natures of modernism and modernity as well as of interrelations of inspiration, collaboration, and rivalry

among the writers in question. The syllabus includes Conrad's *Lord Jim, Nostromo, The Secret Agent,* and *Under Western Eyes* and most or all of the following: Stevenson, *Dr. Jekyll and Mr. Hyde, The Beach at Falesa,* and *The Ebb-Tide;* Hardy, *Jude the Obscure;* James, *The Turn of the Screw* and *In the Cage;* Kipling, *Kim;* Galsworthy, *The Man of Property* (*Forsyte* I); Wells, *Tono-Bungay;* Forster, *Howards End;* Lawrence, *Sons and Lovers;* Ford, *The Good Soldier.*

ENGL 982a[u], History of Feminist Thought. Margaret Homans.
TTh 1–2.15
This course explores a range of key works from the intellectual history of feminism in Britain, France, and the United States from the Enlightenment onward. We also examine influential writings on gender and sexuality with which these works are in dialogue. The aim is to trace the foundations and development of various strands of feminist thought: liberal feminism with its emphasis on sameness and equality, cultural and separatist feminisms with their focus on difference, and postmodern and third-wave feminisms and queer theory with their questioning of such identity categories as "woman." *Also WGST 590a[u].*

ENGL 990a,The Teaching of English. John Rogers.
M 9–10.50
An introduction to the teaching of literature and composition. Weekly seminars address a series of practical problems connected with teaching: preparing syllabi and lesson plans; generating and guiding classroom discussion; lecturing and serving as a teaching assistant; introducing students to various literary genres; formulating aims and assignments in composition classes; grading and commenting on students' papers. Continuing attention to important theoretical issues: e.g., how the study of literature and writing can be related to study in the humanities at large; how the increasingly abstruse methodologies of current criticism can be adapted for use at more elementary levels of inquiry; and what linguistic and social assumptions underlie various approaches to the teaching of composition. Occasional guest speakers provide information on teaching practices and related issues. Some assigned reading in teaching methods, pedagogical theory, and consideration of the relation of teaching and scholarship.

Students enrolled in this course are affiliated with a section of one of the freshman literature or composition courses. This arrangement enables them to observe a class in action and to confer with an experienced teacher on classroom strategies. In addition, with the agreement and supervision of the instructor, students teach the class themselves once or twice during the term, grade some papers, and hold tutorials.

Because this course requires the full involvement of everyone who participates in it, no auditors can be accepted. Enrollment limited, with priority given to students in the Department of English. Satisfactory/Unsatisfactory only.

ENGL 995a/b,Directed Reading. Staff.
Designed to help fill gaps in students' programs when there are corresponding gaps in the department's offerings. By arrangement with faculty and with the approval of the director of graduate studies.

PROGRAM IN ENVIRONMENTAL ENGINEERING

Dunham Laboratory, 432.4250
M.Eng., M.S., M.Phil., Ph.D.

Professors
Gaboury Benoit, Menachem Elimelech, Thomas Graedel, Lisa Pfefferle, Joseph Pignatello (*Adjunct*), Daniel Rosner, Karl Turekian, John Walz

Associate Professor
James Saiers

Assistant Professors
Ruth Blake, William Mitch

Lecturers
James Wallis, L. Lee Wikstrom

FIELDS OF STUDY

Fields include aquatic and environmental chemistry, physical and chemical processes for water quality control, transport and fate of pollutants in the environment, transport of microbial particles in groundwater, colloidal and interfacial phenomena in aquatic systems, environmental engineering microbiology, environmental molecular biology, fate of hormones and pharmaceutically active compounds in aquatic environments and engineering systems, removal and reactivity of emerging trace organic pollutants in advanced water reuse, membrane separations for water quality control, industrial ecology, geochemistry and geomicrobiology, and chemical reactions at the mineral-water interface.

For admissions and degree requirements, and for course listings, see Engineering and Applied Science, pages 132–45.

EPIDEMIOLOGY AND PUBLIC HEALTH

60 College Street, 785.6383
M.S., M.Phil., Ph.D.

Chair
Michael Merson

Director of Graduate Studies
Nancy Ruddle (785.6383)

Director of Medical Studies
David Katz

Professors
Serap Askoy, Michael Bracken, Kelly Brownell, Arthur DuBois, Erol Fikrig, Durland Fish, Theodore Holford, Keith Joiner, Edward Kaplan, Stanislav Kasl, Ilona Kickbusch, Harlan Krumholz, Brian Leaderer, Robert Makuch, Lawrence Marks, Diane McMahon-Pratt, Michael Merson, I. George Miller, Alvin Novick, Curtis Patton, Harvey Risch, Nancy Ruddle, Peter Salovey, Eugene Shapiro, John Stitt, Mary Tinetti, Daniel Zelterman

Associate Professors
Elizabeth Bradley, Michael Cappello, Elizabeth Claus, Loretta DiPietro, Nora Groce, Robert Heimer, Jeannette Ickovics, Gary Mack, Susan Mayne, Mary Olson, A. David Paltiel, Holly Prigerson, Mark Schlesinger, Kathleen Sikkema, Jody Sindelar, William White, Heping Zhang, Hongyu Zhao, Liangbiao Zheng, Tongzhang Zheng

Assistant Professors
Louis Alexander, Susan Busch, Joel Dubin, Melinda Irwin, Akiko Iwasaki, Beth Jones, Kaveh Khoshnood, Douglas Leslie, Becca Levy, Judith Lichtman, Haiqun Lin, Linda Niccolai, Alexander Ortega, Melinda Pettigrew, Nina Stachenfeld, Christian Tschudi, Hong Wang, Herbert Yu

Fields of Study

Programs of study are offered in the areas of biostatistics, chronic disease epidemiology, environmental health sciences, genetic epidemiology, health policy and administration, and epidemiology of microbial diseases (infectious disease epidemiology, vector-borne diseases, immunology, parasitology, and virology). The Social and Behavioral Program (SBS), within the Chronic Disease Epidemiology division, offers students specialized instruction in the theory and methods of the social and behavioral sciences. All programs are under the faculty of the Department of Epidemiology and Public Health.

Special Admissions Requirements

Applicants should have a strong background in the biological and/or social sciences and, in the case of biostatistics, mathematics. The GRE General Test is required.

Special Requirements for the Ph.D. Degree

To be admitted to candidacy, a student must: (1) satisfactorily complete the course requirements for their division as outlined in the most current *EPH Bulletin,* achieving grades of Honors in at least two; (2) obtain satisfactory grades in the comprehensive examination; and (3) submit an acceptable dissertation prospectus. The comprehensive examination usually is taken at the end of the second full academic year. With the assistance of his/her faculty adviser, each student requests appropriate faculty members to join a dissertation advisory committee. The dissertation prospectus must be approved within a year of passing the comprehensive examination. Teaching experience is regarded as an integral part of the graduate training program. During the second and third years of study, students serve as Teaching Fellows (10 hours/week) each term. With the approval of the director of graduate studies, graduate research assistantship opportunities may take the place of teaching in the third year. By year four, all students are expected to be engaged in full-time research activities.

All doctoral students are required to successfully complete a minimum of ten graduate-level courses.

The special course requirements for each division are:

Biostatistics — an average of three to four courses per term plus seminars and colloquia;

Chronic Disease Epidemiology — an average of three to four courses per term plus seminars and colloquia;

Environmental Health Sciences — an average of three to four courses per term plus seminars and colloquia;

Epidemiology of Microbial Diseases — two years of course work developed with a faculty committee;

Health Policy Administration — an average of three to four courses per term plus seminars and colloquia.

Master's Degrees

M.Phil. Students who have completed all requirements for the Ph.D. except the dissertation may petition the graduate school for the Master of Philosophy degree.

M.S. Upon application, the faculty may recommend students in divisions other than Biostatistics for the M.S. degree. The M.S. degree is awarded only to students who are not continuing for the Ph.D. degree, but who have successfully completed at least one year of the doctoral program. Students are not admitted for this degree. The department also offers a two-year, terminal master's degree program leading to an M.S. in Biostatistics (for the requirements see Biostatistics, page 70). A Biostatistics student who is withdrawing from the Ph.D. program may apply and be recommended for the M.S. provided he or she meets the requirements of the M.S. program in Biostatistics.

Program materials are available upon request from the Director of Graduate Studies (c/o M. Elliot), Epidemiology and Public Health, Yale University, PO Box 208034, New Haven CT 06520-8034; 203.785.6383; e-mail, ephdoctoral@yale.edu.

Courses

BIS 505a,Introduction to Statistical Thinking I. Elizabeth Claus.
This course provides an introduction to the use of statistics in the fields of epidemiology and public health. Topics include descriptive statistics, probability distributions, parameter estimation, and hypothesis testing, as well as an introduction to sampling and simple linear regression. Statistical analysis using the Statistical Analysis Systems (SAS) software on the PC is introduced. Prerequisite: algebra.

BIS 505b,Introduction to Statistical Thinking II. Daniel Zelterman.
This continuation of BIS 505a covers multiple regression, analysis of variance, nonparametric tests, survival analysis, and an introduction to logistic regression. The course concludes with a review of variable classification and choice of statistical analysis. As in the first term, the Statistical Analysis Systems (SAS) software package is used for statistical analysis. Prerequisite: BIS 505a.

BIS 511a, GIS Applications in Epidemiology and Public Health. Theodore Holford.
The study of epidemiology often seeks to determine associations between exposure risk and disease that are spatially dependent. Geographic information systems (GIS) are modern computer-based tools for the capture, storage, analysis, and display of spatial information. GIS technologies are just beginning to be used for public health planning and decision making. Public health applications of GIS provide cost-effective methods for evaluation interventions and modeling future trends, and also provide a visual tool for data exploration. This class teaches the technical and design aspects of implementing a GIS project in public health and provides students with basic tools for using GIS. Examples are given to introduce a variety of applications in the field of epidemiology. Prerequisite: basic computer skills. No prior GIS experience necessary.

BIS 525a and b,Seminar in Biostatistics. Joel Dubin,Haiqun Lin,Robert Makuch.
Faculty and invited speakers present and discuss current research.

BIS 538b, Survey Sampling: Methods and Management. Robert Makuch.
This course reviews the major sampling plans: simple, stratified, systematic, and cluster random sampling. The uses of weighted data and ratio estimation are discussed. The course emphasizes application of methodology, including use of SUDAAN. Prerequisite: BIS 505b or equivalent.

BIS 540a,Fundamentals of Clinical Trials. Faculty.
This course addresses issues related to the design, conduct, and analysis of clinical trials. Topics include protocol development, examination and selection of appropriate experimental design, methods of randomization, sample size determination, appropriate methods of data analysis including time-to-event (possibly censored) data, and interim monitoring and ethical issues. Prerequisite: BIS 505a or equivalent. Enrollment limited to second-year students.

BIS 560b,Database Management in Medicine and Epidemiology. Prakash Nadkarni.
This course covers the theory and practice of database management as applied to clinical trials, observational studies, and other prospective research projects. Emphasis is placed on the use of user-friendly database management packages that require little programming. Difficult problems in database management are described, although students are not expected to build applications of such complexity. Recent advances in the field of data management are studied. Prerequisite: working knowledge of Macintosh or Microsoft Windows.

BIS 561b,Advanced Topics and Case Studies in Multicenter Clinical Trials. Peter Peduzzi, Pamela Hartigan.
This course addresses advanced issues related to the design, conduct, monitoring, and analysis of multicenter randomized clinical trials. Topics include organizational, regulatory, and

human rights issues; an overview of design strategies; advanced topics in sample size estimation and monitoring; data management and quality assurance procedures; cost-effectiveness and quality of life; and case studies of vaccine trials, factorial trials, primary and secondary prevention trials, large simple trials, strategy trials, and cost-effectiveness. The case studies include many of the classical and landmark clinical trials, such as the polio vaccine field trial, Physicians Health Study, and the trials of AZT for the treatment of AIDS. Prerequisites: BIS 505a and BIS 540b. Enrollment limited to second-year students.

BIS 623a,Applied Regression Analysis. Faculty.
This course covers linear regression, testing hypotheses in multivariate regression, regression diagnostics, analysis of variance, and adjusting for covariates. Emphasis is on the application of methods. Prerequisite: BIS 505b or equivalent.

BIS 625a,Categorical Data Analysis. Daniel Zelterman.
This course presents methods for analyzing categorical data in public health, epidemiology, and medicine. Topics include discrete distributions, log-linear models, and logistic regression. Emphasis is placed on the application of the methods and the interpretation of results by applying the techniques of a variety of data sets. Prerequisite: BIS 505b.

BIS 628b, Longitudinal Data Analysis. Joel Dubin.
This course covers methods for analyzing data in which repeated measures have been obtained for individuals over time. Different methods are discussed to handle both continuous and discrete longitudinal response data. Both subject-specific and population averaged approaches are covered (with particular reference to capturing the heterogeneity between different individuals). Some of the approaches covered include linear, nonlinear, and generalized mixed effects models, as well as generalized estimating equations. The course also covers exploratory methods, approaches for handling missing data, and possibly transition models and advanced topics such as multivariate longitudinal responses, nonparametric longitudinal responses, the joint consideration of longitudinal and survival data, and the joint consideration of longitudinal and spatial data. Emphasis is placed on applying the methods, understanding underlying assumptions, and interpreting results. Both SAS and S-Plus are used throughout the course. Prerequisites: BIS 623a and BIS 625a.

[**BIS 631b, Topics in Genetic Epidemiology.**]

BIS 635b, Topics in Statistical Epidemiology. Theodore Holford.
This course considers methods for analyzing the association of one or more factors with disease. Topics include the analysis of cohort studies, case-control studies, and vital rates. The analysis of matched data is also discussed. Emphasis is placed on the application and interpretation of the techniques. Prerequisites: BIS 505a and BIS 505b, BIS 623a or BIS 625a.

[**BIS 637b,Stochastic Processes in Biology and Medicine.**]

[**BIS 640a,Quantitative and Computational Methods in Bioinformatics.**]

BIS 643b,Theory of Survival Analysis and Its Applications. Haiqun Lin.
This course presents the statistical theory underlying survival analysis. It covers different models of censoring and the three major approaches to analyzing this type of data: parametric, nonparametric, and semi-parametric methods. The application of this theory through some exemplary data sets is also presented. Prerequisite: STAT 610a.

BIS 645b,Statistical Methods in Human Genetics. Hongyu Zhao.
Probability modeling and statistical methodology for the analysis of human family data are presented. Topics include single locus and polygenic inheritance, segregation analysis using the transmission probability model and the mixed model, linkage analysis using lode scores, genetic risk prediction models, disease-marker associations, and DNA fingerprinting. Prerequisites: genetics; BIS 505a and b, or equivalent; and permission of the instructor.

[**BIS 646a,Nonparametric Statistical Methods and Their Applications.**]

BIS 691a,Theory of Generalized Linear Models. Haiqun Lin.
This course considers a class of statistical models which generalize the linear model through the link functions of response mean. Major varieties of GLMs including models for Gaussian, Gamma, binomial, un/ordered polynominal and Poisson responses are discussed. Goodness of fit of the models and overdispersion is considered. Extensions to correlated responses are examined through the approaches of quasi-likelihood and generalized estimating equation. The course covers both theoretical and applied aspects of data analytic issues arising from practice. Prerequisites: STAT 542b, BIS 623a, and some knowledge of matrix calculation.

CDE 505a,Social and Behavioral Influences on Health. Jeannette Ickovics.
This course provides students with an introduction to social and behavioral science issues that influence patterns of health and health care delivery. The focus is on the integration of biomedical, social, psychological, and behavioral factors that must be taken into consideration when public health initiatives are developed and implemented. This course emphasizes the integration of research from the social and behavioral sciences with epidemiology and biomedical sciences.

CDE 508a,Principles of Epidemiology I. Robert Dubrow.
This course presents an introduction to epidemiologic concepts and methods. Topics include causation, measurement of disease rates, epidemic investigation, cohort studies, clinical trials, case-control studies, ecological studies, bias and confounding, effect modification, random variation and statistical significance, and screening. The course utilizes a wide variety of case studies from both chronic and infectious disease epidemiology. *Also EMD 508a.*

[**CDE 511a,Health Psychology: Clinical and Social Foundations.**]

CDE 516b, Principles of Epidemiology II. Tongzhang Zheng.
This course provides students with an overview of the principles of epidemiology. The first part of the course emphasizes fundamental epidemiologic principles including measures of disease frequency and association, bias, confounding, precision, and interaction. The second part of the course emphasizes the design and conduct of various epidemiological studies. The final part of the course emphasizes causal inference and disease prevention and control. Prerequisites: CDE/EMD 508a and BIS 505a. *Also EHS 516b.*

CDE 517a,Developing a Research Protocol. Melinda Irwin.
The objective of this course is to develop a research protocol from hypothesis formation to appropriate study design. Review of relevant background literature, consideration of appropriate statistical techniques, provision of adequate personnel and environment, and understanding of strengths and weaknesses of the proposed study are included. Students are divided into groups with each group responsible for developing a research protocol suitable for submission as a grant proposal to NIH. Special attention is given to writing techniques and style. Prerequisites: CDE 516b, second-year M.P.H. or doctoral status.

CDE 518b,Introduction to Pharmacoepidemiology. Michael Bracken.
The course provides a basic orientation to the study of safety, efficacy, and utilization of ethical pharmaceuticals. The application of epidemiologic methods to the field is emphasized. Among the subjects considered are the usefulness of databases from HMOs, governmental, international, and other sources; current pharmacoepidemiology research within Yale School of Medicine; the role of the Food and Drug Administration; the assessment of drug safety; and assessment of quality of life and the role of pharmacoepidemiology in a managed care environment. Prerequisites: CDE/EMD 508a, BIS 505a, and BIS 505b.

CDE 521b,The Epidemiology of Selected Chronic Diseases. Beth Jones.
This survey course covers some of the major chronic diseases, including coronary artery disease, cancer, stroke, chronic obstructive pulmonary disease, diabetes, major depression, and

Alzheimer's. Invited lecturers who are experts in the field cover the basic pathophysiology, etiology, epidemiology, risk factors, and public health importance of each. Approximately half of the scheduled classes are devoted to discussions of major research articles on these diseases. The course emphasizes developing a working knowledge of chronic diseases, the application of epidemiologic methods, and the capacity to read the literature critically. Prerequisite: CDE/EMD 508a.

CDE 523b,Measurement Issues in Chronic Disease Epidemiology. Susan Mayne.
This course addresses the measurement issues in chronic disease epidemiology from a practical perspective. The first part of the course covers the use and limitations of currently available techniques for measuring exposure to a number of etiologic factors such as diet, alcohol, tobacco, physical activity, psychological stress, and environmental/occupational exposures. The latter part of the course focuses on the measurement of outcome for some of the major chronic diseases, along with some practical considerations involved in conducting chronic disease epidemiology research. Prerequisite: CDE/EMD 508a.

[**CDE 525a and b,Seminar in Chronic Disease Epidemiology.**]

CDE 530a,Molecular Epidemiology of Chronic Disease. Herbert Yu.
The course provides an in-depth overview of issues addressed in molecular epidemiology and its application in cancer research. Subjects covered in the course include basic biochemistry and molecular biology, biological mechanisms related to molecular epidemiology research, principles of molecular and biochemical analysis, biotechnologies and laboratory methods used in molecular epidemiology, and interpretation of study results. The course emphasizes the development of abilities to design and conduct molecular epidemiology research and to critically evaluate findings in the literature. Prerequisite: CDE/EMD 508a or permission of the instructor (biochemistry, cell and molecular biology are helpful, but not required).

CDE 531a,Health and Aging. Becca Levy.
Since 1900, the number of individuals 65 years and older has tripled and life expectancy has increased by about thirty years. In seminar we examine some of the health issues related to this growing segment of the population. The class dicussions address such questions as (1) How does the aging process differ between cultures? (2) What kind of interventions can best reduce morbidity in old age? and (3) How can health policy adapt to the aging population? This course integrates psychosocial and biomedical approaches to the study of aging.

CDE 532b,Epidemiology of Cancer. Brenda Cartmel.
This course applies epidemiologic methods to the study of cancer etiology and prevention. Introductory sessions cover cancer biology, carcinogenesis, cancer incidence and mortality rates in the United States, and international variation in cancer rates. The course then focuses on risk factors for cancer (including tobacco, alcohol, diet, radiation, and occupation) and on major cancer sites (including colon, breast, and prostate). Emphasis is placed on critical reading of the literature. Prerequisites: CDE/EMD 508a, CDE 516b, or permission of the instructor.

CDE 533b, Topics in Perinatal Epidemiology. Kathleen Belanger.
Pregnancy, delivery, and reproduction provide the course's organizing focus. The current perinatal epidemiologic literature is critically reviewed from a methodological perspective. Subjects studied include infertility, miscarriage, fetal growth retardation, preterm labor and delivery, aspects of prenatal care, perinatal risks for cancer and other chronic diseases, SIDS, and infant mortality. Students develop an understanding of what evidence is needed to establish causal relationships in this specialty. Implications of research findings for public health policy, individual decision making, and future studies are considered.

CDE 534b,Approaches to Data Management and Analysis of Epidemiologic Data. Elizabeth Triche.
This course provides students with basic skills of data management and data analysis. The SAS statistical program is used. Main topics include using SAS data sets, data manipulation, bivariate and multivariable analyses. Using existing data sets, students test their own hypotheses and develop a research project. Emphasis is placed on the practical application of the skills learned. The course is a useful preparation for the summer internship and for thesis data analysis. Prerequisites: BIS 505a, CDE/EMD 508a, and CDE major or doctoral status (permission of the instructors for non-CDE majors required); students must have taken or must be currently taking BIS 505b and CDE 516b.

CDE 535b, Vascular Epidemiology. Judith Lichtman.
Vascular disease is the leading cause of death and disability among industrialized nations. This course introduces students to the major categories of cerebrovascular and cardiovascular disease. Students are challenged to think about how individual diseases contribute to the epidemic of vascular disease in the United States. In this course, students learn basic principles about the rates of disease, risk factors, clinical trial results, and outcomes of vascular dieases. Through the analysis of actual studies, students apply basic epidemiology to critically evaluate current literature and topics in the field of vascular epidemiology. Sessions include a clinical overview of a specific disease or risk factor, as well as highly interactive discussion of a specific epidemiologic topic or principle. Students are encouraged to develop their own solutions to current gaps in the epidemiologic literature.

[**CDE 545b,Health Disparities by Race and Sex: Epidemiology and Intervention.**]

CDE 550a,Introduction to Evidence-Based Health Care. Michael Bracken.
Evidence-based health care uses best current evidence in addressing clinical or public health questions. This course introduces principles of evidence-based health care in formulating clinical or public health questions, systematically searching for evidence, and applying it to the question. Types of questions considered include treatment/prevention of disease, etiology, diagnostic testing, and prognosis. Particular consideration is given to the methodology of synthesizing evidence in a systematic review. Also addressed is the role of evidence in informing economic analysis of health care programs, clinical decision analysis, and clinical practice guidelines. Using a problem-based approach, students contribute actively to the classes and small-group sessions. Students complete a systematic review in their own field of interest using Cochrane Collaboration methodology. Prerequisites: students must have passed or be concurrently taking CDE 516b, or obtain permission of instructor.

[**CDE 562a,Nutrition and Chronic Disease.**]

[**CDE 570a,Epidemiology of Psychiatric Disorders.**]

CDE 571b,Psychosocial and Behavioral Epidemiology. Stanislav Kasl.
This course provides a systematic overview of psychosocial and behavioral influences on health, illness, and recovery. The factors of interest that influence health include: individual stable characteristics (e.g., traits), characteristics of the primary social environment (e.g., family, friends), settings defined by social roles (e.g., work), and broader contextual factors reflecting social structural variables (e.g., social class). The interplay of the foregoing factors of interest with biomedical and clinical variables constitutes a central theme. Prerequisite: CDE 505a.

CDE 572b,Strategies of Health Promotion and Disease Prevention. Melinda Irwin.
The course provides an overview of methods for evaluating strategies for changing health behaviors, such as physical activity, diet, and tobacco use. Clinic-based (individual level) and community-based strategies (e.g., theories of behavior change, targeting, tailoring, and deliv-

ery of the intervention) are evaluated. Issues in maintenance of behavioral and life-style changes are also examined. Prerequisite: CDE 505a.

[**CDE 573a,Measurement Issues in Psychosocial and Behavioral Epidemiology.**]

[**CDE 574b,Preventive Interventions: Theory, Methods,and Evaluation.**]

CDE 575a,Religion,Health,and Society. Peter Van Ness.
The course examines the impact of various dimensions of religiousness on mortality and health status, giving special attention to the relation between religion and other social factors such as age, gender, race, and class. Discussion focuses on the public health implications of the epidemiological findings including the nature and significance of faith-based programs serving health needs. Special attention is given to studies drawn from religiously diverse populations.

CDE 619a,Advanced Epidemiologic Research Methods. Harvey Risch.
This advanced course focuses on quantitative issues and techniques relevant to the design and analysis of observational epidemiologic studies. Starting with formal definitions of the commonly used epidemiologic parameters, and assuming a working knowledge of ANOVA and linear regression, the course covers analyses based on various related types of regression, e.g., logistic, Poisson, Cox, etc. The GLIM and PECAN computer programs are described and used throughout. Students analyze and discuss data sets of generally increasing complexity. Prerequisites: BIS 505a, 505b, Ph.D. student status, or permission of the instructor.

[**CDE 638a, HIV/AIDS Prevention Research Seminar.**]

[**CDE 669a,Research Seminar in Psychosocial Epidemiology.**]

EHS 502a,Physiology for Environmental Health Sciences. Gary Mack.
The purpose of this course is to describe the basic physical properties associated with exposure to environmental stress and the physiological strategies used to maintain homeostasis in the human body. Prerequisites: biology, chemistry.

EHS 503b,Introduction to Toxicology. Jonathan Borak.
This course examines factors that affect the toxicity of foreign substances. The absorption, distribution, excretion, and metabolism of foreign compounds are discussed. Introductory lectures in cell biology, teratology, chemical carcinogenesis, dose-response relationship, and behavioral toxicology are included.

EHS 505b,Introduction to Industrial Hygiene. Judith Sparer.
Students are introduced to the practice of industrial hygiene: the recognition, evaluation, and control of health hazards in the workplace. A systematic approach to identifying hazards in the workplace is presented, and students are asked to exercise these techniques in at least one industrial worksite. Topics include regulation of health and safety in the workplace, air sampling and interpretation of sampling results, and approaches to reducing place exposures.

EHS 507a,Environmental Epidemiology. Tongzhang Zheng.
Environmental epidemiology can provide insight about the association between environmental exposures of a population and adverse health outcomes. The potentials and the limitations of environmental epidemiology are explored as they are inherent in the design of suitable studies and as they manifest themselves in actual studies that have been conducted. The analysis and interpretation of such studies, as well as the consequences for the design and conduct of proposed studies, are examined. Prerequisite: CDE/EMD 508a or permission of the instructor.

EHS 508a,Assessing Exposures to Environmental Stressors. Brian Leaderer.
This course examines human exposure to environmental stressors as it applies to environmental epidemiology and risk assessment. Indirect and direct methods of assessing exposures are reviewed and case studies are presented.

[**EHS 509a,Environmental Toxicology.**]

EHS 510b,Fundamentals of Environmental Health and Risk Assessment. Loretta DiPietro.
This course is an overview of environmental health. Students are introduced to the fundamentals of environmental health from the perspective of using risk analysis to reduce environmentally induced disease. The principles used to apply toxicologic, statistical, and pharmacokinetics factors in the assessment of health risk from chemicals are emphasized. Quantitative risk assessment, exposure assessment, and risk characterization are emphasized.

EHS 511a,Applied Risk Assessment I. Jonathan Borak.
Applied environmental risk assessment consists of the effective integration in a specific situation of what is known about pollution sources and their characteristics, about human exposures, about the entry and absorption of pollutants, and about the adverse health effects associated with dosage exposure. In any actual situation there are uncertainties in all of the elements to be integrated. This course emphasizes methodologies in use and the limitations that inevitably constrain the process. A number of applied risk assessments are analyzed.

EHS 514a,Environmental Chemistry. Meredith Stowe.
The basic chemical principles underlying environmental pollutants in water, soil, air, and specialized media are introduced. Various categories of federally regulated compounds and elements are examined with respect to group characteristics, analytical measurement techniques of choice, sampling methods, and data interpretation. Selected chemical agents are studied with regard to their fate (possible transformations/decomposition) in the environment. Students develop insight into some current problems faced in applying pollutant measurements to public health, e.g., analytical precision, uncertainty, detection limits, chemical speciation, and toxicological properties.

EHS 516b,Principles of Epidemiology II. Tongzhang Zheng.
This course provides students with an overview of the principles of epidemiology. The first part of the course emphasizes fundamental epidemiologic principles including measures of disease frequency and association, bias, confounding, precision, and interaction. The second part of the course emphasizes the design and conduct of various epidemiological studies. The final part of the course emphasizes causal inference and disease prevention and control. Prerequisites: CDE/EMD 508a and BIS 505a. *Also CDE 516b.*

EHS 518a,Environmental Measurement. Elan Gandsman, Tom Ouimet, Robert Klein.
Human activities affect natural phenomena, and the resulting changes affect humans. Environmental monitoring refers to repeated observations for the study of these relations. The objective of environmental monitoring is to guide the formulation and aid the implementation of environmental management policies designed to protect human health and well-being, which includes ecological well-being. This course investigates the basic scientific principles and technologies of environmental measurements and monitoring, including boundaries on the collection, interpretation, and use of environmental data.

EHS 532b,Indoor Climate. Faculty.
The impact of environmental factors in the indoor environment on human health and well-being is examined. Emphasis is placed on assessing the nature of and exposures to indoor air contaminants and different thermal micro-environments and their influence on health and comfort.

EHS 551a and b,Seminar in Environmental Health. Nina Stachenfeld.
Students are introduced to a wide variety of research topics, policy topics, and applications in environmental health. Faculty members, public health professionals, and students make brief

oral presentations and engage in related dialogues. The course is designed to help students develop topics for their M.P.H. theses. Second-year students have the opportunity to receive feedback on their developing research. Prerequisite: permission of the instructor.

EHS 553a,Epidemiological Methods in Injury Control. Linda Degutis.
This course addresses the application of epidemiological methods to injury surveillance, etiology of injuries, and the evaluation of the effects of injury control programs. Major topics include methods of scoring injury severity; distribution of injury types and severity in segments of the U.S. population; exemplar epidemiological studies of etiology; strategies to reduce incidence and severity; evaluation of attempts to change environments and behavior by standards, laws, persuasion, and economic incentives; and the use of cost-effectiveness, cost-benefit, and cost-savings analysis. Prerequisite: permission of the instructor or completion of epidemiologic methods course work.

EHS 570a,Public Health Management of Disasters. David Cone, Linda Degutis.
This course addresses the role of public health in disaster preparedness and management. It includes discussion of concepts in basic science, human responses to injury and illness, public health systems, and policy. Major topics include types of disasters and their consequences; the role of public health systems in disasters; hazard assessment and community vulnerability management; and mental health and environmental health issues in disasters. Practical applications of the concepts developed are emphasized, as are both the similarities and differences between domestic and foreign disaster management. Prerequisite: CDE/EMD 508a.

EHS 573b,Occupational Epidemiology. Mark Cullen.
This course considers various approaches to the epidemiologic evaluation of health hazards in the workplace. The work includes consideration of specific substances. Critical review of the literature is stressed. Intermediate to advanced techniques in study design and analysis of occupational epidemiologic studies are included. Prerequisites: BIS 505a and CDE/EMD 508a.

EHS 575a and b,Introduction to Occupational and Environmental Medicine. Mark Cullen [F],Mark Russi [Sp].
This yearlong course presents a broad overview of the principles of occupational and environmental medicine. In the fall term the major diseases of environmental origin are presented. In the spring term the major hazards — chemical, physical, and biologic — and the settings in which they occur are examined. Prerequisite: M.D. degree or permission of the instructor.

EHS 621b,Seminar in Environmental Health Risk Assessment. Jonathan Borak.
Case studies on various topics and problems in the area of risk assessment in relation to environmental health are presented. Topics include modeling, victim compensation, perception, cost-benefit, ethics, comparable risk, validity, data and assumptions, historical aspects, animal versus human data, and federal risk assessment procedures. Prerequisites: BIS 505a; doctoral status.

EHS 655,Readings in Environmental Health. Faculty.
By arrangement with instructor, students study environmental topics through the current literature, often to develop a research or thesis protocol. Prerequisite: EHS major.

EMD 508a,Principles of Epidemiology I. Robert Dubrow.
This course presents an introduction to epidemiologic concepts and methods. Topics include causation, measurement of disease rates, epidemic investigation, cohort studies, clinical trials, case-control studies, ecological studies, bias and confounding, effect modification, random variation and statistical significance, and screening. The course utilizes a wide variety of case studies from both chronic and infectious disease epidemiology. *Also CDE 508a.*

EMD 512b,Immunology for Epidemiologists. Nancy Ruddle.
This course is designed to introduce students to the fundamentals of immunology including antigens, antibodies, methods for detecting antibodies, cells of the immune system, products of such cells, and immune mechanisms. Prerequisite: two terms of college biology.

EMD 516a,Biology of Viruses of Humans. Louis Alexander.
This course consists of a systematic review of the spectrum of viruses and their modes of replication, dissemination, pathogenesis, and immunogenicity. Special problems representative of the characteristics of individual families of viruses are discussed. Prerequisites: biology and EMD 519a.

EMD 534a,Molecular Epidemiology of Bacterial Pathogens. Ravi Durvasula.
This course is designed to introduce students to the fundamentals of the molecular epidemiology of bacterial pathogens. The scientific basis for molecular epidemiological tools and their application toward addressing contemporary problems in public health are evaluated through a combination of lectures and case studies. Topics include the emergence of new bacterial pathogens, antibiotic resistance, vaccine design, and bioterrorism. Prerequisite: EMD 519a or permission of the instructor.

EMD 541b,Infectious Diseases: Epidemiology, Prevention,and Control. Kaveh Khoshnood.
Students learn epidemiologic methods and concepts in infectious diseases, specific viral and bacterial infections, and problems illustrative of the methods and/or disease. Methods include surveillance, seroepidemiology, case/control and cohort studies, vaccine trials, epidemic investigation, principles of causation, immunization policies and their implementation, and evaluation in developed and developing countries. Specific viral and bacterial infections of the central nervous, respiratory, and intestinal tracts; the herpes viruses; slow and persistent viral infections; retroviruses, including AIDS; the exanthems; nosocomial infections; and the relation between viruses and cancer are discussed. The use of epidemiological concepts in the prevention of disease is emphasized. Prerequisite: microbiology.

[**EMD 542a,Infectious Diseases in Countries with Limited Resources.**]

EMD 543a,Molecular Epidemiology of Prokaryotic Pathogens. Melinda Pettigrew.
The goal of this course is for students to develop the tools needed for critical analysis in the field of pathogenic bacteriology, with emphasis placed on problems related to epidemiology. This course is focused on basic principles of bacterial pathogenesis using model microbial systems that illustrate the epidemiology of these organisms and mechanisms of virulence. Emphasis is placed on the epidemiology of specific bacterial pathogens of medical importance and their host-parasite interactions. Topics include antibiotic resistance, emerging infections, and how advances in molecular biology lead to new methods for detection, diagnosis, treatment, and/or prevention of bacterial diseases. This lecture-based course requires student presentations, a written critique of a case study, two exams, and participation in class discussions of assigned research papers. Prerequisites: EMD/CDE 508a and two terms of college biology or permission of instructor.

EMD 557a,Public Health Issues in HIV/AIDS. Kaveh Koshnood.
An introductory, broad-based survey course for students of all levels interested in the epidemiology of HIV/AIDS. The course covers virology, clinical issues, natural history of infection, laboratory testing, transmission, and prevention of HIV/AIDS. The course, designed to give students a general, comprehensive understanding of HIV/AIDS issues, is targeted to students beginning work in public health or HIV/AIDS, or for those who wish to expand their specialized knowledge base regarding HIV/AIDS. Regular attendance at the Yale AIDS Colloquium Series (YACS) and written synopsis are required. *Also NURS 713a.*

EMD 630a,Modeling Infectious Diseases: Theory and Applications. Edward Kaplan.
This course provides an introduction to some of the mathematical modeling methods that have developed over the years for the description and control of infectious diseases, and also considers applications of such models to standard problems in epidemiology (e.g., estimating disease incidence, determining the transmission potential of an infectious agent) and more broadly in contemporary public health (e.g., evaluating control options/intervention programs for HIV, West Nile, SARS, potential bioterror agents such as smallpox or anthrax, etc.). The course emphasizes the formulation of basic models, the insight that derives from the formal analysis of such models, and the translation of such insights into the world of real problems. By the end of the course, students will be able to formulate and solve their own models for disease progression, transmission, and control. Prerequisites: EMD 508 or permission of the instructor. Familiarity with basic epidemiological principles and familiarity with basic calculus, algebra, and probability theory.

EMD 642a,Roles of Microorganisms in the Living World. Diane McMahon-Pratt, Robert Macnab,L.Nicholas Ornston.
This topical course explores the biology of microorganisms. Emphasis is placed on mechanisms underlying microbial adaptations and how they influence biological systems. Prerequisites: biology, chemistry, and biochemistry. Requirements: class participation and three exams. *Also GENE 642a, MB&B 642a, MBIO 642a, MCDB 642a.*

EMD 650b,Biology of Disease Vectors. Liangbiao Zheng.
The majority of (re)emerging infectious diseases are associated with invertebrate vectors or animal reservoirs, especially in developing countries. This course introduces students to the major groups of medically important arthropods and the diseases that are transmitted by them. Lectures cover aspects of the natural history, ecology, and physiology of arthropod vectors as they relate to disease transmission. Intervention methods and current research trends are also critically evaluated. Prerequisite: permission of the instructor.

EMD 664b, Biology of Parasitic Protozoa and Helminths. Curtis Patton, Serap Aksoy, Christian Tschudi.
The course focuses on developmental biology, natural history, form, function, and cell and molecular biology of the major eukaryotic parasites of public health importance. Host parasite integration, co-evolution, diagnosis, pathogenesis, and control strategies are emphasized. Prerequisites: one year of biology, two years of chemistry. *Also MBIO 664b.*

EMD 670a and b,Advanced Research Laboratories. Faculty.
This course is taken for two or three terms. The course offers experience in directed research and reading in selected research laboratories. The first two terms must be taken in the first year of the doctoral program while the third term is taken at a time determined after faculty consultation with the student. Prerequisite: Ph.D. student status. Requirements: written analyses in the form of research article/paper.

EMD 680a and b,Advanced Topics in Molecular Parasitology. Curtis Patton, Diane McMahon-Pratt,Christian Tschudi,Michael Cappello.
This broadly based seminar focuses on current research topics in cell and molecular parasitology. Topics are chosen from the current literature. Prerequisite: Ph.D. or advanced M.P.H. status. *Also MBIO 680a,b.*

EMD 682a and b,Advanced Topics in Vector Biology. Liangbiao Zheng, Serap Aksoy.
This broadly based seminar is on current research topics in the biology of medically important vectors, vector-pathogen interactions, vector ecology, disease management, and vector control strategies. Topics are chosen from the current literature. Prerequisite: Ph.D. student status or permission of the instructor.

[**EMD 684a,Molecular and Cellular Processes of Parasitic Eukaryotes.**]

EMD 694a, Tutorial in Population Genetics of Vectors. Leonard Munstermann.

EMD 695a,Readings in Vector Ecology. Durland Fish.

EMD 728b, Ecology and Evolution of Infectious Diseases. Paul Turner.
TTh 11.30–12.45
Overview of the ecology and evolution of pathogens (bacteria, viruses, protozoa) and their impact on host populations, one of the greatest challenges facing humankind today. Scope is comprehensive, including theoretical concepts, ecological and evolutionary dynamics, molecular biology, and epidemiology of ancient and emerging diseases. Relevant for pre-med and medical students, as well as students in E&EB, F&ES, and EPH. *Also E&EB 728b*^{u}.

HPA 510a,Health Policy and Health Systems. Mark Schlesinger.
This course provides an introduction to the making and understanding of health policy. The various goals of policy making and the alternative means of achieving those goals are examined. Health issues are placed in the context of broader social goals and values. The current performance of the health care system is assessed, with particular emphasis on shifting needs, rising costs, and changing institutional arrangements. The course provides an overview of the important actors in the health care and political systems and introduces students to methods for understanding their behavior. Students apply these methods to a set of concrete policy issues.

HPA 514b,Government and Health Policy. Karl Kronebusch.
This course is designed to familiarize students with the various processes by which governmental health policy is made in the United States, and with current policy debates. One focus of the course is to understand the politics underlying the successes and failures of health policy making during the course of the twentieth century. This includes a discussion of the relevant governmental institutions, political actors, the major national programs that have been established,andhow political actors use resources and set their strategies.

HPA 516a,Clinical Concepts: Individuals,in Sickness and in Health. David Katz.
This course is directed at students with no or little background in biomedical or clinical sciences. The normal anatomy and physiology of the major organ systems are described to serve as a basis for understanding disease processes of public health importance. The course is taught by a practicing clinician and draws liberally from actual patient care experiences, as well as from the current medical literature. The course assumes little prior knowledge, but does develop some fairly complex concepts necessary to understand the workings of the human body. There is substantial emphasis placed on the interdependence of clinical medicine and public health, and on medical humanism. (An appreciation for poetry is desirable, but not required.) Upon completing the course, students will have a working knowledge of the human body, its remarkable adaptations, and its myriad vulnerabilities; facility with medical terminology; an understanding of clinical decision making; and familiarity with medical technology.

HPA 529a, Policy Analysis and Health Politics. Karl Kronebusch.
This course provides students with policy analysis skills and teaches students to think critically and write succinctly about health care policy. The course integrates the study of policy analysis and the world of health politics as analysts must do in real life. The course begins broadly by thinking first about the nature of public policy and the theories of policy analysis and policy decision making. Next, eight key components of the policy analysis process are considered, and the impact of major political organizations and institutions on the process of analyzing and selecting public health care policy is jointly examined. Prerequisite: HPA 510a.

HPA 538a,Regulation and Public Health Policy. Mary Olson.
This course provides students with an understanding of the role of government regulation in public health and health-related markets. Students learn to analyze how economic and political forces can influence both the development and the implementation of public health regulations. The course utilizes theories and empirical evidence from economics, political science, law, and public health to help students answer five questions relating to government intervention in health-related markets: Why regulate? How are regulatory rules made? How are regulations enforced? How do we determine whether regulations are successful? What alternatives exist to regulation? Students also apply insights and concepts from the course to explain policy making in public health bureaucracies. Prerequisite: microeconomics or permission of the instructor.

HPA 542a,Health of Women and Children. Mary Alice Lee.
The health of women and children in the United States is the focus of this course. The epidemiology of selected health conditions is presented. The utilization and financing of women and children's health care services are discussed. Existing targeted governmental and private programs are identified and assessed. Major sources of data on the health of women and children are identified and compared. Health care access issues are discussed. Students report on a women's or infant's health care condition and develop a fact sheet with recommendations for addressing the problem. Topics include prenatal care, low birth weight, infant mortality, contraceptive use, abortion, maternal mortality (with an international perspective) and health care coverage for pregnant women and children. Discussion of the public health implications of these health conditions and the health care of women and children provides a basis for policy analysis in later study.

[**HPA 544a,Public Law and Public Health: The Law, the Individual,and the State.**]

HPA 545b,Health Care Disparities. Alexander Ortega.
This course explores what constitutes and explains a disparity in health care. Emphasis is placed on studying the history of disparities in the United States in order to understand the current state of disparities, and on evaluating the effectiveness of ongoing strategies to eliminate them, such as increasing insurance coverage and the delivery of culturally competent health care. The course also examines sociological models that explain disparities in health care and requires students to evaluate and expand on these models. Prerequisites: HPA 510a, CDE 505a.

HPA 546b,Ethical Issues in Public Health. Bruce Jennings.
Public health policy is always the product of controversy. Scientific considerations blend with political and ethical conflicts in public health; questions of autonomy, coercion, justice, and the common good are central. This seminar discusses these issues of ethics and political theory in reference to selected public health issues such as preventive medicine and behavior modification, smoking, control of infectious disease, and contraception and teen pregnancy.

HPA 547b,Law and the Management of Health Care Organizations. William J. Thomas.
This course is a survey of legal topics important to the management of health care organizations. It is designed to acquaint the future health care manager with the basic legal issues that daily affect the provision of health care services. The course examines the relationships among the parties involved in the delivery of health care; the law of business organizations, including that of corporations and partnerships; the legal constraints that affect health care organizations, including state and federal regulatory laws, labor relations, and antitrust doctrines; and doctrines particularly applicable to managed care organizations. The course also considers a variety of emerging legal issues in the health care field.

HPA 560b,Health Care Finance and Delivery. Susan Busch.
This course introduces students to the organization and operation of the American health care system. The course examines systems of health care delivery and finance and recent trends in their organization, including the growth of managed care. The course seeks to provide students with an understanding of the existing structure of the system and to provide them with conceptual frameworks.

HPA 564a,Integrated Clinical/Financial Information Management. Donna Diers, Stephen Allegretto.
No matter what the regulatory or payment environment is, management of health care delivery systems depends upon data. In this course, theory of information management and applications are provided, using real data. The course uses a powerful local resource, the work of the Resource Information Management System (RIMS) at Yale–New Haven Hospital, as the basis for learning about the clinical, financial, operational, and technical input to a management information system. The uses and applications of information in planning, developing, operating, negotiating, and evaluating health care service are stressed. HPA 560b, or equivalent, and accounting are desirable but not required.

HPA 570a,Cost-Effectiveness Analysis and Decision Making. A.David Paltiel.
This course introduces students to the methods of decision analysis and cost-effectiveness analysis in health-related technology assessment, resource allocation, and clinical decision making. The course aims to develop the following: (1) technical competence in the methods used; (2) practical skills in applying these tools to case-based studies of medical decisions and public health choices; and (3) an appreciation of the uses and limitations of these methods at the levels of national policy, health care organizations, and individual patient care.

HPA 583b,Methods in Health Services Research. Rani Desai.
This course introduces students to both quantitative and qualitative methods for research in health services. Topics include research objectives and hypotheses formulation, study design, sampling techniques, measurement, data analysis, results presentation, and discussion. Students synthesize these skills in the final paper. Prerequisite: BIS 505a.

HPA 586b,Microeconomics for Health Care Professionals. William White.
This course introduces students to microeconomics. Emphasis is placed on topics in microeconomics of particular relevance to the health care sector. Attention is paid to issues of equity and distribution, uncertainty and attitudes toward risk, and alternatives to price competition. This course is designed for students with minimal previous exposure to economics.

HPA 587a,Health Care Economics. Douglas Leslie.
This course applies the principles learned in Microeconomics for Health Care Professionals (HPA 586b) to the health of individuals, to health care institutions and markets, as well as to health care policy. The economic aspects of health behaviors, hospital markets, cost-benefit analysis, regulation, and the market for physician services are covered. Prerequisite: microeconomics or permission of the instructor.

HPA 588b,Multivariate Statistical Methods: Causal Modeling and Measurement Theory. Donald Green.
This seminar is an advanced course in quantitative methodology. It begins with linear regression and works its way to simultaneous equations with unobserved variables. The aim of the course is to provide students with the statistical background necessary to read and conduct quantitative research. There is special effort to integrate applications into presentations of statistical theory. A weekly computer lab is part of the course. Prerequisite: PLSC 500 or equivalent.

HPA 590b,Economics of Drugs and Crime. Jody Sindelar.
The primary topic is illicit drugs and their use. The course covers the prevention, treatment, and consequences of the use of illicit drugs, and public policies to mitigate the adverse consequences. Crime is discussed as it relates to illicit drugs. The intellectual basis and many of the readings come from the economics field. Some economic concepts are taught in class. The class starts with introductory material on drugs, crime, and the association between drugs and crime. Readings and lectures provide the background information, facts, and in some cases the history of topics. Public policy solutions to help to mitigate the adverse consequences of drugs and crime are discussed. No prerequisites, but a familiarization with microeconomics is preferred.

HPA 592a,Concepts and Principles of Aging. Courtney Lyder.
This multidisciplinary course provides the major concepts and principles of gerontology. Students are introduced to a variety of theories of aging in the biopsychosocial spheres. Delivery systems of care for the elderly are explored along with recent social policy initiatives as they relate to the elderly. Research initiatives are presented throughout the course. *Also NURS 723a.*

HPA 596b,Critical Policy Issues in the AIDS Pandemic. Michael Merson.
This seminar is intended for students with an understanding of the epidemiology of HIV/AIDS (either through work experience or course work). Students in public health, medicine, nursing, law, management, and international studies will appreciate this in-depth interdisciplinary examination of key policy challenges that this global pandemic presents, as well as the sharpened skills in policy analysis that such examination necessarily fosters. Enrollment limited to twenty students. Prerequisite: first-term core.

HPA 597b,Integrative Policy Analysis Seminar. Mary Olson.
This seminar is designed as the capstone educational experience for students concentrating in health policy. It integrates previous course work in health policy and public health and facilitates students' transition from the academic setting into the world of professional policy analysis. Students explore different strategies for policy analysis and associated models of professionalism. They learn how to select the appropriate strategy and disciplinary perspective for addressing a social problem. Students also learn how to identify and frame health policy problems. They gain an understanding of how framing may be used to change the focus of policy debates. Finally, students learn to present ideas in the sort of crisp and concise fashion required of professional policy analysis. These issues are studied in a series of applied areas, including substance abuse and the community obligations of managed care plans. Prerequisite: HPA 510a or equivalent.

HPA 600a and b,Readings in Health Services Research and Policy. Faculty.
This seminar explores current and cutting-edge topics in the broad fields of community and personal health services. It is designed to familiarize students with a breadth of research opportunities. Students review existing research projects and critique recent research publications. Prerequisite: Ph.D. student status or permission of the instructor.

HPA 603b,The Ethical Conduct of Research. Susan Katz.
This seminar exposes students to both practical and theoretical issues in research ethics. The focus is on real-world situations in public health research with the aim of equipping students to function as responsible researchers. Representative areas to be addressed include, among others, informed consent; research with vulnerable populations; privacy and confidentiality; the collections, retention, and reporting of data; federal regulations and institutional policies governing research; research in developing countries; authorship and publication; scientific misconduct; and conflict of interest. Prerequisite: Ph.D. student status or permission of the instructor.

HPA 612a and b,Interface of Health Policy and Clinical Care. David Katz.
This course explores health policy dilemmas that have an impact on both populations and individual patients. The emphasis is on balancing the demands of public and private health care delivery, and on critical decision making. Current topics are chosen each term. Examples include resource allocation in end-of-life care, breast cancer screening, medical malpractice and tort law, physician-assisted dying, and appropriateness of invasive hemodynamic monitoring. Students receive a packet of readings from the current literature each week. Classes consist of student presentations followed by discussion and debate. Discussions are moderated by an expert faculty member from EPH, the School of Medicine, or outside institutions as indicated. The course is open to M.D./M.P.H. students, physicians, and others by permission of the instructor.

HPA 617a,Colloquium in Health Policy and Health Services Research I. Faculty.
This seminar focuses on the analysis of current issues in health policy and on state-of-the-art methodological issues in health services research. The format includes guest speakers and presentations by EPH as well as other faculty and graduate students of ongoing research projects. Students participate in critical discussions of the issues that arise in both types of sessions. Prerequisite: Ph.D. student status or permission of the instructor.

HPA 617b, Colloquium in Health Policy and Health Services Research II. Faculty.
This seminar includes in-depth discussions of major policy concerns in the health and health care of vulnerable populations such as the poor, young, old, and disabled. The seminar also includes student presentations of their own research. Prerequisite: Ph.D. student status or permission of instructor.

HPA 650a,Colloquium on Mental Health Services Research I. Faculty.
This seminar focuses on the state-of-the-art methods in the evaluation and the measurement of need for treatment and organization of mental health services. Students review ongoing research projects and develop research on the use of mental health services, prepare annotated bibliographies, and participate in the examination of relevant issues. Prerequisite: Ph.D. student status or permission of the instructor.

HPA 650b,Colloquium on Mental Health Services Research II. Faculty.
This seminar focuses on social and cultural factors in the development, diagnosis, treatment, and prevention of mental illness. Attention is given to the underlying theory and research in the social epidemiology of mental illness and the relation between stress and psychiatric status. The seminar also includes student presentations of their own research in mental health services and/or social psychiatry. Prerequisite: Ph.D. student status or permission of the instructor.

COUNCIL ON EUROPEAN STUDIES

Luce Hall, 34 Hillhouse, 432.3423

Chair
Laura Engelstein

Director of Graduate Studies
Paul Bushkovitch (245 Luce Hall, 432.3423)

Professors
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Associate Professors
Kevin Repp (*History*), Hilary Fink (*Slavic Languages & Literatures*), Lawrence King (*Sociology; on leave*)

Assistant Professors
John MacKay (*Slavic Languages & Literatures*), Timothy Snyder (*History*)

Lecturer
Slobodan Novak (*Slavic Languages & Literatures*)

Senior Lectors
Rita Lipson (*Slavic Languages & Literatures*), Constantine Muravnik (*Slavic Languages & Literatures*), George Syrimis (*Hellenic Studies*)

Participating Staff
Jonathan Brent (*Yale University Press*), Brian Carter (*PIER*), Tatjana Lorković (*Library*)

On July 1, 1999, the Council on West European Studies merged with the Council on Russian and East European Studies to create a new interdisciplinary body, the Council on European Studies. The Council on European Studies will formulate and implement new curricular and research programs reflective of current developments in Europe, broadly defined to encompass all states and peoples from Ireland to the Urals.

European Studies builds on existing programmatic strengths at the same time it serves as a catalyst for the development of new initiatives. Yale's current resources in European Studies are vast and include the activities of many members of the faculty who

have teaching or research specialties in the area. Such departments as Economics, History, History of Art, Political Science, Slavic Languages and Literatures, and Sociology regularly offer courses with a European focus.

European Studies includes a master's degree program in Russian and East European Studies (see listing under Russian and East European Studies) and strongly supports the disciplinary and interdisciplinary study of Western Europe as well as Russia and Eastern Europe and the increasing interactions between them. European Studies is also the home of the newly organized program on Hellenic Studies, which offers instruction in Modern Greek language, literature, and culture. The Council on European Studies will continue the efforts of both predecessors to promote and coordinate existing resources, including those in the professional schools, and to support individual and group research.

Currently, more than two hundred and fifty graduate students are working toward degrees with a European emphasis within the major disciplines of the humanities and the social sciences. As in the past, the chair and faculty members of the Council on European Studies and other Europeanist faculty are available to assist students with formulating a tailored interdisciplinary course of study.

The benefits provided to the Yale community by the new Council on European Studies include its affiliation with inter-university and international organizations that can offer specialized training programs and research grants for graduate students, support conferences among European and American scholars, and subsidize European visitors to Yale. The Fox International Fellowship Program offers generous fellowship support to qualified students who undertake research at specified institutions in the United Kingdom, Germany, France, and Russia, for example. Furthermore, the Council supplements the regular Yale curriculum with courses, lectures, and seminars by eminent European and American scholars, diplomats, and political officials. Each year, the European Commission sponsors a European Union Fellow at Yale. The Fellow during the 2001–2002 academic year was Brian McDonald, Principal Administrator in the European Commission's Directorate General for Trade, who taught a course on trade policy and the WTO. During 2002–2003, the European Union Fellow will be a specialist in questions of health and consumer affairs related to the Euro and the EMU. Also in 2002–2003, European Studies will host the distinguished scholar Slobodan P. Novak, who will teach courses on South Slavic literatures and cultures and on Serbian and Croatian language.

The special objective of European Studies, spearheaded by the Council on European Studies, is to encourage research and discussion on projects of a pan-European nature or those involving comparison of developments among several countries. Thus, faculty are available to supervise work on European economic, political, and cultural integration, including studies of a specific topical character like labor migration between south and north, comparable problems of socialist or center parties in several countries, common tendencies in the national literatures or art of European countries, or common problems in the relations of European countries with other areas of the world.

Inquiries regarding European Studies should be addressed to the Council on European Studies, Yale University, PO Box 208206, New Haven CT 06520-8206.

EXPERIMENTAL PATHOLOGY

342 Brady Memorial Laboratory, 785.6721
M.S., M.Phil., Ph.D.

Chair
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David Stern (785.4832, df.stern@yale.edu)

Professors
Philip Askenase (*Internal Medicine*), Richard Bucala (*Internal Medicine*), Young Choi, José Costa, S. Evans Downing (*Emeritus*), Stuart Flynn, Nikki Holbrook (*Internal Medicine*), Michael Kashgarian (*Molecular, Cellular & Developmental Biology*), Jung Kim, Paul Lizardi, Marc Lorber (*Surgery*), Joseph Madri, Vincent Marchesi (*Director, Boyer Center for Molecular Medicine; Cell Biology*), Mark Mooseker (*Molecular, Cellular & Developmental Biology*), Jon Morrow (*Molecular, Cellular & Developmental Biology*), Jordan Pober (*Immunobiology; Dermatology*), John Rose (*Cell Biology*), David Stern, Raymond Yesner (*Emeritus*)

Associate Professors
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Assistant Professors
Serguei Bannykh, Mary Chacho, Tamara Handerson (*Dermatology*), Liming Hao, Pei Hui, Dhanpat Jain, Diane Kowalski, Rossitza Lazova (*Dermatology*), Marguerite Pinto, Pars Ravichandran, Idris Tolgay Ocal, David Tuck

Research Scientists
Janet Brandsma (*Comparative Medicine*), Christine Howe

Associate Research Scientists
Robert Camp, Gouri Chaterjee, Jan Czycyk, Debbie Dillon, Nancy Kirkiles-Smith, Meng Liu, Keyvan Mahboubi, Mark Mattie, Deepti Pradhan, Nina Rose, Michael Stankewich, Zenta Walther, Thomas Welte, Bogdan Yatsula, Shao-Min Zhang, Zhushan Zhang

Fields of Study

Fields include molecular and cellular basis of cancer; biology, biochemistry, and pathology of the plasma membrane; cells, molecules, and response to stimuli of connective tissue; interaction of viruses with animal cells; pathology of organ systems; somatic cell genetics and birth defects; biology of endothelial cells; assembly of viruses.

Special Admissions Requirements

A strong background in basic sciences is recommended for applicants to the program, including biology, chemistry through organic and physical chemistry, mathematics through calculus, biochemistry, genetics, or immunology. GRE General Test or MCAT is required.

To enter the Ph.D. program, students apply to an interest-based track, usually the Pharmacological Sciences and Molecular Medicine track, within the interdepartmental graduate program in the Biological and Biomedical Sciences (see pages 65–67).

Special Requirements for the Ph.D. Degree

There is no foreign-language requirement. Three to four terms of course work including courses in biochemistry, genetics, immunology, cell biology, and pathology are selected according to the student's background and choice. The qualifying examination has both written and oral parts. After a reading period of six weeks the student will answer, in essay form, one of two questions in each of three subject areas, which include a brief research proposal. The oral examination will specifically address the chosen areas of interest in addition to general problems of pathology. Upon completing the course requirement with at least two terms of Honors, passing the qualifying examination, and submitting a thesis prospectus, students will be admitted to candidacy. They must then submit a written thesis describing the research and present a thesis research seminar.

In accordance with the BBS program, Ph.D. students are expected to participate in two terms (or the equivalent) of teaching.

Master's Degrees

M.Phil. See Graduate School requirements, pages 397–98. Awarded only to students who are continuing for the Ph.D. Students are not admitted for this degree.
M.S. Awarded only to students who are not continuing for the Ph.D., but who have successfully completed one year of the doctoral program. Students are not admitted for this degree.

Program materials are available upon request to the Director of Graduate Studies, Department of Experimental Pathology, Yale University, PO Box 208023, New Haven CT 06520-8023; Web site, info.med.yale.edu/pathol/training/gtp.htm/.

Courses

Note: Pathology 600, 616, 617, and 618b are primarily geared toward medical students, but may be taken by graduate students with the permission of the director of medical studies (Dr. Joseph Madri).

PATH 600, Pathological Basis of Human Disease. Joseph Madri and staff.
Fundamental principles underlying the pathological alterations in function and structure that constitute the reaction of the organism to injury. Pathology of diseases involving special organs and systems. Correlation of the clinical and anatomical manifestations is emphasized. For EPH graduate students and MSTP students who are required to take PATH 100 for graduate credit.

PATH 616,Autopsy Pathology. John Sinard and staff.
Participation in the autopsy service with members of the house staff in pathology. Participation in autopsies and the presentation and review of the clinical and anatomical findings of postmortem examinations with senior members of the department. Opportunities exist for correlation studies with previous biopsies, and clinical investigative and cell biologic techniques in relation to necropsy material. Six weeks minimum, full time. Enrollment limited to two students.

PATH 617,Anatomic Pathology. José Costa and staff.
The department offers an elective to medical students in the third and fourth years that provides a broad experience in general diagnostic techniques. Students have opportunities to participate in surgical pathology, cytology (including fine-needle aspiration), and autopsy. A daily diagnostic conference is scheduled for both residents and students, and an additional two hours of conference are provided each week exclusively for the students. In addition to direct responsibilities in the handling of the cases, the student has the opportunity to apply the special techniques of electron microscopy, immunohistochemistry, and flow cytometry. A minimum of four weeks is suggested for this elective. Five students are accommodated every four to six weeks.

PATH 618b,Clinical and Pathologic Correlates in Renal Disease. Michael Kashgarian,Norman Siegel.
A series of clinical pathologic conferences designed to illustrate clinicopathologic correlates in renal disease. At each session, one student acts as clinician and another as pathologist in the evaluation and discussion of case material from autopsies or renal biopsies. Discussions are informal, but require preparation in advance and all participants are expected to contribute in each session. One two-hour session per week for six weeks. Given once in spring term. Limited to twelve students.

PATH 620a and b,Laboratory Rotations in Experimental Pathology. David Stern.
Laboratory rotations for first-year graduate students.

PATH 640a, From Molecular Biology to Molecular Medicine: New Concepts, Trends, and Applications. Xin-Yuan Fu, Paul Lizardi.
The objective of the course is to update students on the most recent progress in the research field of molecular medicine. The course has five themes: (1) Genome projects and applications. (2) Bioinformatics in gene discovery and pathway analysis. (3) Gene therapy: theory and practice. (4) Signaling pathways and molecular targets with small compounds. (5) Applications of biologicals such as cytokines and cell surface proteins in molecular therapy.

PATH 650b,Cellular and Molecular Biology of Cancer. David Stern, Archibald Perkins.
A comprehensive survey of cancer research from the cellular to the clinical level. The relation of cancer to intracellular and intercellular regulation of cell proliferation is emphasized, as are animal models for cancer research. Background in molecular genetics and cell biology is assumed. Open to advanced undergraduates with permission of the organizers.

PATH 670b,Biological Mechanisms of Reaction to Injury. Michael Kashgarian, Jon Morrow, José Costa,and Archibald Perkins.
An introduction to human biology and disease as a manifestation of reaction to injury. Topics include organ structure and function, cell injury, circulatory and inflammatory responses, disordered physiology, and neoplasia.

PATH 680a,Seminar Course. Staff.
Readings and discussion in topics relevant to cell biology, pharmacology, and molecular medicine. The class emphasizes analysis of the primary research literature and development of presentation skills.

PATH 690a,Molecular Mechanisms of Disease. Staff.
The molecular defects underlying fundamental human diseases. Covers the cellular and molecular mechanisms of infectious and degenerative diseases, vascular and inflammatory processes, AIDS, and hemorrhagic disorders. Objective is to highlight the interface between experimental and molecular medicine and how it relates to the pathogenesis of human diseases.

FILM STUDIES

53 Wall, Rm 216, 436.4668
M.Phil., Ph.D.

Co-Chairs
Dudley Andrew
Charles Musser

Director of Graduate Studies
Dudley Andrew (Rm 219, 53 Wall, dudley.andrew@yale.edu)

Graduate Committee
Dudley Andrew, Katerina Clark, John MacKay, Aaron Gerow, Charles Musser, Brigitte Peucker, Noa Steimatsky, Katie Trumpener

Professors
Ora Avni, David Bromwich, Hazel Carby, Michael Denning, John Mack Faragher, Benjamin Harshav, Thomas Kavanaugh, Christopher L. Miller, Joseph Roach, Michael Roemer, John Szwed, Paolo Valesio, Laura Wexler

Associate Professor
Susan Weiner

Assistant Professors
Seth Fein, Kristin Philips

Fields of Study

Film Studies is an interdisciplinary field drawing on the study of the history of art, national cultures and literatures, literary theory, philosophy, sociology, and other areas. Film Studies offers a joint Ph.D. with a number of other departments and programs, currently including American Studies, Comparative Literature, East Asian Languages and Literatures, French, German, History of Art, Italian, and Slavic Languages and Literatures. In addition to acquiring a firm grounding in the methods and core material of both film studies and another discipline, the candidate is advised to coordinate a plan of study involving comprehensive knowledge of one or more areas of specialization. Such areas include:

1. Historiography, including archival history, history of technology, early cinema.
2. Aesthetics: theories of the image, adaptation, film/philosophy.
3. European film: British, French, German, Italian, Slavic.
4. American culture: Hollywood, independent film, African American cinema.
5. World Film: global image exchange; cinema in Asia, Latin America, and Africa; documentary.

Through course work, examinations, and the dissertation, the candidate links a film specialty with material and methods coming from the participating discipline. Directors of graduate studies from both programs monitor the candidate's plans and progress.

Special Admissions Requirements

Interested students must check the joint Ph.D. in Film Studies box on their applications and indicate the participating department they plan to work within in combination with Film Studies.

Special Requirements for the Ph.D. Degree

Every student selected for the combined program is subject to the combined supervision of the Film Studies program and the relevant participating department. A written protocol between each department and Film Studies outlines the requirements and schedule to be borne in mind as a plan of study is worked out in consultation with the director of graduate studies of Film Studies and the director of graduate studies of the participating department. In all cases, students are required to take two core seminars in Film Studies (FILM 601 and FILM 603) as well as at least four additional Film Studies courses. Course requirements vary for participating departments but comprise a total of sixteen courses (fourteen for American Studies, fifteen for History of Art). A student advances to candidacy by completing a number of formal procedures by the end of the sixth semester:

1. One-hour oral examination covering basic primary and secondary texts in Film Studies and administered by two members of the Film Studies graduate committee.

2. Qualifying examination, following the regulations of the participating department with at least one member of the Film Studies graduate committee participating.

3. The dissertation prospectus presented to a faculty committee consisting of at least one member of the Film Studies graduate committee and one member of the participating department who is not also on that Film Studies committee. Once the student and dissertation adviser deem the dissertation finished, a public defense of the completed work shall be held. At least one examiner of the dissertation must be a member of the graduate Film Studies committee and one a member of the participating department who is not also on the Film Studies committee.

The faculty in Film Studies considers participation in the Teaching Fellows Program to be essential to the professional preparation of graduate students. Students normally teach in years three and four. Every student is required for the degree to serve as a teaching fellow in two of the following courses: Introduction to Film; Film Theory; World Cinema.

Master's Degree

M.Phil. See Graduate School requirements, pages 397–98.

Program materials are available upon request to the Director of Graduate Studies, Yale Film Studies Program, Yale University, P.O. Box 208363, New Haven CT 06520-8363.

Courses

FILM 601a,Films and Their Study. Dudley Andrew.
T 10.30–12.20
"Films and their Study" sets in place some undergirding for graduate students in various disciplines who plan to develop a subspecialty or who want to anchor their particular film inter-

est to something like the "professional discourse" of this field. Providing a coordinated set of topics under the rubrics of (a) spectacle, (b) narrative, (c) realism, and (d) signification, the flow of this survey is interrupted first by the often discordant relation of history to theory and second by the obtuseness of the films examined each week. As the title of this seminar is meant to convey, films themselves take the lead in our discussions. *Also CPLT 917a.*

[**FILM 603,Problems in Film History.**]

[**FILM 721^{u}, Spatial Dimensions in Cinema.**]

FILM 728a^{u}, Film and the Transformation of Theatrical Culture. Charles Musser.
T 3.30–5.20
Explores the transformation in American theater that resulted from the introduction of motion pictures. Cinema is examined as a theatrical form of entertainment that restructured both the theatrical world and spectatorship between 1895 and 1930. The unfolding interactions between stage and screen are considered through a variety of films and texts (plays, critical and theoretical writings). Adaptation is employed as a crucial lens for exploring this historical dynamic. Works by Belasco, Wilde, O'Neill, Porter, Griffith, Lubitsch, DeMille, and Micheaux. *Also AMST 716a.*

FILM 729a^{u}, German Cinema 1945–1965: Cold War Film Culture.
Katie Trumpener.
TTh 11.30–12.45
Juxtaposing East and West German films, this course explores their diverging accounts of Nazi and postwar life; the theory and practice of socialist filmmaking; cinema culture; questions of genre; the emerging New Waves. *Also CPLT 932a^{u}, GMAN 730a^{u}.*

FILM 730a^{u}, New Chinese Cinemas. James Tweedie.
F 1.30–3.20; screenings TH 7 P.M.
The course introduces a range of films produced in Taiwan, Hong Kong, and mainland China from the early 1980s to the present; situating them within social, political, and cultural contexts. What has been the role of cinema in constructing the cultural framework for the emerging "Pacific Rim,"and how do the boundary zones of trans-national China challenge the logic of national or area studies approaches to cultural phenomena?

[**FILM 731^{u}, Classical Hollywood Cinema.**]

[**FILM 736^{u}, Contemporary Documentary Film and Video.**]

[**FILM 737,American Documentary Film and Photography.**]

FILM 763b^{u}, The Films of Fassbinder, Herzog,and Wenders. Brigitte Peucker.
TH 1.30–3.20
The three major directors of the New German Cinema. Topics include postmodernism; high and low culture; film's relation to the other arts; issues of gender, race, and national identity; the influence of Hollywood. *Also GMAN 720b^{u}.*

[**FILM 811,Cinematic Landscapes in Postwar Europe.**]

[**FILM 822,Eisenstein,Pudovkin, Vertov.**]

FILM 827b,The Face on Film. Noa Steimatsky.
M 1–5 (includes screenings)
The human face is a paradigmatic arena in which the largest questions on referentiality, the inscription of identity and subjectivity, and the articulation of interiority in art intersect. This seminar explores cinema's intervention vis-à-vis portraiture's traditional concerns, the narrative, discursive, ideological uses of facial representation, and its modern transfigurations. In extending its photographic basis to consider the parameters of movement, the incorporation

of speech, and the shifting trajectory of the look, our discussion juxtaposes narrative fiction film in relation to documentary and experimental "cinematic portraits." We explore the close-up, the regime of the shot-reaction shot, the debates surrounding identification, expressivity, and notions of animism in cinema, in light of theoretical writings and of classical and experimental films by such makers as Epstein, Kuleshov, Dreyer, Bresson, Pasolini, Hitchcock, Warhol, Cronenberg. *Also HSAR 727b.*

FILM 843b, The Archive of Popular Front France. Dudley Andrew.

T 1.30–3.20; screenings TBA

In 1930s Paris, novelists (Céline, Malraux), intellectuals (Gide, Benjamin), and filmmakers (Renoir) found themselves recruited by politics. Using cinema to bracket the Popular Front (Surrealism on one side, Poetic Realism on the other), this seminar examines publishing, the art scene, and radical groups such as the Collège de Sociologie to track the social changes visible in French culture at the end of the Third Republic. In English. *Also CPLT 934b, FREN 931b.*

FORESTRY & ENVIRONMENTAL STUDIES

205 Prospect, 432.5100
M.S., M.Phil., Ph.D.

Dean
James Gustave Speth

Director of Doctoral Studies
Oswald Schmitz (370 Prospect, 432.5110, oswald.schmitz@yale.edu)

Professors
Mark Ashton, Gaboury Benoit, Graeme Berlyn, Gerry Brewer, William Burch, Michael Dove, Daniel Esty, Thomas Graedel, Timothy Gregoire, Stephen Kellert, Xuhui Lee, Robert Mendelsohn, Chadwick Oliver, Oswald Schmitz, David Skelly, John Wargo

Associate Professors
Lisa Curran, James Saiers

Assistant Professors
Benjamin Cashore, Marian Chertow, Erin Mansur, Kathleen McAfee, Sheila Olmstead, Peter Raymond

Non-Ladder Faculty
Ann Camp, Carol Carpenter, Timothy Clark, Florencia Montagnini

Joint Appointments
James Axley, Ruth Blake, Adalgisa (Gisela) Caccone, Michael Donoghue, Menachem Elimelech, Robert Evenson, Jonathan Feinstein, Mary Helen Goldsmith, Brian Leaderer, William Nordhaus, Jeffrey Powell, Alison Richard, James Scott, Stephen Stearns, Christopher Timmins, Karl Turekian, Robin Winks

Fields of Study

Fields include agroforestry; biodiversity conservation; biostatistics and biometry; community ecology; ecosystems ecology; ecosystems management; environmental biophysics and meteorology; environmental chemistry; environmental ethics; environmental governance; environmental health risk assessment; environmental history; environmental law and politics; environmental and resource policy; forest ecology; hydrology; industrial ecology; industrial environmental management; plant physiology and anatomy; pollution management; population ecology; resource economics; energy and the environment, silviculture, social ecology; stand development, tropical ecology and conservation; urban planning; water resource management; environmental management and social ecology in developing countries.

Special Admissions Requirements

Applicants should hold a bachelor's or master's degree in a field related to natural resources, such as forestry, or in a relevant discipline of the natural or social sciences, such as biology, chemistry, economics, or mathematics. The GRE General Test is required but Subject Tests are optional.

Special Requirements for the Ph.D. Degree

Students are required to take the Doctoral Student Seminar, 824a/b, before the second term of their program. Aside from this requirement, there is no required curriculum of credit courses and no formal language requirement. Courses of study are individually designated through consultation between degree candidates and their advisers and dissertation committees. The amount of course work required will depend on the previous training of the student but the normal requirement for a student with no previous graduate training is three or four courses per term for four terms. The program of each student will be evaluated at the end of the first year of residence. At least two term grades of Honors are required in the first two years of study; however, it is anticipated that grades of Honors or High Pass will be achieved in two-thirds of all courses taken. A written and oral qualifying examination is required upon completion of the course requirements. Students are expected to take the examination by the end of their second or third term. All students must complete the examination at the end of their fourth term of study. At the time of the qualifying examination, the student must present a prospectus of the research work proposed for the dissertation. Successful completion of the qualifying examination and submission of the prospectus will result in admission to candidacy. Upon completion of the dissertation, the candidate must make unbound copies of the dissertation available to the faculty and appear for an oral examination at a time and place designated by the director of graduate studies. Copies of the approved dissertation must be submitted to the Graduate School, and one copy to the library of the School of Forestry & Environmental Studies. Depending upon the nature of the dissertation topic, completion of the Ph.D. degree normally requires four years. Teaching and research experiences are regarded as integral parts of the graduate training program in Forestry & Environmental Studies. All students are required to serve as teaching fellows (10 hours per week) for two terms prior to the end of their fourth year of study. In addition, before the end of their fourth year of study, all doctoral students must complete a two-term research project/assistantship with their major adviser (10 hours per week). The nature of teaching assignments and research duties is determined in cooperation with the student's major adviser and the director of graduate studies.

Master's Degrees

M.Phil (en route to the Ph.D.) Students may petition for this degree after they have passed the qualifying exam and advanced to candidacy.

M.S. (en route to the Ph.D.) This degree is normally granted only to students who are withdrawing from the Ph.D. program. Applications for this master's degree are not accepted.

Requirements that must be met for award of the M.S. are (1) successful completion of two years of course work in residence with two grades of Honors; (2) a written prospectus; (3) fulfillment of one term of the teaching requirement.

For information on the terminal master's degrees offered by the Yale School of Forestry & Environmental Studies (the Master of Forestry, Master of Forest Science, Master of Environmental Management, and Master of Environmental Science degrees) visit the School's Web site, www.yale.edu/environment, or contact Admissions Director, Yale School of Forestry & Environmental Studies, 205 Prospect Street, New Haven CT, 06511.

For courses, see the *Bulletin of the School of Forestry & Environmental Studies.*

FRENCH

82 – 90 Wall Street, 3rd floor, 432.4900
M.A., M.Phil., Ph.D.

Chair
Edwin Duval

Director of Graduate Studies
Ora Avni [F] (82 – 90 Wall Street, Rm 322, 432.4902, ora.avni@yale.edu)
Thomas Kavanagh [Sp] (thomas.kavanagh@yale.edu)

Professors
Ora Avni, Howard Bloch, Peter Brooks, Edwin Duval, Shoshana Felman, Thomas Kavanagh, Christopher L. Miller

Associate Professor
Susan Weiner

Assistant Professors
Mark Burde, Catherine Labio, Farid Laroussi, Donia Mounsef, Jean-Jacques Poucel, Julia Prest

Lecturer
Achille Mbembe (*Visiting, African American Studies*)

Fields of Study

Fields include French literature, criticism, theory, and culture from the early Middle Ages to the present, and the French-language literatures of Africa, the Caribbean, and the Maghreb.

Special Admissions Requirements

A thorough command of French is expected, as well as a good preparation in all fields of French literature. A strong background in at least one other foreign language is also expected. Applicants should submit a twenty-page writing sample in French.

Special Requirements for the Ph.D. Degree

(1) Candidates will have to demonstrate a reading knowledge of Latin and a second language by passing department-administered examinations, Yale undergraduate courses, or Yale Summer Language Institute courses with at least a B or High Pass grade. Students must fulfill the Latin requirement before the beginning of their third term of study. The other language requirement must be satisfied before the beginning of the fifth term, and before the oral qualifying examination. (2) During the first two years of study, students normally take sixteen term courses. These *must* include Old French and at least two graduate-level term courses outside the department. They *may* include one term of a lan-

guage course (Latin or other) taken as a means of fulfilling one of the language requirements, and as many as four graduate-level term courses outside the department. A grade of Honors must be obtained in at least four of the sixteen courses, two or more of which must be in courses offered by the department. (3) A qualifying oral examination normally takes place during the fifth term or, in some special cases, no later than the end of the sixth term. The examination is designed to demonstrate students' mastery of the French language, their knowledge and command of selected topics in literature, and their capacity to present and discuss texts and issues. (4) After having successfully passed the qualifying oral examination, students are required to submit a dissertation prospectus for approval, normally no later than the end of the term following the oral examination.

In order to be admitted to candidacy for the Ph.D., students must complete all predissertation requirements, including the prospectus. Students must be admitted to candidacy by the end of the seventh term.

Teaching is considered an integral part of the preparation for the Ph.D. degree and all students are required to teach for at least one year. Opportunities to teach undergraduate courses normally become available to candidates in their third year, after consideration of the needs of the department and of the students' capacity both to teach and to fulfill their final requirements. Prior to teaching, students take a language-teaching methodology course.

Combined Ph.D. Program

The French department also offers two combined Ph.D.s: one in French and African American Studies (in conjunction with the program in African American Studies), and one in French and Film Studies (in conjunction with the program in Film Studies). Students in both of these combined degree programs are subject to all the requirements for a Ph.D. in French. In addition, they must fulfill certain requirements particular to the conjoined program.

The combined Ph.D. in French and African American Studies is most appropriate for students who intend to concentrate in and write a dissertation on the literature of the francophone Caribbean. Students must complete two core courses in African American Studies and a third-year colloquium. For this degree, the French department's requirement for a language in addition to Latin will normally be filled by demonstrating reading competence in a Creole language of the Caribbean or in Spanish. The students' oral examinations normally include two topics of African American content. The dissertation prospectus must be approved by the director of graduate studies both in the French department and in African American Studies, and final approval of the dissertation must come from both departments. For further details see African American Studies.

For students in the combined Ph.D. program in French and Film Studies, the oral examination will normally include one topic on film theory and one on French film. Both the dissertation prospectus and the final dissertation must be approved by the French department and the program in Film Studies. In addition, Film Studies requires a dissertation defense. For further details see Film Studies.

Master's Degrees

M.Phil. See Graduate School requirements, pages 397–98. Alternatively, the Department of French offers, in conjunction with the Medieval Studies program, a joint M.Phil. degree. For further details, see Medieval Studies.

M.A. (en route to the Ph.D.). Students enrolled in the Ph.D. program may petition for the M.A. degree after a minimum of one year of study in residence, upon completion of the Latin requirement, and of eight courses, of which at least six are in French. Two grades of Honors in French graduate courses are required.

Program materials are available upon request to the Administrative Assistant to the Director of Graduate Studies, French Department, Yale University, PO Box 208251, New Haven CT 06520-8251.

Courses

All classes are taught in French unless otherwise noted.

FREN 610a,Old French. Mark Burde.
W 1.30–3.20
An introduction to the historical grammar of Old French through reading, translation, and discussion of some of its major literary forms, including epic, romance, allegory, *fabliau,* and drama.

FREN 714a,Gender, Desire,and the Modern Stage. Donia Mounsef.
W 5.30–7.20
This course examines the provocative relationship between gender, sexuality, desire, and the modern stage. It looks at the way desire is produced and consumed from the early twentieth century to the way it is instituted, circulated, and promoted as infinite accumulation in late capitalism. The course considers the subject and object relationship delineated by the theatrical gaze and provides an intersection between sexual politics and politics of representation by looking at the way texts are structured by desire, and theatricality by difference. The following questions are also addressed: What makes desire performative? What are the forces that script the female body as emblems of desire and property? What effects do censorship and obscenity laws have on playwriting and theater production? Readings from Apollinaire, Cocteau, Sartre, Sarraute, Genet, Duras, Cixous, Koltès. Theoretical readings from: Irigaray, Kristeva, Wittig, Foucault, Beauvoir, Cixous, Clément, Derrida, Case, Butler.

FREN 741a,The Bayeux Tapestry. Howard Bloch.
M 3.30–5.20
A study of the Bayeux Tapestry in the context of the Conquest and the Anglo-Norman world. Topics include origin, formal description, fabrication, nordic and continental homologies; relation of inscription to image, of borders to central panels, of decoration to narration; representations of the protagonists, of the events, of the everyday, of military, nautical, architectural, social, political, religious, and natural worlds; mixing of Viking, Celtic, Saxon, and Gallic cultures; literary and chronicle accounts. Basic text, the Bayeux Tapestry Digital Edition CD, 2003. In English. *Also HSAR 593a.*

FREN 751b[u], Jean-Jacques Rousseau. Thomas Kavanagh.
M 10.30–12.20
This seminar examines the relation between Rousseau the writer and Rousseau the political philosopher – between such works as *La Nouvelle Héloïse, Les Confessions, Les Rêveries* on the

one hand and the two *Discours, Emile, Du contrat social,* and the *Essai sur l'origine des langues* on the other. We look at various approaches (psychoanalytic, historical, semiological) to resolving this opposition while considering the major contemporary critical assessments of Rousseau (Starobinski, Derrida, de Man, etc.).

FREN 789a, Testimony: Crises of Witnessing in Literature, Psychoanalysis, and History. Shoshana Felman.

W 3.30–5.20

The course looks at various instances of testimony (literary, historical, legal, poetical, political, and psychoanalytic) as part of a general investigation of memory and trauma through narratives of individual and collective limit-experiences. In analyzing art's relation both to death and to survival, the course probes (in texts and films) the limits of what can be said and the limits of representation in the face of events whose reality unsettles common sense, defies imagination, and resists assimilation. Topics include the tension between violence and speech, truth and denial, judgment and forgiveness, and the concrete interrelations between language, silence, mourning, injury, identity, and cross-cultural exchanges (texts by Plato, Jacques Lacan, Emile Zola, Oscar Wilde, Virginia Woolf, Hannah Arendt; syllabus to be posted on the Web in August). Requirements: two short papers in the course of the term; oral presentations and ongoing active participation. *Also CPLT 789a.*

FREN 815b, The Medieval French Lyric. Howard Bloch.

M 1.30–3.20

A study of major lyric works from the twelfth-century *chanson de toile* (women's work songs), occasional poetry (*aube, pastourelle, débat*), and *grand chant courtois* through some of the fixed forms and great poetic personalities of the fourteenth and fifteenth centuries (Machaut, Deschamps, Froissart, Christine de Pizan, Charles d'Orléans, Villon). In English.

FREN 839b, Events, Ideologies, and Literature in the Renaissance. Edwin Duval.

Th 10.30–12.20

A study of literary responses to various political and religious crises of the Renaissance, with special emphasis on the period of the Wars of Religion (1562–1598). The seminar focuses on the literary means (form, parody, allusion, metaphor, allegory) by which authors bestow meaning and value on events and ideologies, while at the same time transforming history and polemics into transcendent aesthetic experience. Readings include Marot's *Enfer* and *Epîtres,* Ronsard's *Odes* and *Discours,* selections from Rabelais's *Quart Livre de Pantagruel,* and d'Aubigné's *Printemps* and *Tragiques.*

FREN 856b, Theatrical Controversy in Seventeenth-Century France. Julia Prest.

W 1.30–3.20

Just as the seventeenth century gave rise to one of the most productive periods of French drama, so it saw some of the most vociferous debates regarding theater production. For many anti-theatricalists, any form of theater was fundamentally wrong, while for others, certain types of theater, produced under certain circumstances, were deemed acceptable. Objections were made on religious and moral grounds as well as aesthetic and personal ones. Paying particular attention to the famous *querelles* surrounding *Le Cid* and *L'Ecole des Femmes,* we examine the diverse arguments put forward against different forms of theater and those used in their defense.

FREN 914b, French Perspective, Maghreban Landscape. Farid Laroussi.

T 1.30–3.20

An examination of French Orientalism, its presence and function in literary works by twentieth-century French authors. We try also to assess imagination and collective identity set in colonial and postcolonial backgrounds. Other issues at stake are representation of modernity versus the Other (Muslim), and how the Maghreb (the Orient) is constructed as a symbolic

place to heal traumas of Western society. Readings include: Belhad, Berque, Gide, Le Clézio, Massignon, Montherlant, Tounier, and Van Cauwerlaert.

FREN 931b, The Archive of Popular Front France. Dudley Andrew.

T 1.30–3.20; screenings TBA

In 1930s Paris, novelists (Céline, Malraux), intellectuals (Gide, Benjamin), and filmmakers (Renoir) found themselves recruited by politics. Using cinema to bracket the Popular Front (Surrealism on one side, Poetic Realism on the other), this seminar examines publishing, the art scene, and radical groups such as the Collège de Sociologie to track the social changes visible in French culture at the end of the Third Republic. In English. *Also CPLT 934b, FILM 843b.*

FREN 932a, Representations of the German Occupation in Literature and Film. Ora Avni.

T 1.30–3.20

An examination of the evolving representations of the German Occupation for the last fifty years. The course has a strong historical component (the years immediately preceding the war, the shift in public opinion after the defeat, the politics of the Vichy regime, the cleansing after the liberation, etc.). Film and fictions are viewed for their intrinsic value as well as for the ways in which they relate to national memory, writing (and rewriting) history, carrying on cultural and political legacies, and the relationship of the arts and the realities they purport to depict.

FREN 950a, The Functions of "Appetite" in Contemporary African Fiction. Achille Mbembe.

T 10.30–12.20

Recent criticism has paid little attention to "appetite," despite its prominence in African contemporary fiction, imagery, and archives. Our seminar attempts to fill this gap. We examine the question of appetite in the general context of an African written history of the five senses. We focus especially on appetite, desire, lack, and envy; appetite and economy; and finally, appetite and the death drive. This exploration leads to a rethinking of the construction of the subject in times of want and plenty, and of the politics that govern relations between people and things in such circumstances.

FREN 957b, Experiments in Fiction. Ora Avni.

Th 1.30–3.20

This course examines modern novels and short stories that attempt to break away from traditional narratives. We work simultaneously on two planes: (1) Broken narratives as they reflect postwar disillusions, fear of loss of the "self," and the bewilderment of man cast in a world that is no longer coherent. (2) Formal experiments with narratives that purport to tell "stories" without the support of "heroes," "characters," proper sequence, linear time, or even events that can be attributed to a specific persona. Under these conditions, what is left of stories and storytelling? More importantly, to what extent do these experiments succeed in breaking away from literary tradition?

FREN 964a[u], Après-Mai. Susan Weiner.

Th 1.30–3.20

Fiction, film, and thought after the events of May 1968 up to the present day. The focus is on texts whose impact was made primarily in French culture rather than in the American university. Authors include Sollers, Finkielkraut, Houellebecq, Echenoz, Lyotard, Furet, Fumaroli, Eustache, Carax.

GENETICS

I-313 Sterling Hall of Medicine, 785.5846
M.S., M.Phil., Ph.D.

Chair
Richard Lifton, M.D., Ph.D.

Director of Graduate Studies
Michael Stern (I-352 SHM, 737.2283, michael.stern@yale.edu)

Professors
Edward Adelberg (*Emeritus*), Nancy Berliner (*Internal Medicine; Hematology*), Douglas Brash (*Therapeutic Radiology*), W. Roy Breg, Jr. (*Emeritus*), Lynn Cooley, Daniel DiMaio, Jerome Eisenstadt (*Emeritus*), Bernard Forget (*Internal Medicine; Hematology*), Peter Glazer (*Therapeutic Radiology*), Arthur Horwich, Paula Kavathas (*Laboratory Medicine*), Kenneth Kidd, Richard Lifton (*Internal Medicine; Nephrology; Molecular Biophysics & Biochemistry*), Maurice Mahoney, Charles Radding, Shirleen Roeder (*Molecular, Cellular & Developmental Biology*), Margretta Seashore, Carolyn Slayman, Kay Tanaka (*Emeritus*), Peter Tattersall (*Laboratory Medicine*), David Ward, Sherman Weissman

Associate Professors
Allen Bale, Susan Baserga (*Molecular Biophysics & Biochemistry*), Stefan Somlo (*Internal Medicine; Nephrology*), Michael Stern, Hong Sun, Joann Sweasy (*Therapeutic Radiology*), Tian Xu, Hui Zhang, Hongyu Zhao (*Epidemiology & Public Health; Biostatistics*)

Assistant Professors
Valerie Reinke, Matthew State (*Child Study Center*), Kevin White

Fields of Study

Molecular Genetics: chromosome structure and function, genetic recombination, viral genetics, DNA damage repair, ribosome biogenesis, protein folding, and the regulation of gene expression. Genomics: genome mapping, genome modification, high-throughput technology, evolutionary genetics and functional genomics. Cellular and Developmental Genetics: genetic control of the cytoskeleton, cell death, aging, cell fate determination, cell cycle progression, cell migration, cell signaling and growth control. Cancer Genetics: oncogenesis and tumor suppression. Medical Genetics: genetic basis of human disease, chromosome rearrangements, population and quantitative genetics.

Special Admissions Requirements

The department welcomes applicants who have a bachelor's or master's degree in biology, chemistry, or a related field, with experience (from course work and/or research) in the field of genetics. GRE General Test scores are required. A pertinent Subject Test in Biochemistry and Molecular Biology, Biology, or Chemistry is recommended.

To enter the Ph.D. program, students apply to the Molecular Cell Biology, Genetics and Development (MCGD) track within the interdepartmental graduate program in the Biological and Biomedical Sciences (BBS) (see pages 65–67).

Special Requirements for the Ph.D. Degree

The Ph.D. program in Genetics is designed to provide the student with a broad background in general genetics and the opportunity to conduct original research in a specific area of genetics. The student is expected to acquire a broad understanding of genetics, spanning knowledge of at least three basic areas of genetics, which include molecular, cellular, organismal, and population genetics. Normally this requirement is accomplished through the satisfactory completion of formal courses, many of which cover more than one of these areas. Students are required to pass at least six graduate-level courses. Advanced graduate study becomes increasingly focused on the successful completion of original research and the preparation of a written dissertation under the direct supervision of a faculty adviser along with the guidance of a thesis committee.

A qualifying examination is given during the second year of study. This examination consists of a period of directed reading with the faculty followed by the submission of two written proposals and an oral examination. Following the completion of course work and the qualifying examination, the student submits a dissertation prospectus and is admitted to candidacy for the Ph.D. degree. There is no language requirement. An important aspect of graduate training in genetics is the acquisition of communication and teaching skills. Students participate in presentation seminars and two terms (or the equivalent) of teaching. Teaching activities are drawn from a diverse menu of lecture, laboratory, and seminar courses given at the undergraduate, graduate, and medical school level. Students are not expected to teach during their first year.

Honors Requirement

Students must meet the Graduate School's Honors requirement by the end of the fourth term of full-time study (see pages 394–95).

Master's Degrees

M.Phil. See Graduate School requirements, pages 397–98.
M.S. Awarded only to students who are not continuing for the Ph.D. degree, but who have successfully completed one year of the doctoral program. Students are not admitted for this degree.

Prospective applicants are encouraged to visit the BBS Web page (info.med.yale.edu/bbs/), MCGD Track.

Courses

GENE 500b,Principles of Human Genetics. Allen Bale.
A genetics course taught jointly for graduate students and medical students, covering current knowledge in human genetics as applied to the genetic foundations of health and disease.

[**GENE 520b,Scientific Integrity in Biomedical Research.**]

GENE 625a,Basic Concepts of Genetic Analysis. Tian Xu,Richard Lifton, Shirleen Roeder, Michael Stern.
TTh 1–2.15
The universal principles of genetic analysis in eukaryotes are discussed in lectures. Students also read a small selection of primary papers illustrating the very best of genetic analysis

and dissect them in detail in the discussion sections. While other Yale graduate molecular genetics courses emphasize molecular biology, this course focuses on the concepts and logic underlying modern genetic analysis. *Also MB&B 625a^{u}, MCDB 625a^{u}.*

GENE 642a,Roles of Microorganisms in the Living World. L.Nicholas Ornston, Diane McMahon-Pratt,Robert Macnab.
TTh 11.30–12.45
A topical course exploring the biology of microorganisms. Emphasis on mechanisms underlying microbial adaptations and how they influence biological systems. *Also EMD 642a, MB&B 642a, MBIO 642a, MCDB 642a.*

GENE 645a,Statistical Methods in Human Genetics. Hongyu Zhao, Kenneth Kidd.
Th 10-11.50
Probability modeling and statistical methodology for the analysis arising from human genetics studies are presented. Topics include: population genetics, single locus and polygenic inheritance, linkage analysis using parametric models and allele-sharing methods, population-based and family-based disease-marker associations, genetic risk prediction models, sequence analysis, microarray data analysis. Prerequisites: Genetics; BIS 505a and b, or equivalent; permission of instructor.

GENE 675,Graduate Student Seminar. Joann Sweasy and staff.
W 4.30–5.30
Students gain experience in preparing and delivering seminars and in discussing presentations by other students. A variety of topics in molecular, cellular, developmental, and population genetics are covered. Required for all second-year students in Genetics.

GENE 705a,Molecular Genetics of Prokaryotes. Nigel Grindley, Charles Radding, Joann Sweasy.
MW 11.30–12.45
Molecular aspects of the storage, replication, evolution, and expression of genetic material in prokaryotes. Required: previous or concurrent introductory courses in genetics and biochemistry. *Also MB&B 705a^{u}, MCDB 505a^{u}.*

[**GENE 743b,Molecular Genetics of Eukaryotes.**]

GENE 749a,Medical Impact of Basic Science. Joan Steitz and staff.
TTh 1–2.30
Consideration of examples of recent discoveries in basic science that have elucidated the molecular origins of disease or that have suggested new therapies for disease. Emphasis is placed on the fundamental principles on which these advances rely. Reading is from the primary scientific and medical literature, with emphasis on developing the ability to read this literature critically. Aimed primarily at undergraduates. Prerequisite: MB&B 600a^{u}/601b^{u} or permission of the instructor. *Also MB&B 749a^{u}.*

GENE 777b,Mechanisms of Development. Lynn Cooley, Xing-Wang Deng, Scott Holley, Valerie Reinke, Frank Slack,Michael Stern, Kevin White.
M 9.45–11, F 1.30–3
This is an advanced course on mechanisms of animal development focusing on the genetic specification of cell organization and identity during embryogenesis and somatic differentiation. The use of evolutionarily conserved signaling pathways to carry out developmental decisions in a range of animals is highlighted. Course work includes student presentations and critical analysis of primary literature. *Also MCDB 677b.*

GENE 810a,Human Molecular Genetics. Allen Bale,Cheryl Garganta.
WF 12–1
This course focuses on molecular genetics of single gene and multifactorial human traits. About one-half of the lectures covers strategies and methodologies for human genetics

research as well as resources developed by the Human Genome Project. The remainder of the course gives examples of applications of molecular genetics in medicine and industry. Seminars devoted to reviews of primary literature and workshops lead to rigorous treatment of a limited set of topics and emphasis on a "how-to" approach. This course is intended for students with a good background in genetics and a strong interest in research. Clinical genetics is not the main emphasis of the course. General format: two 1-hour sessions per week — one didactic, one practical (i.e., workshop or review of methods in primary literature).

GENE 840a and b,Medical Genetics. Margretta Seashore.
Clinical rotation offering medical and graduate students the opportunity to participate in the Genetic Consultation Clinic, genetic rounds, consultation rounds, and genetic analysis of clinical diagnostic problems.

GENE 900a and 901b,First-Year Introduction to Research. Susan Ferro-Novick, Ronald Breaker, Michael Stern.
Lab rotations, grant writing, and ethics for Molecular Cell Biology, Genetics, and Development track students. *Also CBIO 900a and 901b; MCDB 900a and 901b.*

GENE 920a and b,Reading Course for Qualifying Examination. Michael Stern and staff.
Reading period for second-year Genetics students for qualifying examination.

GENE 921a and b,Reading Course in Genetics and Molecular Biology. Michael Stern and staff.
Directed reading with faculty. Term paper required.

GEOLOGY AND GEOPHYSICS

Kline Geology Laboratory, 432.3124
M.S., M.Phil., Ph.D.

Chair
Leo Hickey

Director of Graduate Studies
David Bercovici

Professors
Jay Ague, David Bercovici, Robert Berner, Mark Brandon, Derek Briggs, Leo Buss, Michael Donoghue, Jacques Gauthier, Robert Gordon, Thomas Graedel, Leo Hickey, Shun-ichiro Karato, Jeffrey Park, Danny Rye, Adolf Seilacher (*Adjunct*), Brian Skinner, Ronald Smith, Karl Turekian, George Veronis, Elisabeth Vrba, John Wettlaufer

Assistant Professors
Ruth Blake, David Evans, Jun Korenaga, Mark Pagani, Peter Reiners, Steven Sherwood

Lecturer
Catherine Skinner

Fields of Study

Fields include geochemistry and petrology, geophysics, structural geology and tectonics, paleontology and paleoecology, and oceanography, meteorology, and climatology.

Special Admissions Requirements

The department welcomes applicants oriented toward the earth sciences who have a bachelor's or master's degree in such fields as biology, chemistry, engineering, mathematics, meteorology, or physics, as well as those trained in geological sciences. Scores from a pertinent GRE Subject Test are desirable but not required. The TOEFL exam is required for all applicants for whom English is a second language.

Special Requirements for the Ph.D. Degree

There is no formal language requirement and no required curriculum. Students plan their course of study in consultation with their advisers to meet individual interests and needs, to lay the foundations for dissertation research, and to prepare for the general examinations which take place in January of the second year. At the end of the first year the faculty reviews the standing of each student. A student recommended for continuation in the Ph.D. program will be so notified. Some students may be encouraged at that time to pursue only the M.S. degree. At the end of the second year the faculty reviews each student's overall performance to determine whether he or she is qualified to continue for the Ph.D. degree. In order to qualify, a student must have met the Graduate

School Honors requirement, maintained a better than passing record in the area of concentration, passed the oral and written general examinations, and presented a dissertation prospectus to the faculty. Remaining degree requirements include a dissertation review in the third year; the preparation and defense of the dissertation; and the submission of the dissertation to the Graduate School. The department requires that an additional copy, for which the student will be reimbursed, be deposited with the librarian of the Kline Geology Library.

Teaching experience is regarded as an integral part of the graduate training program in Geology and Geophysics. For that reason all students are required to serve as teaching fellows (5 hours per week) for two terms during the course of their predoctoral training.

Master's Degrees

M.Phil. See Graduate School requirements, pages 397–98.
M.S. Awarded only to students who are not continuing for the Ph.D. Students are not admitted for this degree.

Program materials are available at www.geology.yale.edu or upon request to the Director of Graduate Studies, Department of Geology and Geophysics, Yale University, PO Box 208109, New Haven CT 06520-8109; e-mail, dgs@geology.yale.edu.

Courses

G&G 500b[u], Mineral Deposits. Brian Skinner.
An introduction to the formation and distribution of mineral deposits.

G&G 501b[u], Radiative Transfer and Climate. Steven Sherwood.
MWF 9.30–10.20
An introduction to the behavior of electromagnetic radiation in macroscopic media, with emphasis on planetary atmospheres. Quantitative discussion of atmospheric optical phenomena, Earth's climate and climate change, planetary remote sensing, and other selected topics.

G&G 502b[u], Introduction to Geochemistry. Peter Reiners.
MWF 9.30–10.20
Basic principles of geochemistry and their use in geological science. Thermodynamics of aqueous and igneous systems. Element fractionation and isotope geochemistry. Biogeochemical cycles, geochronology, cosmochemistry.

G&G 504a[u], Minerals in the Biosphere: The Geochemistry of Human Health. Catherine Skinner.
TTh 11.20–12.45
Study of the interrelations between earth materials and processes, and personal and public health. The transposition of the chemical elements essential for life from the environment.

G&G 505a[u], Geochemistry of Planetary Evolution. Karl Turekian.
MWF 9.30–10.20
The processes and time-scales of the origin and history of the earth and solar system as inferred from the distribution of radioactive, radiogenic, and stable nuclides. The origins of the earth's structure, atmosphere, and hydrosphere, and the history of early life.

G&G 506b^{u}, Chemical Cycles and the Global Environment. Robert Berner.
TTh 11.30–12.45
Application of basic chemical, biological, and geological principles to the study of the cycling of major elements of the atmosphere, rainwater, lakes, rivers, and the ocean and how humans have disrupted this cycling.

[**G&G 511a,Stratigraphic Principles and Applications.**]

G&G 512b^{u}, Structural Geology and Tectonics. Mark Brandon.
TTh 11.30–12.45, Lab 2 HTBA
An introduction to the origin and structure of the lithosphere and continental and oceanic crust. Questions addressed include: what controls the solid versus fluid behavior of rocks during deformation; and what controls the character and motion of tectonic plates? Laboratory exercises and field trips.

[**G&G 513a^{u}, Invertebrate Paleontology: A Treasure House of Skeletal Reconstructions.**]

G&G 515a^{u}, Paleobotany. Leo Hickey.
TTh 9–10.15
A detailed survey of the evolutionary history of plants through geological time, the origin and diversification of their major lineages and of plant communities, and the interactions of plants and their physical environment. Laboratory exercises involve fossil and modern plants and include a field trip to study an ancient plant community.

G&G 519a^{u}, Introduction to the Physics and Chemistry of Earth Materials. Shun-ichiro Karato.
TTh 11.30–12.45
Basic principles that control the physical and chemical properties of earth materials. Equation of state, phase transformations, chemical reactions, elastic properties, diffusion, kinetics of reaction, and mass/energy transport.

G&G 520b^{u}, Petrology and Mineralogy. Jay Ague.
TTh 9–10.15; Lab 2 HTBA
Comprehensive study of the structures, chemistry, and physical properties of minerals. Interpretation of mineral associations and textures in terms of processes acting in the formation of igneous and metamorphic rocks. Study of the interplay between plate tectonics and the genesis of igneous and metamorphic rocks.

G&G 521b^{u}, Geophysical Fluid Dynamics. George Veronis.
TTh 1–2.15
Derivation of the equations of a geophysical fluid. Analysis of the most important dynamical phenomena common to all planetary atmospheres, oceans, and interiors, with emphasis on the roles of planetary rotation, gravitation, and thermal gradients.

G&G 522a^{u}, Introduction to Meteorology and Climatology. Steven Sherwood.
TTh 9–10.15
The climatic system; survey of atmospheric behavior on timescales from days (i.e., weather) to decades (i.e., climate); formulation of mathematical equations describing weather and climate with selected applications to small- and large-scale phenomena.

[**G&G 523b^{u}, Theory of Climate.**]

[**G&G 525a^{u}, Geophysical Continuum Mechanics.**]

G&G 526a[u], Introduction to Geophysics. Jun Korenaga.
MWF 10.30–11.20, 1 HTBA
Composition and structure of the earth; seismological models; geochemical models; material properties in the earth (elasticity, anelasticity, viscosity); specific topics on earth structure (crust, mantle, core).

[**G&G 527b,Dynamics of Earth and Planets.**]

[**G&G 530a[u], Large-Scale Atmospheric Motions I.**]

[**G&G 531b[u], Large-Scale Atmospheric Motions II.**]

[**G&G 533b[u], Paleomagnetism.**]

G&G 535a[u], Physical Oceanography. George Veronis.
TTh 1–2.15
An introduction to ocean dynamics. Exploration of the physical mechanisms underlying the large-scale ocean circulation, the Gulf Stream, wind-driven waves, tides, coastal upwelling, and phenomena attributable to the earth's rotation.

G&G 536b,Mesoscale Atmospheric Dynamics. Ronald Smith.
The fluid dynamics of the atmosphere on scales of 1 km to 1000 km. Gravity waves, mountain airflow and precipitation, transport of pollutants, convection, thunderstorms, shear instability, and vortices. Requires background in fluid mechanics, meteorology, applied mathematics.

[**G&G 540a[u], Geomicrobiology: Microbial Processes in the Geologic Environment.**]

[**G&G 550a[u], Paleontology and Evolutionary Theory.**]

[**G&G 555a[u], Ocean Circulation.**]

G&G 556a[u], Introduction to Seismology. Jeffrey Park.
MF 4–5.15
Earthquakes and seismic waves, P and S waves, surface waves, and free oscillations. Remote sensing of the earth's deep interior and faulting mechanisms.

[**G&G 557a,Advanced Seismology.**]

[**G&G 559b,Data Analysis in the Earth Sciences.**]

G&G 560a[u], Theory of Viscous Flow. John Wettlaufer.
TTh 2.30–3.45
The mathematical theory of the flow of viscous fluids: Cartesian tensors, kinematics of the flow field, equations governing the flow of Newtonian fluids, dimensional analysis, low-Reynolds number hydrodynamics, boundary-layer theory. Examples from geophysics, engineering, and biophysics.

G&G 562b[u], Observing the Earth from Space. Ronald Smith and staff.
Topics include the spectrum of electromagnetic radiation; satellite-borne radiometers; data transmission and storage; computer image analysis; and GIS analysis of satellite imagery with applications to weather and climate, oceanography, surficial geology, snow and ice, forestry, agriculture, and watershed management. *Also F&ES 506b.*

G&G 565a[u], Archaeometallurgy. Robert Gordon.
TTh 10.30–11.20, 1 HTBA
Evidence of the winning and use of metals by people in different cultures from earliest to modern times. The role of science; environmental consequences. Interpretation of artifacts and of smelting and metalworking sites. Laboratory demonstrations and field trips.

[G&G 567b[u], Geochemical Approaches to Archaeology.]

[G&G 601b, Topics in Earth Science.]

[G&G 611a, Advanced Stratigraphy.]

[G&G 615a, Advanced Petrology.]

[G&G 618b, Petrology of Light Stable Isotopes.]

G&G 620[u], Plate Tectonics. David Evans.
MWF 9.30–10.20
An introduction to the large-scale elements of Earth's crust and mantle, and quantitative methods of measuring their relative motions within a spherical geometry. Investigation of geological and geophysical processes assocated with oceans and continents in motion.

[G&G 621b, Geochemistry of Heavy and Radioactive Isotopes in Rock Systems.]

G&G 631a, Vertebrate Paleontology: Phylogeny of Vertebrates. Jacques Gauthier.
HTBA
This seminar course offers a detailed look at current issues in the phylogeny, anatomy, and evolution of fossil and recent vertebrates. Lectures review the broad outline of vertebrate phylogeny and evolution. Lab section is required.

[G&G 650b[u], Time-Dependent Deformation of Earth Materials.]

G&G 655a[u], Extraordinary Glimpses of Past Life. Derek Briggs, Adolf Seilacher.
MW 11.30–12.45
The fossil record is typically limited to the hard parts of organisms. In exceptional settings, called *lagerstaetten,* more complete and even nonmineralized animal skeletons are preserved. These peepholes into the history of life (e.g., the Burgess Shale, Solnhofen limestones) are examined to reveal ancient life styles, environments, and preservational processes.

[G&G 657a, Marine and Surficial Geochemistry.]

G&G 660a, Diagenesis, Weathering, and Geochemical Cycles. Robert Berner.
A theoretical approach to earth surface chemical processes; modeling of geochemical cycles.

G&G 666b, Geophysical Thermodynamics and Kinetics. John Wettlaufer.
TTh 2.30–3.45
Classical thermodynamics is derived from statistical thermodynamics. We then explore phenomena that are of direct relevance to problems in the atmospheres, oceans, and in the earth's interior and take many of our examples from those fields. We develop kinetics, transport theory, and reciprocity from the linear thermodynamics of irreversible processes. A strong emphasis is placed on interfacial thermodynamics, nucleation theory, in the liquid and gas phases. No quantum mechanics is necessary as a prerequisite.

G&G 675a, Advanced Structural Geology. Mark Brandon.
A review of advanced methods in structural geology, including analysis of deformation in three dimensions, and microscale processes associated with deformation and fabric formation in rocks. Course includes practical exercises for measuring and interpreting strain and lattice preferred orientation in real geologic settings.

G&G 690a and b, Directed Research in Geology and Geophysics.
By arrangement with faculty.

In addition to the seminars noted below, others on special topics like evolution, invertebrate and vertebrate paleontology, statistical mechanics and spectroscopy, structural geology and tectonics, petrology, volcanology, and physics of oceans and atmospheres

are offered according to student interest, by arrangement with departmental faculty. Seminars are often organized around the research interests of visiting faculty as well.

G&G 703a,Seminar in Systematics. Jacques Gauthier.
Also E&EB 930a.

G&G 705b,Advanced Seminar in Evolutionary Paleontology. Elisabeth Vrba.
The contents of this seminar are designed at the start of each spring term in consultation with graduate students who wish to take it.

G&G 707a,Advanced Topics in Macroecology and Macroevolution. Elisabeth Vrba.
HTBA

G&G 740a or b,Sediment Seminar. Robert Berner.

G&G 742a or b, Seminar in Geophysical Fluid Dynamics. Ronald Smith.

G&G 744a or b,Seminar in Mantle and Core Processes. David Bercovici, Shun-ichiro Karato, Jeffrey Park, Jun Korenaga.
The seminar covers advanced topics concerning physical and chemical processes in the mantle and core of the earth and planets. Specific topic and hour will be arranged in consultation with enrolled graduate students.

G&G 746a or b,Seminar in Global Change. Karl Turekian.

[**G&G 753a,Seminar in Petrology.**]

G&G 762a or b,Seminar in Applications of Satellite Remote Sensing. Ronald Smith.
HTBA
This seminar combines lectures and readings with support and discussion of student projects.

G&G 767a,Seminar in Ice Physics. John Wettlaufer.
HTBA
We bring together the basic thermodynamics and statistical mechanics of crystal growth, surface phase transitions, metastability, and instability to explore the many faces of the surface of ice. These processes control the macroscopic growth shapes of ice crystals, underlie the enigma of the snowflake, and have implications in, inter alia, the atmosphere, the oceans, basic materials science, and astrophysics.

G&G 777a,Early Life. David Evans,Adolf Seilacher.
HTBA
Critical evaluation of data and hypotheses bearing on the origin and evolution of Precambrian life on earth.

Tutorial courses, offered by arrangement with individual faculty, are offered as follows:

G&G 800a or b, Tutorial in Paleobiology.

G&G 805a or b, Fossil Floras. Leo Hickey.

G&G 810a or b, Tutorial in Structural Geology and Tectonics or Solid Earth Geophysics.

G&G 820a or b, Tutorial in Meteorology, Oceanography, or Fluid Dynamics.

G&G 830a or b, Tutorial in Geochemistry, Petrology, or Mineralogy.

G&G 840a or b, Tutorial in Sedimentology.

G&G 860a or b, Tutorial in Remote Sensing.

GERMANIC LANGUAGES AND LITERATURES

W. L. Harkness Hall, 432.0788
M.A., M.Phil., Ph.D.

Chair
Brigitte Peucker

Director of Graduate Studies
Ingeborg Glier [F] (305 WLH, 432.0782, ingeborg.glier@yale.edu)
Eric Schwab [Sp] (304 WLH, 432.0781, eric.schwab@yale.edu)

Professors
Ingeborg Glier (*on leave* [Sp]), Cyrus Hamlin, Carol Jacobs (*on leave* [Sp]), Winfried Menninghaus (*Visiting*), Brigitte Peucker

Associate Professor
Matthias Konzett

Assistant Professors
Eric Schwab, Kirk Williams

Affiliated Faculty
Seyla Benhabib (*Political Science; Philosophy*), Karsten Harries (*Philosophy*), James Kreines (*Philosophy*), Christine Mehring (*History of Art*), Leon Plantinga (*Music*), Kevin Repp (*History*), Steven Smith (*Political Science*), Katie Trumpener (*Comparative Literature; Film Studies*), Jay Winter (*History*)

Fields of Study

Fields include medieval literature, German literature and culture from the Reformation to the twenty-first century in Germany, Austria, and Switzerland; literary theory; literary sociology; film.

Special Admissions Requirement

All students must provide evidence of mastery of German upon application.

Requirements for the Ph.D. Degree

Students are required to demonstrate, besides proficiency in German, a reading knowledge of two other foreign languages, one at the end of the second term, the other by the fifth term of study. Recommended are Latin and French, although other relevant languages may be substituted for these. The faculty in German considers teaching to be essential to the professional preparation of graduate students. Students in German teach in their third and fourth years, at least. Students are normally expected to teach undergraduate language courses under supervision beginning in the third year of study. An oral examination must be passed not later than the end of the sixth term of study, and a dissertation prospectus should be submitted soon thereafter, but not later than the seventh term of study. All students will be asked to defend the prospectus in an informal discussion with the faculty. The defense will take place before the prospectus is officially

approved, usually in November or early December of the seventh term. Students are admitted to candidacy for the Ph.D. upon completion of all predissertation requirements, including the prospectus. After the submission of the prospectus, the student's time is devoted to the preparation of the dissertation. A dissertation committee will be set up for each student at work on the dissertation. It is expected that students will periodically pass their work along to all members of their committee, so that faculty members in addition to the dissertation adviser can make suggestions well before the dissertation is submitted.

Two concentrations are available to students: Germanic Literature and German Studies.

Special Requirements for the Germanic Literature Concentration

During the first two years of study, students are required to take sixteen term courses, four of which may be taken outside the department.

Special Requirements for the German Studies Concentration

During the first two years of study, students are required to take sixteen term courses, seven of which may be taken outside the department. Students are asked to define an area of concentration upon entry, and will meet with appropriate advisers both from within and outside the department.

Joint Ph.D. Program

The Department of Germanic Languages and Literatures also offers, in conjunction with the Program in Film Studies, a joint Ph.D. in Germanic Languages and Literatures and Film Studies. For further details, see Film Studies on page 177. Applicants to the joint program must indicate on their application that they are applying both to Film Studies and to Germanic Languages and Literatures. All documentation within the application should include this information.

Master's Degrees

M.Phil. See Graduate School requirements, pages 397–98. Alternatively, the Department of Germanic Languages and Literatures offers, in conjunction with the Medieval Studies program, a joint M.Phil. degree. For further details, see Medieval Studies.

M.A. (en route to the Ph.D.). Students enrolled in the Ph.D. program may qualify for the M.A. degree upon completion of a minimum of eight graduate term courses and the demonstration of reading knowledge in either Latin or French.

Master's Degree Program. For the terminal master's degree students must pass eight term courses, six of which must be in the department, and demonstrate a reading knowledge of either Latin or French. A comprehensive written examination will be given at the end of the second term. For the quality requirement for the M.A. degree, see page 398.

Program materials are available upon request to the Director of Graduate Studies, Department of Germanic Languages and Literatures, Yale University, PO Box 208210, New Haven CT 06520-8210; german@yale.edu.

Courses

GMAN 534a, Gottfried von Straßburg and the Tristan Tradition. Ingeborg Glier.
W 3.30–5.20
The seminar focuses on Gottfried von Straßburg's *Tristan und Isold,* which is the most sophisticated and most puzzling of all medieval European Tristan versions. We also examine other French and German Tristan texts before and after Gottfried, then briefly discuss some late medieval and early modern Tristan versions, and finally examine the reception of Gottfried in the late nineteenth and early twentieth centuries (Richard Wagner and Thomas Mann).

GMAN 560a, Poetics of Representation: Sebald, Rilke, Yeats. Carol Jacobs.
T 1.30–3.20
Readings of the works of three twentieth-century authors who, in very different ways, challenge conventional modes in which to consider the relationship between literature and what we tend to call reality. Inevitably we have to take into account on the one hand Sebald's and Yeats's difficult stances toward what we tend to call the political, as well as Rilke's apparent withdrawal from the realm of such worldly concerns. We necessarily also ask how to think the performance of art and its implicit theorizations as crucial to these questions. *Also CPLT 531a.*

GMAN 583b^{u}, Mania and Mass Psychology. Eric Schwab.
W 3.30–5.20
Exploration of the correlation between traditional concepts of mania (from enthusiasm to bipolar disorder) and the psychology of human masses (from groups and crowds to mass culture and religious and political movements). Readings from theoretical and literary works (including Freud, Kant, Benjamin, Brecht, Reich, Schreber, Canetti, Theweleit) as well as films (*Metropolis, Triumph of the Will, Kuhle Wampe*) that attempt to describe, explain, and/or transform the "mass" mentality in some way. Topics include rhetoric and propaganda, communism and fascism, violence and sexuality, schizophrenia and mass media. *Also CPLT 583b^{u}.*

GMAN 598a^{u}, Thomas Mann's Novels: The Crises of Modernity. Ingeborg Glier.
MW 11.30–12.45
Analysis and comparison of three novels from Mann's early, middle, and late period: *Königliche Hoheit, Der Zauberberg, Doktor Faustus;* their relation to Mann's other writings (essays, narratives) and their reflections on the crises of the early twentieth century (in history, literature, and music). Readings in German and English; conducted in German.

GMAN 613b^{u}, The Drama and Theater of Bertolt Brecht. Cyrus Hamlin.
TTh 11.30–12.45
The major plays by Bertolt Brecht are studied in the context of their performance in the theater under his direction, specifically in Berlin during the 1920s and after World War II from 1949 to 1956. Among the works to be studied are *Baal, Drums in the Night, In the Jungle of the Cities, Man Is Man, Threepenny Opera, Rise and Fall of the City of Mahagonny, The Measures Taken, Saint Joan of the Stockyards, Mother Courage and Her Children, Life of Galileo, The Good Woman of Setzuan,* and *Caucasian Chalk Circle.* Reading and discussion in English. Occasional viewing of video materials. *Also CPLT 530b^{u}.*

GMAN 621a^{u}, European Bestsellers in Contemporary Fiction. Matthias Konzett.
M 1.30–3.20
This course examines recent European novels from the 1980s to the present, focusing on the growing sense of a shared transnational European legacy and identity. Particular attention is given to themes of historical memory, cultural identity, postcolonial legacies, transformation of traditional European culture, the opening toward Eastern Europe, and the negotiation of multiculturalism. Authors include Kundera, Ransmayr, Kertesz, Kureishi, Barnes, Mulisch, Jelinek, Sebald, Eco, Sarraute, Chamoiseau, Ishiguro, Faschinger, and Cela.

GMAN 671b[u], Ornament and Crime in Cosmopolitan Vienna. Matthias Konzett.
M 1.30–3.20
Expanding on Adolf Loos's critique of the discrepancy between official pomp and ornament in turn-of-the-century Viennese architecture, and the substandard living conditions of the city's masses, an examination of the social and aesthetic contradictions that surround Vienna's metropolis and its cosmopolitan culture. Works by Loos, Freud, Herzl, Hofmannsthal, Kraus, Wittgenstein, Schoenberg, Klimt, Schiele, and others; well-known studies on Vienna, and critical theories on Cosmopolitan and migrant identities.

GMAN 675b, Walter Benjamin's Literary Criticism. Winfried Menninghaus.
T 3.30–5.20
Walter Benjamin's literary criticism provides a critical transformation of both aesthetic concepts (beauty, semblance, the sublime), and rhetorical figures (irony, allegory). It puts into question the relations of myth, literature, philosophy, dream, and history. The seminar focuses on a discussion of Benjamin's highly influential basic concepts while at the same time drawing on some of the literary works he deals with. The second half of the class is devoted to the way the later Benjamin of the "Arcades Project" transforms his modes of literary readings into a new kind of reading societal "dream energies" in fashion, technology, architecture, interior design, and trends of the visual arts. *Also CPLT 950b.*

GMAN 720b[u], The Films of Fassbinder, Herzog, and Wenders. Brigitte Peucker.
TH 1.30–3.20
The three major directors of the New German Cinema. Topics include postmodernism; high and low culture; film's relation to the other arts; issues of gender, race, and national identity; the influence of Hollywood. *Also FILM 763b[u].*

GMAN 730a[u], German Cinema 1945–1965: Cold War Film Culture. Katie Trumpener.
TTH 11.30–12:45
Juxtaposing East and West German films, this course explores their diverging accounts of Nazi and postwar life; the theory and practice of socialist filmmaking; cinema culture; questions of genre; the emerging New Waves. *Also CPLT 932a[u], FILM 729a[u].*

HISTORY

240 Hall of Graduate Studies, 432.1366
M.A., M.Phil., Ph.D.

Chair
Jon Butler

Director of Graduate Studies
Valerie Hansen (236 HGS, 432.1361)

Professors
Jean-Christophe Agnew (*American Studies*), Abbas Amanat, Ivo Banac, Beatrice Bartlett, David Blight, Paul Bushkovitch, Jon Butler, John Demos, Carlos Eire, Laura Engelstein, John Mack Faragher, Paul Freedman, Joanne Freeman, Ute Frevert, John Gaddis, Glenda Gilmore, Robert Gordon (*Law*), Timothy Guinnane (*Economics*), Valerie Hansen, Robert Harms, John Heilbron (*Visiting*), Paula Hyman, Matthew Jacobson, Gilbert Joseph, Donald Kagan, Paul Kennedy, Daniel Kevles, Benedict Kiernan, Bentley Layton (*Religious Studies*), Ivan Marcus, John Matthews (*Classics*), John Merriman, Cynthia Russett, Lamin Sanneh (*Divinity School*), Stuart Schwartz, Frank Snowden, Jonathan Spence, Harry Stout, Frank Turner, John Harley Warner (*History of Medicine & Science*), Jay Winter, Keith Wrightson

Associate Professors
Mary Habeck, Jonathan Holloway, Susan Lederer, Stephen Pitti, Kevin Repp, Steven Stoll, Anders Winroth

Assistant Professors
Michael Auslin, Jennifer Baszile, Brian Cowan, Seth Fein, Andrew Gregory (*Classics*), Jennifer Klein, Mary Lui, Michael Mahoney, Carolyn Moehling, Carlos Noreña (*Classics*), Laila Parsons, Mridu Rai, Ronald Rittgers (*Divinity School*), Naomi Rogers (*History of Medicine & Science*), Celia Schultz (*Classics*), Timothy Snyder, Francesca Trivellato, Kariann Yokota

Fields of Study

Fields include ancient, medieval, early modern, and modern Europe (including Britain, Russia, and Eastern Europe), United States, Latin America, Asia, Middle East, Africa, Jewish history; and diplomatic, environmental, ethnic, intellectual, labor, military, political, religious, social, and women's history.

Special Admissions Requirements

The department requires a short book review to accompany the application. It should cover the book that has most shaped the applicant's understanding of the kind of work he or she would like to do as a historian.

Special Requirements for the Ph.D. Degree

All students must pass examinations in at least two foreign languages, one by the end of the first year. Students are urged to do everything in their power to acquire adequate linguistic training before they enter Yale and should at a minimum be prepared to be examined in at least one language upon arrival. Typical language requirements for major subfields are as follows:

African: Either (1) French and German or Portuguese or Dutch-Afrikaans; or (2) French or German or Portuguese and Arabic; or (3) French or German or Portuguese or Dutch-Afrikaans and an African language approved by the department.

American: Two languages relevant to the student's research interests, or a high level of proficiency in one language; competence in statistics may substitute for a natural language under appropriate circumstances.

Ancient: French, German, Greek, and Latin.

Chinese: Chinese and French; additional languages like Japanese, Russian, or German may be necessary for certain dissertation topics.

East European: The language of the student's concentration plus two of the following: French, German, Russian, or an approved substitution.

Japanese: Japanese and French or German; Chinese may be necessary for some fields of study.

Latin American: Spanish, Portuguese, and French.

Medieval: French, German, and Latin.

Modern Western European (including British): French and German; substitutions are permitted as appropriate.

Russian: Russian plus French or German with other languages as required.

During the first two years of study, students normally take twelve term courses, at least eight of which shall be chosen from those offered by the department, and must achieve Honors in at least one course in the first year. Three of the twelve courses must be research seminars in which the student produces an original research paper from primary sources. One of the second-year courses will be a tutorial resulting in a prospectus for the dissertation. When this has been discussed in a dissertation colloquium and approved by the student's committee, and after any further language requirements have been met, the student takes an oral examination, normally in the third year. The examination will cover three chosen fields of concentration: a major field and two minor fields, one of which is comparative or theoretical, or on a continent different from the student's ordinary field of specialization. U.S. historians must offer a minor field that addresses historiography outside the United States. If these do not include one field dealing with premodern history, then a year's work in that earlier period must have been included among the twelve required courses. Completion of these requirements will qualify a student for admission to candidacy for the Ph.D., which must take place by the end of the third year of study.

Teaching is an important part of the professional preparation of graduate students in History. Students will teach, usually in the third and fourth years of study. Students are also encouraged to participate in the teaching programs offered by the Graduate School.

Combined Ph.D. Programs

HISTORY AND AFRICAN AMERICAN STUDIES

The Department of History also offers, in conjunction with African American Studies, a combined Ph.D. in History and African American Studies. For further details, see African American Studies.

HISTORY AND RENAISSANCE STUDIES

The Department of History also offers, in conjunction with the Renaissance Studies program, a combined Ph.D. in History and Renaissance Studies. For further details, see Renaissance Studies.

Master's Degrees

M.Phil. Students who have completed all requirements for admission to candidacy for the Ph.D. may receive the M.Phil. degree. Alternatively, the Department of History offers, in conjunction with the Medieval Studies program, a joint M.Phil. degree. For further details, see Medieval Studies.

M.A. (en route to the Ph.D.). Students enrolled in the Ph.D. program may qualify for the M.A. degree upon completion of a minimum of six graduate term courses at Yale, of which one must be an Honors grade and the other five courses must average High Pass. Students must also pass an examination in one foreign language. A student in the American Studies program who wishes to obtain an M.A. in History, rather than an M.A. in American Studies, must include in the courses completed at least two research seminars in the History department.

Master's Degree Program. For this terminal master's degree students must pass six term courses, four of which must be in History; substantial written work must be submitted in conjunction with at least two of these courses, and Honors grades are expected in two courses, with a High Pass average overall. All students in this program must pass an examination in one foreign language.

Program materials are available upon request from the Director of Graduate Studies, Department of History, Yale University, PO Box 208324, New Haven CT 06520-8324.

Courses

HIST 514b[u], The Athenian Imperial Democracy. Donald Kagan.
T 1.30–3.20
A history of Greece in the years between the Persian invasion and the Peloponnesian War, with emphasis on Athens.

HIST 517b, Thucydides. Donald Kagan.
Th 1.30–3.20
Select problems in Thucydides' aims and methods. Ancient Greek required. German, French, and Italian also helpful. *Also CLSS 831b.*

HIST 518a[u], The Spartan Hegemony. Donald Kagan.
T 2.30–4.20
A history of Greece during the period 404–362 B.C. The focus is on the relationship between domestic constitutions and politics and diplomacy and war.

HIST 525b, Topics in Roman History and Culture. John Matthews.
F 4–6
A weekly program of research papers on various topics, given by faculty members, graduate students, and visitors to Yale, followed by formal and informal discussion. Graduate students may acquire a course credit by presenting a paper to the seminar or by writing a term paper on one of the topics chosen, together with regular participation and contributions to discussion. Suggestions for and offers of papers are welcome. *Also CLSS 850b.*

HIST 532a[u], Jews in Muslim Lands from the Seventh to the Sixteenth Century. Ivan Marcus.
TTh 11.30–12.45
Introduction to Jewish culture and society in Muslim lands from the Prophet Muhammad to Suleiman the Magnificent. Topics to be discussed include Islam and Judaism; Jerusalem as a holy site; rabbinic leadership and literature in Baghdad; Jewish courtiers, poets, and philosophers in Muslim Spain; the Jews in the Ottoman Empire. *Also RLST 777a[u].*

HIST 541a, Jews in Christian and Muslim Lands from the Fourth to the Sixteenth Century. Ivan Marcus.
T 1.30–3.20
Research seminar that focuses on a comparison of the two medieval Jewish sub/cultures of Ashkenaz (northern Christian Europe) and Sefarad (mainly Muslim and Christian Spain). Issues in historiography and comparative methodology complement discussions about the symbols and reality of literary, political, and economic features of each society. *Also RLST 776a.*

HIST 548b, Trade and Travel in the Middle Ages. Paul Freedman, Valerie Hansen.
T 1.30–3.20
An introduction to the different types of source materials — travel narratives (such as Marco Polo and Ibn Battuta), maps, archaeological excavation, contracts and legal documents, language textbooks — useful for analyzing contacts between China, Europe, and the Islamic world before 1500.

HIST 551a, Readings in Medieval European History: Church History. Anders Winroth.
F 1.30–3.20
Discussions of topics in medieval church history focusing on the period of reform.

HIST 556a, Popular Religion in Europe, 1300–1700. Carlos Eire.
T 1.30–3.20
Readings in primary texts from the period 1300–1700 which focus on definitions of the relationship between the natural and supernatural realms, both Catholic and Protestant. Among the topics to be covered: mystical ecstasy, visions, apparitions, miracles, and demonic possession. All assigned readings in English translation. *Also RLST 680a.*

HIST 576b, The English Reformation Revisited. Ronald Rittgers.
W 1.30–3.20
This seminar is designed to introduce students to critical skill of historical interpretation by way of examining current historiographical debates in Reformation scholarship. In the spring of 2004 the seminar topic will be the revisionist historiography of the English Reformation. Over the last twenty years, scholars have successfully challenged the traditional view of the English Reformation as a largely popular movement analogous to the Reformation on the continent. However, the revisionist scholarship on the English Reformation is not without its problems. It is the task of this seminar to determine where the revisionists have raised legitimate objections to traditional views and where they are susceptible of revision themselves. There are no prerequisites, but a basic grasp of the chronology of the English Reformation is helpful.

HIST 577b, Sin, Penance,and Forgiveness in Early Modern Christianity. Ronald Rittgers.

M 1.30–3.20

This course examines the revolutionary changes that took place in Christian penitential thought and practice during the early modern period (1400–1700). It stresses close reading of select primary sources and critical interaction with key works in the secondary literature. The seminar discusses the theological, political, and social dimensions of the early modern transformation of penance, as well as the impact on popular piety. There are no specific prerequisites, but a good grasp of western church history is essential.

HIST 602a,Microhistories. Keith Wrightson.

Th 10.30–12.20

Research seminar. The first weeks are devoted to reading and discussing a number of outstanding microhistorical studies of individuals, families, communities, incidents, and processes, principally drawn from the literature on early modern England. Particular attention is paid to questions of sources and their use. Thereafter, members of the class undertake research exercises on edited primary sources. Particular use can be made of the records of Earls Colne, Essex (available in their entirety in microfiche and online).

HIST 605b,Early Modern Media and Politics. Brian Cowan.

T 10.30–12.20

This course examines the various ways in which people communicated with each other in the early modern world. We look at a wide variety of early modern media, including print, manuscript, images, as well as oral and ritual communication as a means of studying the social construction of knowledge and credibility in early modern societies. Armed with this understanding of their context, we read a variety of different early modern texts including poetry, plays, pictures, newspapers, diaries, and correspondence. While the primary focus of our readings is early modern England, students may write a reseach paper in a field of their own choice. The seminar includes research orientation sessions at the Beinecke Library and the British Art Center.

HIST 609a,English Royal Courts,Sixteenth and Seventeenth Centuries. Maija Jansson.

M 3.30–5.20

Taking into account the "personal style" of the monarch, the course examines the structure and political function of English (and some continental) courts of the sixteenth and seventeenth centuries. Attention focuses on the governmental responsibilities and the economic organization of the court and Household offices during the long period of personal monarchy, as well as on the social and symbolic aspects of court entertainments and masques. This includes a close look at the changing nature of the Privy Chamber and its subsidiary offices from the time of Henry VII through Anne, the last Stuart. Research paper.

HIST 618b[u], The Scientific Revolution. John Heilbron.

TTh 1.30–2.45

A survey of the natural science that developed between the Age of Discovery and the French Revolution. The course covers the background in Aristotelian philosophy; the shift from geocentric to heliocentric astronomy; the replacement of scholastic natural philosophy by the ideas of Galileo, Descartes, and Newton; the roles of the Catholic and Protestant churches, universities, and learned academies; the invention and improvement of scientific instruments; and the science of the Enlightenment. *Also HSHM 679b[u].*

HIST 628b,The Citizen and Social Policy in Modern Britain. Frank Prochaska.
T 1.30–3.20
Readings in the history of social reform and social policy from the late eighteenth century to the present. Topics include the Poor Laws, charitable provision, the condition of England and the industrial novel, the rise of collective provision, challenges to the state, and social policy and democratic values.

HIST 634a,Cultural and Intellectual History of European Modernism. Kevin Repp.
Th 1.30–3.20
Reading and discussion. Explore recent methodological approaches to intellectual and cultural history while also learning something about the state of historical research on twentieth-century European modernism. Topics include media, markets, and modernism; modernism and the First World War; "fascist modernism"; and "postmodernism." Authors include Peter Fritzsche, Paul Fussel, Mark Antliff, Raymond Williams, Jürgen Habermas, Michel Foucault, and Pierre Bourdieu.

HIST 638a,The Emergence of Modern Paris. John Merriman.
T 10–12
This reading and discussion seminar considers themes in the social, political, and cultural history of Paris from the seventeenth century to the present. It emphasizes the nineteenth and twentieth centuries. A knowledge of French is required.

HIST 655a,Relations of the Great Powers since 1890. Paul Kennedy.
W eve
Reading and discussion. Among the topics covered are the "New Imperialism," the military and naval arms race prior to 1914, the relationship between domestic politics and foreign affairs, the First World War and the alteration of the Great Power order, the "new diplomacy," appeasement, and the rise of the dictator states. There is a heavy emphasis on historiography, and an encouragement to relate economic and strategical trends to diplomatic.

HIST 657a,Germany in Europe: A Transnational Approach to Modern History. Ute Frevert.
Th 3.30–5.20
Reading and discussion.

HIST 666b,Russia to 1725. Paul Bushkovitch.
W 10.30–12.20
The major phases of Russian history from the tenth century, covering the major historiographical controversies and sources. Russian or German helpful but not required.

HIST 670b,Self,Society, and the State in Soviet Russia: New Approaches. Laura Engelstein.
T 1.30–3.20
Focus on the relationship between individuals, society, and the apparatus of power (state and Party) in the Soviet period. Themes include mass psychology and collective identity; private lives and everyday experience; consumerism; violence — responsibility and vulnerability; cult of personality; testimony and myth. Readings draw on recently published archival documents, as well as personal accounts. The goal is to revisit some of the major interpretations of the Soviet system, while also addressing methodological issues connected with the use of historical sources.

HIST 672a,Imperial Russia and the Challenge of Modernity. Laura Engelstein.
M 1.30–3.20
Selected themes in the late imperial period relating to the problem of modernity as a social and cultural concept. Focus on issues of ideology, representation, and political culture. Readings include primary sources, as well as material from the recent scholarly literature. Most reading in English, some in Russian.

HIST 700a, Introduction to the Historiography of the United States. Jon Butler.
TTh 10.30–12.20
Readings and discussion of scholarly work on U.S. history from the settlement era to the present. Members of the department faculty visit the class on a rotating basis. *Also AMST 700a.*

HIST 715a,Readings in Nineteenth-Century American History, 1820–1877. David Blight.
W 1.30–3.20
This course explores recent trends and historiography on several problems through the middle of the nineteenth century: sectionalism; expansion; slavery and the Old South; northern society and reform movements; Civil War causation; the meaning of the Confederacy; why the North won the Civil War; the political, constitutional, and social meanings of emancipation and Reconstruction; violence in Reconstruction society; the relationships between social/cultural and military/political history; problems in historical memory; the tension between narrative and analytical history writing; and the ways in which race and gender have reshaped research and interpretive agendas. *Also AMST 715a.*

HIST 722b,Research Seminar in United States History. David Blight.
W 1.30–3.20
Some class sessions focus on matters of craft: research techniques, styles of writing narrative and analysis; judging scholarly work; and philosophical dimensions of doing history in the early twenty-first century. Primary focus of the course is for each student to complete his/her own major research paper. Students in any field of American history are welcome. *Also AMST 722b.*

HIST 726b,The Culture of the Gilded Age. Cynthia Russett.
Th 1.30–3.20
Although the politics of the Gilded Age may seem somewhat jejune (who today has lively memories of Chester A. Arthur or James Garfield?), its society and culture were undergoing dramatic and challenging developments. Industrialization and urbanization brought new immigrants to our shores; labor unions grew and flexed their muscle in a series of major strikes. In the world of thought the impact of Darwinism was still being absorbed, especially in the new academic disciplines of the social sciences: sociology, economics, and psychology. Some important names from the period: William James, Charlotte Perkins Gilman, Henry George, Andrew Carnegie, W. E. B. Du Bois, Jane Addams, Edward Bellamy, Samuel Gompers (and, of course, many more).

HIST 735a,Readings in Twentieth-Century American Political and Social History. Jennifer Klein.
Th 1.30–3.20
Readings in American social and political history from the late nineteenth century to the present, with an emphasis on political economy. Major topics include changing relationships between the state, economy, and communities over time; the role of social movements of the Left and Right in political, social, and economic transformations; definitions and boundaries of citizenship; development of social policy, labor policy and politics, and the "New Deal Order"; America's rural and urban economies in regional, national, and international context. *Also AMST 717a.*

HIST 738b,Reading and Research in Western and Frontier History. John Mack Faragher.
T 10.30–12.20
An introduction to recent work on the history of North American frontiers and the region of the American West, and original work in primary materials. Held in the Beinecke Library, the seminar examines documents from Yale's outstanding collections of Western Americana. Students elect to produce a substantial research essay or a dissertation prospectus. *Also AMST 738b.*

HIST 751a,Race and Races in American Studies. Matthew Jacobson.
W 10.30–12.20
This reading-intensive seminar examines influential scholarship across the disciplines on "race" and racialized relations in American culture and society. Major topics include the cultural construction of race; race as both an instrument of oppression and an idiom of resistance in American politics; the centrality of race in literary, anthropological, and legal discourse; the racialization of U.S. foreign policy; "race mixing"; vicissitudes of "whiteness" in American political culture; and "race" in the realm of popular cultural representation. A lengthy review essay due at the end of the term gives students a chance to explore in depth the themes, periods, and methods which most interest them. *Also AFAM 687a, AMST 701a.*

HIST 754b,Race Politics in the Twentieth-Century United States. Stephen Pitti, Jonathan Holloway.
TH 10.30–12.20
This course examines a range of civil rights movements as they have been developed and articulated since 1919. Readings in the course pay particular attention to the contested nature of such movements, their multifaceted nature, and the deep social fissures they reveal along lines of race, class, gender, and sexuality. Primary and secondary sources cover a range of methodological perspectives. Readings and discussion. *Also AFAM 714b, AMST 713b.*

HIST 757a,Culture in U.S. International and Transnational Histories. Seth Fein.
M 11.30–1.20
Reading seminar that examines interdisciplinary approaches to the study of "culture" in relations between, within, and among the United States and other nations (mainly since 1900). Discussions and papers focus on comparing methodologies, using theory, doing research, writing history. Topics include globalization, Americanization, transnationalism, and hybridity; gender, national identity, international relations, and state formation; imperialism, postcolonialism, hegemony, and resistance; mass culture, political economy, foreign policy, and postmodernity. *Also AMST 775a.*

HIST 760b,American Legal History, 1880–1980. Robert Gordon.
MW 2.10–3.25
Selected topics in the modern history of American law, legal thought, legal institutions, and the legal profession. Examination, with an option (open to a limited number of students) to write a research paper based on primary sources. *Also AFAM 760b, AMST 780b, Law 21063.*

HIST 782a,History of Western Canada. Gerald Friesen.
W 1.30–3.20
This is an advanced reading and research seminar in western Canadian history. Twelve meetings are devoted to discussion of reports on some of the latest and most important writings in the field. The topics range from Aboriginal and Métis culture to gender, capitalist, class, cultural, and regional approaches. Each student also writes a major research paper and presents both a summary of this paper and a commentary on another student's paper.

HIST 783b,Material Culture in Historical Research. Kariann Yokota.
W 3.30–5.20
The material objects people produce and consume provide rich texts for historical analysis. This seminar explores how the cultural meanings of objects have been analyzed and understood from various perspectives. Readings are interdisciplinary, including works by historians, anthropologists, cultural theorists, sociologists, postcolonial scholars, writers, museum curators, and archaeologists. Topics of discussion include the role of material culture in the formation of national, ethnic, gender, and class identities. *Also AMST 732b.*

HIST 785a,Science and Technology in American Society. Daniel Kevles.
T 1.30–3.20
This course deals with both the growth of science and technology in the United States and their integration into the overall national narrative. Topics include the American scientific community and its roles in exploration, agriculture, industry, national defense, religion, culture, the environmental movement, and social change. *Also HSHM 785a.*

HIST 790a,Narrative,and Other, Histories. John Demos.
W 3.30–5.20
An exploration, through readings and discussion, of the recent "literary turn" in historical study. Readings include history, fiction, and some theory. In addition, a month-long "practicum" focuses on writings by course participants. *Also AMST 790a.*

HIST 796b, Interdisciplinary Approaches to the History of Capitalism and Culture. Jean-Christophe Agnew.
W 10.30–12.20
A reading-intensive seminar that explores the historical intersections between capitalism and culture in the United States and elsewhere. Subjects range from the cultural construction of credit and risk, to cultural capital and class formation, gift and commodity exchange, law and the corporation, gender and the "invisible economy," virtualism and the "experience economy." Readings include both canonical treatments of capitalism and culture and more recent contributions by scholars associated with feminist criticism, the New Economic Criticism, and economic anthropology and sociology. *Also AMST 796b.*

HIST 805a,Social and Cultural History of Colonial Latin America. Stuart Schwartz.
M 1.30–3.20
Introduction to the basic themes and literatures of colonial history with emphasis on changing methods and approaches in Latin American, European, and U.S. scholarship.

HIST 807a,Resistance,Rebellion,and Survival Strategies in Modern Latin America. Gilbert Joseph, Patricia Pessar.
T 1.30–3.20
An interdisciplinary examination of new conceptual and methodological approaches to such phenomena as peasants in revolution, millenarianism, "banditry," refugee movements, and transnational migration.

HIST 810b,Introduction to Brazilian History. Stuart Schwartz.
M 1.30–3.20
Designed to introduce graduate students to the historical problems and historiography of Brazil. Course consists of readings of basic books in the field and discussion of the historiographical traditions. Basic readings are in English but students are encouraged to use Portuguese.

HIST 829a[u], The History of the Islamic Near East from Mohammad to the Mongol Invasion. Adel Allouche.
TTh 11.30–12.45
An examination of the shaping of society and polity from the rise of Islam to the Mongol conquest of Baghdad in 1258. The origins of Islamic society; conquests, and social and political assimilation under the Ummayyads and Abbasids; the changing nature of political legitimacy and sovereignty under the caliphate; provincial decentralization; and new sources of social and religious power. *Also ARBC 570a[u].*

HIST 833b,Readings in Imperialism in the Nineteenth- and Twentieth-Century Middle East. Laila Parsons.
W 3.30–5.30
An examination of classic as well as more recent histories of the complex relationship between British and French imperialism and political, social, economic, and cultural change in the nineteenth- and twentieth-century Middle East. The emerging literature on the question of U.S. imperialism and its role in the Middle East are also discussed.

HIST 837a,Becoming the Middle East. Abbas Amanat.
W 3.30–5.20
An inquiry into the emergence of the modern Middle East from the heterogeneous peoples and cultures of Western Asia and North Africa in the nineteenth and twentieth centuries with emphasis on Iran, Turkey, Egypt, Iraq, and Saudi Arabia. Topics include Western imperial strategies and Ottoman and Qajar responses, new readings of Islam and secularism, historical memories and national identities, dilemmas of modernity, nation-states' sovereignty and popular revolutions.

HIST 839b, Environmental History of Africa. Robert Harms.
TH 1.30–3.20
An examination of the interaction between people and their environments in Africa, and the ways in which this interaction has affected or shaped the course of African history. *Also AFST 839b.*

HIST 860b,Basic Texts of Confucianism. Annping Chin.
TH 1.30–3.20
A close study of some basic Confucian texts in translation. We consider these texts both as sources on moral cultivation and political thought. The readings include Confucius' *Analect,* the *Book of Mencius,* the *Book of Hsun Tzu,* and the works of three Neo-Confucian thinkers, Chu Hsi, Wang Yang-ming, and Huang Tsung-hsi. Knowledge of Chinese is not required. There is an additional section for students who read classical Chinese.

HIST 861a,Issues in Tang,Song,and Yuan History. Valerie Hansen.
TH 1.30–3.20
An introduction to the secondary literature in English about the major issues in Chinese history, 600–1400. Permission of instructor required.

HIST 866a,China and the Wider World,1830–1979. Jonathan Spence.
M 3.30–5.20
This course gives a broad view of Chinese relations with the world at large, from the period of the first opium war to the collapse of the Guomindang on the mainland. Some of the focus is on the wars with Britain, France, and Japan, but attention is also given to the impact of foreign missionaries, the translation of texts, the development of press and other media, the role of foreign ideologies, the growth of international business, the varying patterns of Chinese travel abroad (both in diplomacy and for study), the Korean war, and the idolization of the Cultural Revolution. Reading and discussion. Chinese not required.

HIST 869a,Qing Communications,Archives,Official Historical Writing,and Reading Documents. Beatrice Bartlett.
F 1.30–3.20
Qing documents and communications systems (including the institutional background for understanding them), the use of primary sources and archives in particular, and reading Qing documents. Prerequisites: advanced Chinese (with at least one course in literary Chinese), HIST 868.

HIST 894a,Making Colonial Subjects in British India. Mridu Rai.
W 3.30–5.20
This course investigates how British colonialism established itself in India through cultural technologies of rule. It explores how legal, political, and social categories such as those of race, caste, class, religion, and gender were deployed to make Indians available for imperial control. It also examines how these categories may in turn have shaped anti-colonial resistance.

HIST 929b,Science Around 1900. John Heilbron.
W 1.30–3.20
At the turn of the twentieth century many scientists and fellow travelers took stock of the accomplishments of the "Century of Science" and tried to forecast its future. The seminar takes this literature as its point of departure. After some collaborative investigation of the situation around 1900, each student picks a topic for further study. The main product of our work will be a set of publishable papers. *Also HSHM 712b.*

HIST 932a,Readings in the History of American Medicine. John Harley Warner.
M 1.30–3.20
An examination of the variety of approaches to the social and cultural history of medicine and public health, taking as a focus nineteenth- and twentieth-century America. Readings are drawn from recent literature, sampling writings on health care, illness, experiences, and medical cultures in the United States. Topics include the role of gender, class, ethnicity, race, region, and religion, in the experience of sickness and health care: the multiple meanings of science in medicine, the intersection of lay and professional understandings of the body, and the role of the marketplace in shaping professional identities and patient expectations. *Also AMST 877a, HSHM 719a.*

HIST 934b,Medicine,Public Health,and Colonialism,1750–1950. Naomi Rogers.
TH 1.30–3.20
A reading seminar on recent historical works dealing with medicine, healing, public health, and body politics in various colonial settings from 1750 to 1950, including Hong Kong, India, the Philippines, Mali, South Africa, Brazil, Mexico, and regions in North America. *Also HSHM 726b.*

HIST 935b,Introduction to the Historiography of Science. John Heilbron.
W 1.30–3.20
An introduction to the literature of the scientific revolution through analyses of texts by Galileo, Descartes, and Newton, and some of their modern commentators.

HIST 938a^{u}, The Engineering and Ownership of Life. Daniel Kevles.
W 1.30–3.20
The development of biological knowledge and control in relation to intellectual property rights in living organisms. Topics include agribusiness, medicine, biotechnology, and patent law. *Also HSHM 676a^{u}, LAW 20332.*

HIST 941a,Making the Modern Body. Susan Lederer.
T 9.30–11.20
An examination of the ways in which the human body in the twentieth century has become both a site for medical and surgical practices and a source of tissue and tools for research and industry. Topics include the body in biomedicine; the development and social impact of such technologies as cosmetic and plastic surgery, organ transplantation, assisted reproduction, and cloning; and the intersections of gender, race, and nation in biomedicine. *Also HSHM 723a.*

HIST 954a,Diplomacy, Power, and Culture: The Cold War as International History. Stephen Remy.

M 1.30–3.20

This course examines the international history of the Cold War. Our emphases are on the intersection of diplomacy and domestic political cultures worldwide; and the ways in which post-1989 archival research and revelations have expanded our knowledge of this conflict. The course is reading, writing, and discussion intensive, with reading assignments combining recent scholarship and primary-source materials. (Note: First class will meet on September 15.) *Also INRL 554a.*

HIST 965a,Agrarian Societies: Culture,Society, History, and Development. Robert Harms, James Scott,Michael Dove, Paul Freedman.

M 1.30–5.20

An interdisciplinary examination of agrarian societies, contemporary and historical, Western and non-Western. Major analytical perspectives from anthropology, economics, history, political science, and environmental studies are used to develop a meaning-centered and historically grounded account of the transformations of rural society. Team taught. *Also ANTH 541a, F&ES 753a, PLSC 779a.*

HIST 970a,When Was Europe? The Whitney Seminar on European Identities. Paul Freedman, Paula Hyman, Jay Winter.

Sem. w 4–6, Lect. w 7

This seminar examines the idea of Europe from the Middle Ages until now. Topics include European identity in relation to Christian and Roman foundations, the mythology of nationalism and the misuse of history (romantic and nationalist theories of historical origins), the rhetoric of Enlightenment and Progress, the impact of Marxism and liberalism on notions of Europe, unification and Balkanization in the late twentieth century. This seminar examines the notion that "Europe" was as much a shifting discursive field as it was a shifting territorial one. The boundaries of both discourse and territory remain contested and fluid to this day. *Also WHIT 970a.*

HIST 971b, History and Memory: The Whitney Seminar on European Identities. Jay Winter.

Sem. w 4–6, Lect. w 7

This seminar explores facets of the historical literature surrounding issues of individual memory, collective memory, and commemoration. The focus is on modern Europe, though the literature surveyed addresses issues beyond the confines of Europe. After a survey of interdisciplinary approaches to the field, focusing on social agency, representation, trauma studies, and cognitive psychological research, two different kinds of evidence are examined. The first relates to historical sites (monuments, ruins, battlefields, landscapes) as well as social spaces (families, trials, museums); the second to representations and languages of remembrance, through the narratives of trauma, fiction, memoir, testimonial literature, photography, and film. The focus is on civil society rather than primarily on the state and the manipulation of commemorative forms. *Also WHIT 971b.*

HIST 975a,Cold War International History. John Gaddis.

T 1.30–3.20

Examines major issues and sources for the "new" Cold War history. Readings and discussions, with short analytical essays.

HIST 978b,The Theory and History of Toleration. Daniel Markovits, Timothy Snyder.

T 10.10–12

This course addresses the philosophical problems posed by political toleration in conjunction with several expressions that political toleration has received in historical practice. The philo-

sophical component considers the merits of contemporary arguments in favor of toleration, set against the worrisome possibility that some degree of intolerance may be rationally required. The historical component presents examples of toleration (and intoleration) and investigates the relationship between toleration and other historically potent ideologies, for example nationalism. Finally the course joins these two themes together, considering to what extent the contemporary philosophical approach to toleration is itself historically contingent and the consequences that such contingency has for the approach's philosophical merit. *Also Law 21414.*

HIST 979a[u], Historical Perspectives in the Study of the Holocaust. Paula Hyman.
MW 10.30–11.20, 1 HTBA
A survey of the major historical issues raised by the Holocaust, including the roots of Nazism; different theoretical perspectives and ways of accounting for genocide; the behavior of perpetrators, victims, and bystanders; and problems of representation. *Also RLST 768a[u].*

HIST 980b Genocide: History and Theory. Ben Kiernan.
W 2.30–4.20
Description and analysis of modern genocide; theories and case studies; an interregional, interdisciplinary perspective. Reading and discussion.

HIST 985a,Studies in Grand Strategy, Part II. John Gaddis, Paul Kennedy.
M 1.30–3.20
This two-term course begins in January with readings in classical works from Sun Tzu to Clausewitz to Kissinger. Students identify principles of strategy and examine the extent to which these were or were not applied in historical case studies from the Peloponnesian War to the post-Cold War period. During the summer, students undertake research projects or internships designed to apply resulting insights to the detailed analysis of a particular strategic problem or aspect of strategy, whether of a historical or contemporary character. Written reports on these projects are presented and critically discussed early in the fall term. The seminar then turns its attention to strategic dilemmas currently facing governments, corporations, and nongovernmental organizations. Students must take both terms, fulfill the summer research/internship requirement, and attend additional lectures on grand strategy to be scheduled throughout the spring and fall terms. For the first term, students from the Graduate School receive a grade of FY (full year), which converts to a final grade for both terms upon completion of the course. Other students receive grades in accordance with the grading systems of their respective schools. In both semesters the seminar meets during reading week and holds a total of fourteen weekly sessions. Admission is by competitive application only; forms are available at International Security Studies. *Also PLSC 715a.*

HIST 995a/b,Prospectus Tutorial. Faculty.

HIST 998a/b,Directed Readings. Faculty.
Offered by permission of instructor and DGS to meet special requirements not met by regular courses.

HIST 999a/b,Directed Research. Faculty.
Offered by arrangement with instructor and permission of DGS to meet special requirements.

HISTORY OF ART

56 High, 432.2668
M.A., M.Phil., Ph.D.

Chair
Edward Cooke, Jr. (102A AG, 432.2670, edward.cooke@yale.edu)

Director of Graduate Studies
Alexander Nemerov (203 OAG, 432.8442, alexander.nemerov@yale.edu)

Professors
Brian Allen (*Adjunct*), Judith Colton, Edward Cooke, Jr., David Joselit, Diana Kleiner, Amy Meyers (*Adjunct*), Mary Miller, Alexander Nemerov, Jock Reynolds (*Adjunct*), Vincent Scully (*Emeritus*), Robert Thompson, John Walsh (*Adjunct*), Christopher Wood, Mimi Yiengpruksawan

Associate Professors
Christy Anderson, Timothy Barringer, Jonathan D. Katz (*Adjunct*)

Assistant Professors
Judith Barringer, Anne Dunlop, Björn Ewald, Sandy Isenstadt, Kellie Jones, Christine Mehring, Noa Steimatsky, Lillian Tseng

Lecturers
Mark Aronson, Karen Foster, Patricia Garland, Lynn Jones (*Visiting*), John Marciari (*Visiting*), Kishwar Rizvi (*Visiting*), John Walsh (*Adjunct*)

Fields of Study

Fields include Greek and Roman; Medieval and Byzantine; Renaissance; Baroque; eighteenth-, nineteenth-, and twentieth-century European; Modern Architecture; African; African American; American; British; Pre-Columbian; Chinese; Japanese; and film.

Special Requirements for the Ph.D. Degree

Students in the history of art must pass examinations in German or French, and one other language pertinent to their field of study (which may be French or German). One examination must be passed at the beginning of the first term, the other not later than the beginning of the third term. German is required for students in Western art. Students of Chinese art must qualify in Chinese, Japanese, and either German or French, and they have an extra year in which to do so. During the first two and a half years of study, students normally take thirteen term courses. Normally by January 20 of the second year, students submit a qualifying paper that should demonstrate the candidate's ability successfully to complete a Ph.D. dissertation in art history. By the end of the first term of the third year, the student is expected to have established a dissertation topic. A prospectus outlining the topic must be approved by a committee at a colloquium. During the spring term of the third year the student is expected to take the qualifying examina-

tion. The candidate must demonstrate knowledge of his or her field and related areas, as well as a good grounding in method and bibliography. Students are admitted to candidacy for the Ph.D. upon completion of all predissertation requirements, including the prospectus and qualifying examination. Admission to candidacy must take place by the end of the third year.

The faculty considers teaching to be an important part of the professional preparation of graduate students. Students in the History of Art will teach in their second and third years. They receive a total of one course credit as teaching fellows when they lead a discussion section.

Combined Ph.D. Programs

HISTORY OF ART AND AFRICAN AMERICAN STUDIES

The History of Art department offers, in conjunction with the Program in African American Studies, a combined Ph.D. in History of Art and African American Studies. Students in the combined-degree program will take three core courses in African American Studies as part of the required twelve courses and are subject to the language requirement for the Ph.D. in History of Art. The dissertation prospectus and the dissertation itself must be approved by both History of Art and African American Studies. For further details, see African American Studies.

HISTORY OF ART AND RENAISSANCE STUDIES

The Department of History of Art also offers, in conjunction with the Renaissance Studies Program, a combined Ph.D. in the History of Art and Renaissance Studies. For further details, see Renaissance Studies.

The Center for the Study of American Art and Material Culture

The Center for the Study of American Art and Material Culture provides a programmatic link among the Yale faculty, museum professionals, and graduate students who maintain a scholarly interest in the study, analysis, and interpretation of American art and material culture. It brings together colleagues from a variety of disciplines — from History of Art and American Studies to Anthropology, Archaeological Studies, and Geology and Geophysics — and from some of Yale's remarkable museum collections from the Art Gallery and Peabody Museum to Beinecke Library. Center activities will focus upon one particular theme each year and will include hosting one or more visiting American Art and Material Culture Fellows to teach a course each term and interact with Yale colleagues; weekly lunch meetings in which a member makes a short presentation centered on an artifact or group of artifacts followed by lively discussion about methodology, interpretation, and context, and an annual three-day Yale–Smithsonian Seminar on Material Culture.

Master's Degrees

M.Phil. See Graduate School requirements, pages 397–98. Alternatively, the Department of the History of Art offers, in conjunction with the Medieval Studies program, a joint M.Phil. degree. For further details, see Medieval Studies.

M.A. (en route to the Ph.D.). This degree is awarded after the satisfactory completion of one year of course work (six term courses) and after evidence of proficiency in one required foreign language. The student normally petitions for the degree at the time of registration in the fall of the second year.

Program materials are available upon request to the Director of Graduate Studies, Department of the History of Art, Yale University, 56 High Street, PO Box 208272, New Haven CT 06520-8272.

Courses

HSAR 500a,Introduction to the Study of Art History. Christopher Wood.
W 3.30–5.20
This class introduces students to the methods of the discipline of art history, such as, for example, connoisseurship, iconography, feminism, and social art history. The class is reserved for incoming graduate students in the History of Art department.

HSAR 506a or b,The Teaching of the History of Art.
History of Art graduate students only. By arrangement with faculty.

HSAR 512a or b,Directed Research.
By arrangement with faculty.

HSAR 514a or b,Curatorial Training.
By arrangement with faculty.

HSAR 525b,The City of Rome. Björn Ewald,Christopher Wood.
T 1.30–3.20
This seminar is structured around a trip to Rome during spring break. Class meetings address the history, topography, urban politics, architecture, and art of Rome from antiquity to the eighteenth century, with some attention to late-nineteenth- and early-twentieth-century urbanism and restoration policy as well. Topics include the myth of Rome's origins; urban planning; Roman sculpture and architecture; the city as spectacle; imperial spaces and monuments; temple and church construction; the relic cult and pilgrimages; civic icons; the survival of pagan artifacts in the Middle Ages; tombs and cemeteries; early travel guides; palaces and villas; the use of spolia and the construction of a monumental memory. We explore how changes in the architectural organization of public space reflect Rome's political, social, and economic changes over the centuries. The questions of continuity and change, transformation and adaptation, are leitmotifs of the course. The course is designed for all students of Western art and culture, not only for those focusing on Roman archaeology and art history. *Also CLSS 878b.*

HSAR 593a,The Bayeux Tapestry. Howard Bloch.
M 3.30–5.20
A study of the Bayteux Tapestry in the context of the Conquest and the Anglo-Norman world. Topics include: origin; formal description; fabrication; Nordic and continental homologies; relation of inscription to image, of borders to central panels, of decoration to narration; representations of the protagonists, of the event, of the everyday, of military, nautical, architectural, social, political, religious, and natural worlds; mixing of Viking, Celtic, Saxon, and Gallic cultures; literary and chronicle accounts. Basic text, the Bayeux Tapestry Digital Edition CD, 2003. *Also FREN 741a.*

HSAR 598a,The Imperial Image: Issues in Sixteenth-Century Art and Architecture of the Islamic World. Kishwar Rizvi.
Th 1.30–3.20
The sixteenth century witnessed the rise of three great empires of the early modern Islamic world, namely the Ottoman, Safavid, and Mughal. These kingdoms together stretched from North Africa to the Caspian Sea, and from the Balkans to the Bay of Bengal. Whereas all three shared the Islamic and Turkman roots of post-Mongol Asia, they distinguished themselves through their political and religious disposition. Their differences were accentuated through external rivalry, as between the Sunni Ottomans in Turkey and the Shi'I Safavids in Iran, or manifest in terms of internal communal challenges, as presented in multi-ethnic Mughal India. This course examines the competitive discourse between, and within, the Ottoman, Safavid, and Mughal courts, by examining the imperial art and architecture commissioned by the ruling elite. An interdisciplinary approach, which makes use of contemporary historical narrative painting, urbanism, and architecture, raises issues on the making of art and history in the early modern Islamic world.

HSAR 634b,Architecture of the English Renaissance. Christy Anderson.
T 2.30–4.20
A close study of the major monuments in Tudor and early Stuart England including Elizabethan, prodigy houses, religious and devotional architecture, garden design, building in London, and the changes in court architecture. Special attention is given to the relationship of architecture to the other arts (including literature and book design, theater, painting, textiles) as well as to the current political and cultural debates.

HSAR 655a,Garden and Garden Design 1550–1800. Judith Colton.
T 1.30–3.20
In the light of recent reassessments of the study of gardens in Italy, France, and Britain, this seminar considers some of the current debates in the field. Emphasis is placed on topics, such as politics and gardening, the Gothic and classical revivals, the garden as a setting for display and performance, for which there is primary material in the Yale collections (notably, the BAC, Beinecke, and the Lewis Walpole Library) and which are of special interest to the instructor and to the participants in the course. Gardening practices in countries other than those mentioned above can be included as well.

HSAR 681a,Anglo-French Romanticism. Timothy Barringer, Susan Greenberg.
W 1.30–3.20
A close investigation of the impact of national identity on the development and subsequent historiography of Romanticism in British and French art, ca. 1800–1840, based on Yale collections and the exhibition *Constable to Delacroix* at the Metropolitian Museum.

HSAR 689a,Glass in Modern Architecture. Sandy Isenstadt.
W 3.30–5.20
The course reviews the changing uses of glass in a range of building types from the nineteenth to the twentieth century. Several introductory sessions review the historical development of glassmaking technology and survey the use of glass in architectural theory and building practice. These sessions cover also the development of the glass manufacturing industry, changes in the practice of window making, and key new uses of glass in the nineteenth century, including the Crystal Palace Exhibition of 1851 and the use of large sheets of glass for shop front displays. Twentieth-century changes in the use and understanding of glass are discussed in the context of the invention of the curtain wall in Chicago and in regard to the utopian visions of the German avant-garde and efforts on the part of figures like Bruno Taut and Mies van der Rohe to articulate the formal implications of an architecture of glass. With the rise of a

modern architecture characterized by increased use of glass, more theoretical issues are discussed, such as transparency. A session on resistance to a glass architecture is also included, with reference especially to the work of Louis Kahn, many of whose designs were difficult to glaze. Concluding sessions consider the uses of architectural glass in light of new technological developments as well as in terms of recent stylistic conventions.

HSAR 699a,The Architecture of Art Museums: Functions and Forms. John Walsh.
T 1.30–3.20
This seminar examines museum buildings with particular attention to how they fulfill their functions. The main focus is museums built after World War II, especially for students' reports; but the background in architecture and ideas during the nineteenth and earlier twentieth centuries is covered in introductory lectures, extensive readings, and discussions.

HSAR 703b,Art,Sex,and the Sixties. Jonathan D. Katz.
M 3.30–5.20
Using the work of Andy Warhol as our ur-text, this graduate seminar maps the development of increasingly cool and ironic modes of art making against the heated and ideologically loaded social and political developments of the 1960s. Its central query concerns why a set of aesthetic practices that seemingly celebrated normative values (i.e., Pop art) were nonetheless elevated to dominance ahead of a range of more confrontational and oppositional strategies in line with the tenor of the times. Sexuality, its liberation, and its suppression figure prominently in this inquiry into the paradoxical engendering of opposition through the citation of normative forms. In asking this question, this course hopes to make sense of such wildly divergent artistic genres of the period as Pop, minimalism, photo-realism, op art, Fluxus, protest art, performance, hard-edge abstraction, happenings, assemblage, new media, conceptual art, text-based art, etc. Painters became dancers, filmmakers, authors, and designers in record numbers. And at a moment when Formalist theory grew both increasingly rigid and prominent, an unheard-of range of distinctly un-Formalist artistic practices flourished amidst new audiences, new galleries, and art spaces and, perhaps most notable of all, new prestige. As American cultural influence finally matched, and perhaps even exceeded, American military and economic influence, the once esoteric art world became genuinely popular and certain artists, most notably Warhol, came to be seen as defining of their social-historical moment despite — and indeed in some sense through — their sexuality. Among the readings for this class are Herbert Marcuse's *One Dimensional Man* and *Eros and Civilization,* Marshall McLuhan's *The Medium Is the Massage* and other works, as well as period art criticism and social critique like Daniel Bell's *The End of Ideology* — in addition to a range of primary and secondary art historical/critical texts. *Also AMST 733b, WGST 730b.*

HSAR 705a,Medium and Media. David Joselit.
M 2.30–4.20
This graduate seminar considers the history of modern art alongside the history of broadcast media in an effort to understand how the term "medium" functions in both the contexts of art history and media studies. In order to periodize this question the seminar is divided into three sections: "Radio and the Avant-Garde," "Television and Midcentury Modernism," and "The Internet and Globalization." By reading media theorists such as Marshall McLuhan alongside influential art critics like Clement Greenberg, this seminar attempts to establish a blueprint for visual studies in the twentieth century. Other assigned authors include T. J. Clark, Fredric Jameson, Lev Manovich, and Rosalind Krauss.

HSAR 706b,Empire/Globe. David Joselit.
Th 3.30–5.20
Despite the widespread talk of globalization as a generative cultural condition and despite Michael Hardt and Antonio Negri's much discussed book, *Empire,* little effort has been made either to define how globalization has specifically affected art practice or to evaluate contem-

porary claims regarding globalization in light of historical precedent. This seminar attempts to do both through three types of reading: theoretical texts on globalization including Hardt and Negri's book as well as readings by Arjun Appadurai, Manuel Castellis, and others; accounts of empire in early modern and pre-modern eras; and twentieth-century readings concerning cosmopolitanism or globalization in art practices ranging from the historical avant-gardes to the present.

HSAR 727b,The Face on Film. Noa Steimatsky.
M 1–5 (includes screenings)
The human face is a paradigmatic arena in which the largest questions on referentiality, the inscription of identity and subjectivity, and the articulation of interiority in art intersect. This seminar explores cinema's intervention vis-à-vis portraiture's traditional concerns, the narrative, discursive, ideological uses of facial representation, and its modern transfigurations. In extending its photographic basis to consider the parameters of movement, the incorporation of speech, and the shifting trajectory of the look, our discussion juxtaposes narrative fiction film in relation to documentary and experimental "cinematic portraits." We explore the close-up, the regime of the shot-reaction shot, the debates surrounding identification, expressivity, and notions of animism in cinema, in light of theoretical writings and of classical and experimental films by such makers as Epstein, Kuleshov, Dreyer, Bresson, Pasolini, Hitchcock, Warhol, Cronenberg. *Also FILM 827b.*

HSAR 729b,American Furniture 1600 to the Present. Edward Cooke.
W 3.30–5.20
In-depth analysis of American furniture made over the past four centuries. Methodologies for the analysis of furniture are reviewed and developed through reading and close examination of objects in the Art Gallery collection. Such topics as materials, techniques, style, use, and market are stressed. *Also AMST 729b.*

HSAR 735b,American Romanticism,1799–1826. Alexander Nemerov.
TH 1.30–3.20
This course focuses on American visual and literary production in the Early Republic. Artists, writers, and other figures to be discussed include the Pearle family, John Vanderlyn, Charles Brockden Brown, Benjamin Rush, William Rush, and Benjamin West. Attention throughout the course is on close analysis of paintings, sculpture, and literature. A term paper and a major in-class presentation are required. *Also AMST 864b, ENGL 864b.*

HSAR 747a,Maya Art and Archaeology of Copan and Quirigua. Mary Miller, Marcello Canuto.
M 1.30–3.20
This seminar addresses the art, archaeology, and history of the southeastern Maya region, particularly the cultural production and developments at the Classic Maya centers of Copan, Honduras, and Quirigua, Guatemala. Among the particular topics for discussion and research are areas where the study of art, archaeology, and anthropology converge to develop interdisciplinary interpretations of this region's importance and role in Classic Maya civilization. Open to advanced undergraduates with appropriate course preparation. *Also ANTH 710a^{u}, ARCG 710a^{u}.*

HSAR 770b,Black British Art and Theory. Kellie Jones.
W 2.30–4.20
This course considers the development of visual culture in this European outpost of the African Diaspora. Of interest is the way the discipline of cultural studies, which evolved in postwar Birmingham, intersected with the rise of black consciousness throughout Britain in the 1980s. How did the interactions of intellectuals and artists at this moment in the late twentieth century lead to the creation of strong postcolonial theory and practice? Readings include

works by Bhabha, Carby, Gilroy, Hall, Maharaj, and Mercer. We look at visual production by Bhimji, D-Max, Fani-Kayode, Gupta, Julien, Kempadoo, Kureshi, Piper, Pollard, and Sulter among others. We also discuss selected exhibitions and publications that supported this movement. *Also AFAM 841b.*

HSAR 778b[u], From West Africa to the Black Americas. Robert Thompson.
TTh 11.30–12.45
Art, music, and dance in the history of key classical civilizations south of the Sahara — Mali, Asante, Dahomey, Yoruba, Ejagham, Kongon — and their impact on the rise of New World art and music. *Also AFAM 728b[u], AFST 778b[u].*

HSAR 779a[u], New York Mambo: Microcosm of Black Creativity. Robert Thompson.
TTh 11.30–12.45
Rise, development, and philosophic achievement of the world of New York mambo and salsa. Emphasis on Palmieri, Cortijo, Roena, Harlow, and Colon. Examination of parallel traditions, e.g., New York Haitian art, Dominican merengue, reggae and rastas of Jamaican Brooklyn, and the New York school of Brazilian capoeira. *Also AFAM 729a[u].*

HSAR 781a,Problem and Theory in Afro-Atlantic Architecture I: Africa. Robert Thompson.
Th 3.30–5.20
The seminar addresses a new frontier — rebuilding the inner cities. This refers to Latino and mainland black cities within the cities of America. Accordingly, the course focuses on major roots of Latino and black traditional architecture — Ituri Forest and Namibian spatial solutions, Berber casbah architecture and its interactions with the Jews on Djerba isle and in Morocco, the concept of the Muslim *assatayah* creolized into the Iberia *azotea* and the spread of this terrace-roof style throughout Latin America. Topics include the architecture of Djenne, Berber art and architecture, Mauritanian sites, the monumental stone architecture of Zimbabwe, the sacred architecture of Ethiopia, and Muslim-influenced architecture from Rabat to Zanzibar. Then comes a case-by-case examination of some of the sites of African influence on the architecture of the Americas — the Puerto Rican *casita;* the southern verandah; the round-houses of New York, Virginia, North Carolina, Mexico, Panama, and Colombia; Ganvie, the Venice of West Africa, and its mirror image among the tidal stilt architectures of blacks of the Choco area in Pacific Colombia. The seminar ends with the shrine architecture of New World adherents of the classical religions of Dahomey. *Also AFAM 739a, AFST 781a.*

HSAR 781b,Problem and Theory in Afro-Atlantic Architecture II: The Black Americas. Robert Thompson.
Th 3.30–5.20
A continuation of HSAR 781a. *Also AFAM 739b, AFST 781b.*

HSAR 800a,Readings in the Intersection of Japanese and Euro-American Art Practices 1850–1950. Mimi Yiengpruksawan.
Th 3.30–5.20
Preliminary study and theorization, by way of readings in English, French, and Japanese, of the Japanese presence in modern Euro-American visual practice from Paris to New York, and its ramifications for understanding the modernist project in world terms.

HISTORY OF MEDICINE AND SCIENCE

L-132 Sterling Hall of Medicine, 785.4338
M.A., M.Phil., Ph.D.

Chair
John Harley Warner

Director of Graduate Studies
Daniel Kevles (201 HGS, 432.1356)

Faculty
Asger Aaboe (*Emeritus, History of Science*), Joseph Fruton (*Emeritus, Biochemistry*), John Heilbron (*Visiting, History*), Daniel Kevles (*History*), Martin Klein (*Emeritus, Physics*), Susan Lederer (*History of Medicine*), David Musto (*Child Study*), Naomi Rogers (*Women's & Gender Studies; History of Medicine*), Frank Snowden (*History*), William Summers (*Molecular Biophysics & Biochemistry*), Frank Turner (*History*), John Harley Warner (*History of Medicine*)

Affiliated Faculty
Cynthia Connolly (*Nursing*), Robert Gordon (*Geophysics & Applied Mechanics*), Dimitri Gutas (*Near Eastern Languages & Civilizations*), Ann Hanson (*Classics*), Bettyann Kevles (*History*), Jennifer Klein (*History*), Cynthia Russett (*History*), Rebecca Tannenbaum (*History*)

Fields of Study

All subjects and periods in the history of medicine and history of science. Special fields represented include American science and medicine; Asian science and medicine, Arabic science and medicine; disease, therapeutics, psychiatry, drug abuse, and public health; physics; science and national security; science and law, science and religion, life sciences, human genetics, eugenics, molecular biology, biotechnology, microbiology, intellectual property, gender, race, and science/medicine; bioethics and medical research.

Special Admissions Requirements

Applicants should have a strong undergraduate background in history and in a science relevant to the direction of their graduate interests. These requirements will be applied with flexibility, and outstanding performance in any field pertinent to the program will be taken into consideration.

Special Requirements for the Ph.D. Degree

Students are required to pass reading proficiency requirements in French and German; a student intending to concentrate in a field or period that requires another foreign language, ancient or modern, may, with approval, substitute that language for either French or German.

Students will ordinarily take twelve term courses during the first two years. All students will normally take the two-term core seminar sequence HSHM 601a/602b or equivalents, four additional graduate seminars in history of science or medicine, and at least one graduate course in a field of history outside of science or medicine. The remaining courses can be taken in history of medicine or science, history, science, or any other field of demonstrated special relevance to the student's scholarly objectives. Two of the twelve courses must be graduate research seminars in the History of Medicine and Science.

Students who enter having previously completed graduate work may obtain some credit toward the completion of the total course requirement, the amount being contingent on the extent and nature of the previous work and its fit with their intended course of study at Yale.

All students are expected, prior to entering on their dissertation work, to develop a general knowledge of two broad fields in the history of science and/or the history of medicine. This knowledge may be acquired through a combination of advanced course work taken at Yale or elsewhere, regular participation in the Program colloquia and workshops, and preparation for the qualifying oral examination.

Students will normally spend the summer following their second year preparing for the oral Qualifying Examination, which will be taken in the third year, preferably during the first half of it.

The Qualifying Examination will cover four areas of chosen concentration

1. a field in the history of science or history of medicine;
2. a field in an area of history outside of medicine or science;
3. a second field in the history of science or history of medicine;
4. a field of special interest, the content and boundaries to be established with the adviser for the field. The student may elect to do a second field in history outside of history of science or medicine; or a field in one of the sciences; or a field in a subject such as bioethics, health policy, public health, medical anthropology or sociology, science and law, science and national security, science and religion, biotechnology, gender, science and medicine; race, science, and medicine; or cultural studies.

During their first year, all students will be advised by the director of graduate studies. Students are encouraged to discuss their interests and program of study with other members of the faculty. At the beginning of the second year, each student is to obtain an adviser who will provide guidance in selecting courses and preparing for the Qualifying Examination. The adviser may also offer help with the development of ideas for the dissertation, but students are free to choose someone else as the dissertation supervisor when the time comes to do so.

Students are encouraged to begin thinking about their dissertation topics during the second year. They are required to prepare a Dissertation Prospectus as soon as possible following the Qualifying Examination and to defend the Prospectus orally before being admitted to full candidacy for the doctoral degree.

Teaching is an important part of the professional preparation of graduate students in History of Medicine and Science. Students will teach, usually in the third and fourth years of study. Students are also encouraged to participate in the programs to develop teaching skills offered by the Graduate School.

Master's Degrees

M.Phil. and M.A. (en route to the Ph.D.). See Graduate School requirements, pages 397–98.

Master's Degree Program

The terminal M.A. program is designed particularly for those who plan to combine teaching or scholarship in these fields with a professional career in medicine or science. Students who enroll in the terminal master's degree program leading to the M.A. are expected to complete six term courses during two terms of study and submit an acceptable master's paper. Course work must include the graduate seminar HSHM 601a/602b and one additional graduate seminar in history of medicine or science. The remaining courses are to be chosen in consultation with the director of graduate studies.

Program materials are available upon request to the Director of Graduate Studies, History of Medicine and Science, Yale University, PO Box 208324, New Haven CT 06520-8324.

Courses

[**HSHM 601a,Introduction to the History of Medicine and Public Health.**]

[**HSHM 602b,Historiography of the Scientific Revolution.**]

HSHM 619a[u], Methods and Literature in the History of Medicine and Science. John Harley Warner and staff.

T 1.30–3.20

Introduction to recent literature in the history of science, medicine, and public health; to historiography issues; and to methods used in historical research and writing. Members of the faculty in the Program in the History of Medicine and Science visit on a rotating basis to introduce the variety of approaches in the field.

HSHM 620b[u], Gender, Science,and Sexuality. William Summers.

T 9.30–11.20

This seminar is based on close readings and discussions of pivotal primary sources in the history of scientific study of sexuality and sex differences. These texts allow exploration of a variety of scientific approaches and their claims to cultural authority, as well as their role in constructing and reinforcing normative gender roles and sexuality. Selected secondary sources provide historical context as well as illustrate various analytic strategies. Themes include the tension between nature and culture in theories of sexuality, the construction of heterosexuality and homosexuality, the role of scientific studies in moral discourse, the rise of sexology as a scientific discipline, and the changing ideas of what constitutes a "scientific" approach.

[**HSHM 622b[u], Introduction to the History of Life Sciences.**]

[**HSHM 625a[u], Women and Medicine in America from the Colonial Era to the Present.**]

HSHM 630a[u], Age of the Gene. William Summers.
T 3.30–5.20
An examination of the origins of the concept of the gene and its changing meaning over the past century. Particular attention is given to the role of gene as an abstract entity in classical genetics and its identification with sequences of DNA with the emergence of molecular biology. Readings include classical primary texts and historical interpretations.

HSHM 631b[u], The Cultures of Western Medicine: A Historical Introduction. John Warner.
MW 10.30–11.20
A survey of medical thought, practice, institutions, and practitioners from classical antiquity through the present. Changing concepts of health and disease in Europe and America explored in their social, cultural, economic, scientific, technological, and ethical contexts.

HSHM 637a[u], Race and Medicine in America, 1800–2000. Susan Lederer.
Th 1.30–3.20
An examination of race and medicine in America, primarily but not exclusively focused on African Americans' encounters with the health care system. Topics include slavery and health; doctors, immigrants, and epidemics; the Tuskegee Syphilis Study and the use of minorities as research subjects; and race and genetic disease.

[**HSHM 642a[u], Plagues, Old and New.**]

[**HSHM 643a[u], Nuclear America.**]

[**HSHM 645b[u], Medical Ethics in America since 1847.**]

HSHM 676a[u], The Engineering and Ownership of Life. Daniel Kevles.
W 1.30–3.20
The development of biological knowledge and control in relation to intellectual property rights in living organisms. Topics include agribusiness, medicine, biotechnology, and patent law. *Also HIST 938a[u], LAW 20332.*

[**HSHM 677b[u], Biology and Society in the Twentieth Century.**]

HSHM 678a[u], Alcohol and Other Drugs in American Culture. David Musto.
TTh 10.30–11.20
The interrelation of alcohol and other drugs since the establishment of the nation. Considerations of scientific, religious, legal, literary, gender, and minority aspects.

HSHM 679b[u], The Scientific Revolution. John Heilbron.
TTh 1.30–2.45
A survey of the natural science that developed between the Age of Discovery and the French Revolution. The course covers the background in Aristotelian philosophy; the shift from geocentric to heliocentric astronomy; the replacement of scholastic natural philosophy by the ideas of Galileo, Descartes, and Newton; the roles of the Catholic and Protestant churches, universities, and learned academies; the invention and improvement of scientific instruments; and the science of the Enlightenment. *Also HIST 618b[u].*

[**HSHM 680a[u], History of Chinese Science.**]

[**HSHM 711b, Experimentation in the History of Life Sciences.**]

HSHM 712b, Science Around 1900. John Heilbron.
W 1.30–3.20
At the turn of the twentieth century many scientists and fellow travelers took stock of the accomplishments of the "Century of Science" and tried to forecast its future. The seminar

takes this literature as its point of departure. After some collaborative investigation of the situation around 1900, each student picks a topic for further study. The main product of our work will be a set of publishable papers. *Also HIST 929b.*

[**HSHM 714b[u], Science and Technology in the Twentieth Century.**]

[**HSHM 718, Performance,Identity, and the Making of American Medicine.**]

HSHM 719a,Readings in the History of American Medicine. John Harley Warner.
M 1.30–3.20
An examination of the variety of approaches to the social and cultural history of medicine and public health, taking as a focus nineteenth- and twentieth-century America. Readings are drawn from recent literature, sampling writings on health care, illness, experiences, and medical cultures in the United States. Topics include the role of gender, class, ethnicity, race, region, and religion, in the experience of sickness and health care: the multiple meanings of science in medicine, the intersection of lay and professional understandings of the body, and the role of the marketplace in shaping professional identities and patient expectations. *Also AMST 877a, HIST 932a.*

HSHM 720b,Germ Theories,Spontaneous Generation,and Origin of Life Debates, 1530–1953. William Summers.
Th 9.30–11.20
A study of major ideas relating to the origin of life, spontaneous generation, contagion, infection, fermentation, and the origins of biological molecules starting with Fracastoro's poem on syphilis and ending with the Miller-Urey experiments on a biogenesis of amino acids. Readings are a mix of primary documents and recent historical analyses.

HSHM 723a,Making the Modern Body. Susan Lederer.
T 9.30–11.20
An examination of the ways in which the human body in the twentieth century has become both a site for medical and surgical practices and a source of tissue and tools for research and industry. Topics include the body in biomedicine, the development and social impact of such technologies as cosmetic and plastic surgery, organ transplantation, assisted reproduction, and cloning; and the intersections of gender, race, and nation in biomedicine. *Also HIST 941a.*

[**HSHM 725a,History of Disease and Public Health in Western Societies.**]

HSHM 726b,Medicine,Public Health,and Colonialism,1750–1950. Naomi Rogers.
Th 1.30–3.20
A reading seminar on recent historical works dealing with medicine, healing, public health, and body politics in various colonial settings from 1750 to 1950, including Hong Kong, India, the Phillippines, Mali, South Africa, Brazil, Mexico, and regions in North America. *Also HIST 934b.*

HSHM 785a,Science and Technology in American Society. Daniel Kevles.
T 1.30–3.20
This course deals with both the growth of science and technology in the United States and their integration into the overall national narrative. Topics include the American scientific community and its roles in exploration, agriculture, industry, national defense, religion, culture, the environmental movement, and social change. *Also HIST 785a.*

[**HSHM 912a,Reading Seminar in the History of Disease and Public Health in America.**]

[**HSHM 913b,Reading Seminar in the History of Life Sciences.**]

HSHM 914a or b,Research Tutorial I.
By arrangement with faculty.

HSHM 915a or b,Research Tutorial II.
By arrangement with faculty.

[**HSHM 919b,Research Seminar in the History of Medicine and Science.**]

HSHM 920a or b,Independent Reading.
By arrangement with faculty.

HSHM 930a or b,Independent Research.
By arrangement with faculty.

IMMUNOBIOLOGY

CAB S531, 785.3857
Ph.D. (M.S., M.Phil. en route)

Chair
Richard Flavell

Director of Graduate Studies
Alfred Bothwell (CAB S621, 785.4020, alfred.bothwell@yale.edu)

Director of Graduate Admissions
David Schatz (CAB S625, 737.2255, david.schatz@yale.edu)

Professors
Jeffrey Bender (*Internal Medicine*),Alfred Bothwell, Kim Bottomly, Joseph Craft (*Internal Medicine*), Ruslan Medzhitov, Peter Cresswell, Richard Flavell, Sankar Ghosh, Paula Kavathas (*Laboratory Medicine*), Ira Mellman (*Cell Biology*), Jordan Pober, Nancy Ruddle (*Epidemiology & Public Health*), David Schatz, Robert Tigelaar (*Dermatology*)

Associate Professors
Fadi Lakkis (*Nephrology*), Mark Shlomchik (*Laboratory Medicine*), Warren Shlomchik (*Internal Medicine*)

Assistant Professor
Akiko Iwasaki (*Epidemiology & Public Health*)

Fields of Study

The graduate program in Immunobiology is designed to prepare students for independent careers in research and teaching in Immunology or related disciplines. Training and research focus on the molecular, cellular, and genetic underpinnings of immune system function and development, and on host-pathogen interactions. Specific areas of interest include: B- and T-cell development, activation and effector functions; the role of cytokines in immunoregulation; intracellular signaling and the control of transcription in lymphocytes; antigen processing and presentation; immunoglobulin and T-cell receptor gene rearrangement; B-cell memory; the immunobiology of vascular endothelial cells; innate immunity; and B- and T-cell tolerance. Mechanisms of autoimmunity and immunodeficiency are a major interest, and a number of important human diseases are under study, including diabetes, systemic lupus erythematosus, multiple sclerosis, AIDS, and a variety of other infectious diseases.

The program emphasizes interdisciplinary training and collaborative and interactive research, an approach based on the idea that solving difficult problems requires the integration of individuals with common goals but differing expertise. Students enter the Immunobiology graduate program after completing their first year in the Biological and Biomedical Sciences (BBS) graduate program. Students from any of the tracks of BBS may enter the program. Hence, Immunobiology has close ties with other graduate programs in the biological sciences at Yale.

Students are encouraged to supplement core courses in molecular and cellular immunology with additional courses selected from the wide range available in cell biology, molecular biology, developmental biology, biochemistry, genetics, pharmacology, molecular medicine, and neurobiology. Research seminars and informal interactions with other graduate students, postdoctoral fellows, and faculty also form an important part of graduate education. Three laboratory rotations ensure that first-year students quickly become familiar with the variety of research opportunities available at Yale. Thesis research begins at the end of the first year, and students are encouraged to develop rigorous and creative approaches to examine significant problems in immunology and biology. At the end of the program, the completed research is presented in the form of a written dissertation and a formal seminar.

Special Admissions Requirements

Applicants should have strong previous research experience and a strong academic background in biology, chemistry, and genetics with course work in physics and mathematics preferred. Submission of the GRE General Test is required. Submission of the Subject Test in Biology or Biochemistry is preferred.

To enter the Ph.D. program, students apply to an interest-based track within the interdepartmental graduate program in the Biological and Biomedical Sciences (see pages 65–67).

Special Requirements for the Ph.D. Degree

Students take two to three courses in the Yale Graduate School during each of their first four terms. Required courses are: IBIO 530a, Biology of the Immune System; IBIO 531b, Advanced Immunology; IBIO 600a, Introduction to Research; IBIO 601b, Fundamentals of Research; and two seminar courses covering special topics in immunology (these courses emphasize the methods and logic of research, how to read and critically evaluate the literature, and how to write a research proposal). Additional courses are determined based on the individual needs of the student, and include courses in biochemistry, cell biology, genetics, molecular biology of prokaryotes, molecular biology of eukaryotes, animal viruses, the structure of nucleic acids and proteins, microbiology, and disease mechanisms. Students choose courses after consulting an advisory committee made up of faculty from the Section of Immunobiology, as well as the director of graduate studies.

The Graduate School uses grades of Honors, High Pass, Pass, or Fail. Students are required to earn a grade of Honors in at least two courses in the first two years, and are expected to maintain a High Pass average. There is no foreign-language requirement.

Early in their fourth term, students make a thirty-minute presentation to the section of their proposed research and initial results. Thereafter, they meet with their prospectus committee, which assigns four or five broad areas of biology and immunology that are of particular relevance to the proposed research and on which the student will be examined in the prospectus exam. During the next several months, students prepare a formal research proposal (in NIH grant format) concerning the proposed thesis research

and study for the exam. The exam is oral, and covers all aspects of immunology generally, with a focus on the assigned areas mentioned above. The student is also questioned on aspects of the thesis proposal. Requirements for admission to candidacy, which usually takes place after six terms of residence, are: (1) completion of course requirements; (2) completion of the prospectus examination; and (3) certification of the student's research abilities by vote of the faculty upon recommendation from the student's thesis committee.

Progress in thesis research in the third and later years is monitored carefully by the student's thesis committee (composed of the adviser and three or four other faculty). All students are required to have two meetings with their thesis committee annually, to provide an update on progress and an opportunity for the committee to provide feedback and suggestions.

Students are expected to teach two one-term courses during their graduate careers, usually during the second and third years.

M.D./Ph.D. Students Majoring in Immunobiology

Required: seven courses for a grade.

Out of the sevencourses the following are mandatory:

1. Ibio 530a, Biology of the Immune System
2. Ibio 531b, Advanced Immunology
3. Two Immunobiology seminar courses: IBIO 536a, 537a, 538a,539a (Seminars can be audited if a student has grades in seven other courses)

Also required:

Two grades of Honors. Yale University graduate courses taken for a grade at the School of Medicine may be counted towards the Honors fulfillment and the seven total required courses. Verification must be provided to the DGS.

One semester of teaching. Previously taught courses in the School of Medicine may count toward this requirement. To request credit for previous teaching experience, a note from the course director describing the teaching experience (duration of the teaching experience, frequency of class meetings, number of students taught, materials covered, dates, and for whom) should be provided to the Immunobiology DGS.

M.D./Ph.D. students are not required to take IBIO 600a, Introduction to Research, but may if they wish.

IBIO 601b (Fundamentals of Research) *Ethics*. A note from the DGS of the M.D./Ph.D. program must be forwarded to the Immunobiology DGS stating that the student has taken IBIO 601b, Fundamentals of Research, or its equivalent in the School of Medicine. *Include dates, titles, and faculty.* If the student has not taken 601b or the equivalent, then registration in this class is required.

Following successful completion of the prospectus examination, the student will be entitled to the M.Phil. degree. Once all the above requirements have been met, the student will advance to candidacy and be A.B.D. ("all but dissertation"). At that point the student will normally focus on research and the writing of the dissertation.

Biannual committee meetings. Each student is required by the Immunobiology Section to have a committee meeting every six months. Departmental Research in Progress talks can count. The committee supervisor will then prepare a letter to the DGS summarizing the student's progress.

Master's Degree

M.S. may be awarded to a student who is in good standing upon completion of at least two terms of graduate study. Note that a High Pass average is required for obtaining a master's degree.

Our Web site at http://info.med.yale.edu/bbs/ offers complete information on the BBS, Biological and Biomedical Sciences Program, and the more than 200 participating faculty.

Courses

IBIO 530a,Biology of the Immune System. Kim Bottomly and staff.
MWF 9.30–10.20
The development of the immune system. Cellular and molecular mechanisms of immune recognition. Effector responses against pathogens; autoimmunity. *Also MCDB 530a[u]*.

IBIO 531b,Advanced Immunology. Ruslan Medzhitov and staff.
The historical development and central paradigms of key areas in immunology. The course attempts to develop a clear understanding of how these paradigms were established experimentally. Landmark studies are discussed to determine how the conclusions were obtained and why they were important at the time they were done. Lecture and discussion format; readings of primary research papers and review articles. Prerequisite: IBIO 530a or equivalent. Enrollment limited to fifteen.

IBIO 538a,Advanced Immunology Seminar: Lymphocyte Receptors/Signal Transduction/Regulation of Expression. Paula Kavathas,Sankar Ghosh,Alfred Bothwell.
HTBA
This course starts at the cell surface studying receptors, then moves to signal transduction through receptors, and then studies how the signals are interpreted in terms of gene regulation. Topics on receptors include the role of sugars in modifying receptor ligand interactions and the molecular basis for receptor ligand interactions focusing on the MHC with TCR, CD8, and Ly49. Alternatively spliced forms of receptors and implications for signaling are discussed. We then cover how signals are transmitted from the cell surface using the toll receptors and the T cell receptor complex as examples. Signaling to death and negative regulation are also covered. The interpretation of these signals in terms of gene regulation is then discussed. Topics include chromatin remodeling, integration of signals through promoter analysis, and regulation of transcription factors that are activated during immune responses.

IBIO 600a,Introduction to Research. David Schatz and staff.
TH 5
Introduction to the research interests of the faculty. Required for all first-year students. Pass/fail.

IBIO 601b,Fundamentals of Research. David Schatz and Staff.
TH 5
Seminar discussing proper conduct of research. Required for first-year Immunobiology track and second-year Immunobiology graduate students.

INTERNATIONAL AND DEVELOPMENT ECONOMICS

Economic Growth Center
27 Hillhouse, 432.3621
M.A.

Director
Michael Boozer

The Department of Economics offers a one-year program of study in International and Development Economics, leading to the Master of Arts degree. With a few exceptions, students are from outside the United States, primarily from developing countries. Many students in the program have worked in central banks, foreign ministries, planning agencies, and other public and private agencies concerned with international economics and development, although some enter the program directly from their undergraduate school.

Students entering the program are required to complete the summer program in English and Mathematics for Economists offered by Yale University. This requirement may be waived for applicants demonstrating exceptional training in economic analysis and a good command of English. The GREs and the Test of English as a Foreign Language (TOEFL) examination are also required.

Preference is given to candidates recommended by their employing agencies or institutions and financed by their employers during the study leave. Yale fellowship funds are not available.

The course program requires the completion of eight term courses, five of which are specifically designed for the program and are required; the remaining three are electives. These required courses are designed to provide an understanding of the basic economic theory necessary for economic policy analysis.

An option of a second year of nondegree elective study is available to qualified students.

Joint program options for study with the School of Management and the School of Forestry & Environmental Studies are also available. Application to the participating professional school must be made simultaneously with the application to the IDE program. Admission to these joint programs is determined by the participating professional school and must be obtained prior to beginning either program. Joint-degree students earn both the Master of Arts degree and the Master of Business Administration or the Master of Environmental Studies degree.

Program materials are available upon request to the Kathryn Toensmeier, Administrative Assistant, International and Development Economics Program, Yale University, PO Box 208269, New Haven CT 06520-8269; ide@yale.edu.

INTERNATIONAL RELATIONS

International Affairs Council
Yale Center for International and Area Studies
210 Luce Hall, 34 Hillhouse, 432.3418
M.A.

Chair
John Gaddis (*History*)

Associate Chair and Director of Graduate Studies
Cheryl Doss (*Economics*) (223 Luce Hall, 432.9395, cheryl.doss@yale.edu)

Professors
Abbas Amanat (*History*), Jack Balkin (*Law*), Ivo Banac (*History*), Michele Barry (*Medicine*), Beatrice Bartlett (*History*), Seyla Benhabib (*Political Science*), Frank Bia (*Medicine*), Paul Bracken (*Management*), William Burch, Jr. (*Forestry & Environmental Studies*), Paul Bushkovitch (*History*), David Cameron (*Political Science*), Amy Chua (*Law*), Deborah Davis (*Sociology*), Michael Dove (*Forestry & Environmental Studies*), Eduardo Engel (*Economics*), J. Joseph Errington (*Anthropology*), Daniel Esty (*Forestry & Environmental Studies; Law*), Robert Evenson (*Economics*), Owen Fiss (*Law*), William Foltz (*Political Science*), Paul Freedman (*History*), John Gaddis (*History*), Penelope Goldberg (*Economics*), Roger Gould (*Sociology*), Timothy Guinnane (*Economics*), Koichi Hamada (*Economics*), Valerie Hansen (*History*), Robert Harms (*History*), Oona Hathaway (*Law*), Paula Hyman (*History*), Gilbert Joseph (*History*), Donald Kagan (*History*), Stephen Kellert (*Forestry & Environmental Studies*), William Kelly (*Anthropology*), Paul Kennedy (*History*), Daniel Kevles (*History*), Ilona Kickbusch (*Epidemiology & Public Health*), Benedict Kiernan (*History*), Harold Koh (*Law*), Anthony Kronman (*Law*), Theodore Marmor (*Management*), Enrique Mayer (*Anthropology*), Robert Mendelsohn (*Forestry & Environmental Studies*), John Merriman (*History*), Michael Merson (*Epidemiology & Public Health*), William Nordhaus (*Economics*), Sharon Oster (*Management*), Curtis Patton (*Epidemiology & Public Health*), Merton Peck (*Economics*), Gustav Ranis (*Economics*), W. Michael Reisman (*Law*), John Roemer (*Political Science*), Susan Rose-Ackerman (*Political Science, Law*), Frances McCall Rosenbluth (*Political Science*), Bruce Russett (*Political Science*), Lamin Sanneh (*Divinity; History*), Peter Schuck (*Law*), T. Paul Schultz (*Economics*), Stuart Schwartz (*History*), James Scott (*Political Science*), Martin Shubik (*Management*), Helen Siu (*Anthropology*), Stephen Skowronek (*Political Science*), Frank Snowden (*History*), Jonathan Spence (*History*), T. N. Srinivasan (*Economics*), Ivan Szelenyi (*Sociology*), Frank Turner (*History*), Christopher Udry (*Economics*), John Wargo (*Forestry & Environmental Studies*), Jay Winter (*History*)

Associate Professors
Nora Groce (*Epidemiology & Public Health*), Philip Levy (*Economics*), K. Geert Rouwenhorst (*Management*)

Assistant Professors
Arun Agrawal (*Political Science*), Michael Auslin (*History*), Jennifer Bair (*Sociology*), Kent Buse (*Epidemiology & Public Health*), Jose Cheibub (*Political Science*), Brian Cowan (*History*), Keith Darden (*Political Science*), Seth Fein (*History*), Anna Grzymala-Busse (*Political Science*), Mary Habeck (*History*), Galina Hale (*Economics*), Anastassios Kalandrakis (*Political Science*), Nathaniel Keohane (*Management*), Lawrence King (*Sociology*), Sharon Kinsella (*Sociology*), Kavesh Koshnood (*Epidemiology & Public Health*), Pierre Landry (*Political Science*), Richard Lindsey (*Management*), Pauline Jones Luong (*Political Science*), Ellen Lust-Okar (*Political Science*), Michael Mahoney (*History*), M. Victoria Murillo (*Political Science*), Mridu Rai (*History*), Rose Razaghian (*Political Science*), Linda-Anne Rebhun (*Anthropology*), Nicholas Sambanis (*Political Science*), Kenneth Scheve (*Political Science*), Andrew Schrank (*Sociology*), Timothy Snyder (*History*), Steven Stoll (*History*), Christopher Timmins (*Economics*), James Vreeland (*Political Science*), Leonard Wantchekon (*Political Science*)

Lecturers
George Andreapolis (*Epidemiology & Public Health*), Dennis Chaibi (*Economics*), Marian Chertow (*Forestry & Environmental Studies*), Giancarlo Corsetti (*Economics*), Ronald Daniels (*Law*), Cheryl Doss (*Economics*), Yun Fan (*Sociology*), Stuart Gottlieb (*Political Science*), Debbie Humphries (*Epidemiology & Public Health*), Jean Krasno (*Political Science*), Guillermo Mondino (*Economics*), Eric Mood (*Epidemiology & Public Health*), Nancy L. Ruther (*Political Science*), Jonathan Schell (*Law*), James Sutterlin (*Political Science*), Anand Swamy (*Economics*)

Adjunct & Visiting Professors
Albert Fishlow (*Adjunct, Management*), Henry Huttenbach (*History*), William Odom (*Adjunct, Political Science*), Patricia Pessar (*Adjunct, Anthropology/American Studies*)

Fields of Study

The two-year program is designed to combine breadth of knowledge of the basic disciplines of international relations with depth of specialization in a particular academic discipline, geographic area, specialized functional issue, and/or professional field. It is designed primarily for students seeking an M.A. degree before beginning a career in international affairs but also supports students interested in going on for a Ph.D. degree in economics, history, or political science. Joint degrees, as well as concentrations within the M.A. program, are offered with the School of Management, the Law School, the School of Forestry & Environmental Studies, and the Department of Epidemiology and Public Health.

Special Admissions Requirements

Applicants must take the GRE General Test and should preferably do this by the October testing date; students whose native language is not English must pass the Test of English as a Foreign Language (TOEFL) in October with a minimum score of 610 on the paper-based test or 253 on the computer-based test. Entering students must have taken introductory courses in microeconomics and macroeconomics prior to matriculation.

Special Requirements for the Master's Degree

The substantive core consists of six graduate-level courses: two history courses (one regional and one great power); two in political science (one in world or comparative politics and one in international relations); and two graduate-level courses in economics (one economic analysis and one international economics). In addition, all first-year students are required to take the workshop in international relations (see course description below for INRL 700a).

Beyond the core courses, each student must identify a coherent set of courses and demonstrate their academic integrity as a proposed concentration for approval by the director of graduate studies. The concentrations require a minimum of eight and a maximum of ten courses in the fields selected. Some of the courses are cross-listed in two or more departments. Students are able to develop concentrations based on a topical, regional, or disciplinary focus.

M.A. candidates are required to achieve an average grade of High Pass in graduate courses plus a minimum of two grades of Honors in term courses, one of which will normally be achieved during the first year. For each grade of Pass, there must be an additional grade of Honors.

POLITICAL ECONOMY OF TRADE, DEVELOPMENT, OR BUSINESS

Within a broad field of political economy, students generally specialize in one of the professional arenas of trade, international business, or international development by taking eight courses beyond the core. They must take three to five additional courses in economics and politics directly related to their professional specialization and at least one of these courses must be in quantitative methods in the first term to prepare for advanced course work. Students specializing in trade or business must complete their concentration by taking an additional three to five relevant courses in law, management, finance, health resource administration, and/or environmental and natural resources policy. Students focused on development should complete their concentration with three to five relevantadditionalcourses in anthropology, management, epidemiology, health resource administration, and/or environmental and natural resources policy.

INTERNATIONAL SECURITY

A specialization in international security is available in conjunction with International Security Studies (ISS). Concentrations in security studies are usually based on courses in history, political science, law, and management. Concentrations of security studies are often combined with a focus on a world region. Students may draw on resources available through United Nations Studies at Yale. Other courses can be selected in consultation with the director of graduate studies of the IR Program.

WORLD REGIONS

It is also possible to undertake concentrations with emphasis on a single geographic region by electing additional courses relating to a specific area. YCIAS councils, including African Studies, East Asian Studies, European Studies, Latin American and Iberian Studies, and Southeast Asia Studies, provide a wealth of research, teaching, and enrich-

ment activities. M.A. degrees in African Studies, East Asian Studies, and Russian and East European Studies are available through these YCIAS councils.

NATURAL RESOURCE MANAGEMENT AND ENVIRONMENTAL POLICY

A concentration in natural resource management and environmental studies requires a student to meet two basic objectives. First, to develop core knowledge in the natural sciences that are relevant to natural resource management and the environment. Second, to understand the social, economic, and political setting through which natural resources are utilized. To achieve the first objective, a student will normally complete, while at Yale, a minimum of four natural science courses concerning the problems of managing air, water, or land, or plant or animal resources. To achieve the second objective, a student will normally complete four courses at Yale that deal with the economic, political, or social aspects of natural resource management and the environment. In addition, a student concentrating in natural resources also may enroll in the summer technical training modules in plant identification, vegetation measurement, and land measurement. The School of Forestry & Environmental Studies teaches these immediately prior to the beginning of the fall term. Students in the IR Program who wish to concentrate in F&ES should design an individualized program with a faculty member in the school in conjunction with the DGS of the IR Program.

LAW AND HUMAN RIGHTS

For those concentrating in international law, a minimum of four term courses is required in the Law School. In addition, a student must select four additional courses that may be outside the Law School to fulfill his or her professional qualifications in the field. With a human rights legal focus, four to six of these eight courses would concentrate on the topic.

PUBLIC HEALTH

Students wishing to concentrate in public health should take between four and six courses in the Department of Epidemiology and Public Health. These should include basic courses in health services administration and epidemiology as well as specialized courses in international health and environmental health. Students in the International Relations Program who wish to concentrate in public health should design an individualized program with a faculty member in that department in conjunction with the DGS of the IR Program.

ACADEMIC DISCIPLINES

For those who wish to concentrate in a single discipline like history, economics, or political science, an additional six courses in the chosen field beyond the core requirement are required. In economics and political science, at least one of these courses must be in quantitative methods, taken in the first semester to set the stage for more advanced course work. In history, courses must include at least one research seminar, two in modern history, including diplomacy and international relations, and two in modern history of an area or country outside North America and Europe. In political science, courses must include one additional course beyond the core in international relations, in

comparative politics or a region or country, and in political economy. In economics, the concentration must include at least one term course in the economics of a world region, in development economics, and in international economics.

OTHER

Other individually developed concentrations are possible provided they are well conceived, intellectually coherent, and relevant to the student's career direction. In all instances, approval must be obtained from the director of graduate studies.

Language Requirements

Three years of college-level language study or its equivalent in language mastery is required to graduate. This competence must be demonstrated through successful completion of course work or by passing a proficiency examination. For international students whose native language is not English, the language requirement may be fulfilled by demonstrated competence in English. Students pursuing joint degree programs must fulfill all language requirements before beginning the program because of the compressed schedule for other course work. Students may study language as part of their Yale program; a maximum of two of the sixteen course credits for the two-year program may be in languages.

Special Requirements for the Joint-Degree Programs

Joint-degree candidates must fulfill all of the requirements of both programs in which they are enrolled. Joint-degree students must fulfill the requirements of both programs before receiving either degree. Joint-degree candidates are required to fulfill the core and concentration requirements of the International Relations Program. An overlap of two courses is allowed between core and concentration, and a maximum of an additional two courses may be credited toward both degrees. Joint-degree students must take at least twelve graduate-level courses in Arts and Sciences departments or in professional schools other than the one granting the joint degree. Under no circumstances will students be allowed an IR concentration in the functional area in which they will be receiving a joint degree.

Applicants to the joint-degree programs must apply separately, by the appropriate deadline, to the Graduate School for the International Relations Program and to the professional school involved. Decisions on admissions and fellowship support are made independently by each school. Students are encouraged to apply to both programs simultaneously. They may also apply during their first year at Yale to the second program for a joint degree. If accepted into the new program, they must receive approval for credit allocation upon registration from both degree programs.

Program materials are available upon request to International Relations, Yale University, PO Box 208206, New Haven CT 06520-8206.

Courses

INRL 552a,Law, Institutions,and Development. Ronald Daniels.
W 4.10–6
This seminar examines the role of law and institutions in promoting development in less developed countries. The topics include competing conceptions of development: economic, political, and social; theories of economic growth; the New Institutional Economics; democracy and development; public administration and development; competing theories of the role of law in development; ethnic diversity; corruption; land and property rights reforms; infrastructure and development; state-owned enterprises: privatization and reform; corporate governance and finance; foreign investment and trade policy; tax policy; and the role of foreign aid and international institutions in development. Paper required. Enrollment limited to thirty students. *Also LAW 20347.*

INRL 553a,The Nuclear Dilemma from Hiroshima to Baghdad: In Law, in Policy, in Thought. Jonathan Schell.
TTh 12.45–2
An introduction to the basic history of the nuclear age and the riddles it poses. Questions to be addressed along the way include: Why is nuclear danger "unthinkable"? What is the impact of nuclear weapons on war? How has the shape of the dilemma changed since the end of the Cold War? Since September 11, 2001? What impact has the dilemma had on the shape of international, constitutional, and statutory law? Nuclear weapons have placed self-extinction within the capacity of the human species. What is the human and philosophical meaning of this turning point? Examination and paper required. *Also LAW 20353.*

INRL 554a,Diplomacy, Power, and Culture: The Cold War as International History. Stephen Remy.
M 1.30–3.20
This course examines the international history of the Cold War. Our emphases are on the intersection of diplomacy and domestic political cultures worldwide; and the ways in which post-1989 archival research and revelations have expanded our knowledge of this conflict. The course is reading, writing, and discussion intensive, with reading assignments combining recent scholarship and primary-source materials. (Note: First class will meet on September 15.) *Also HIST 954a.*

INRL 555b,Theories of International Relations. Stuart Gottlieb.
HTBA
This course provides a comprehensive overview of international relations theories and organizing frameworks. We also use historical and modern examples to test various theories, and create a practical link between political science theory and political reality. Open only to International Relations students.

INRL 556a,Genocide and Terrorism: Probing the Mind of the Perpetrator. Dori Laub.
Th 1.30–3.20
The course begins by establishing a historical framework, which examines on the one hand Russian intellectuals' fascination with violence at the end of the nineteeth and into the twentieth century, and on the other hand Nazi state-sponsored terror and its similarities with and differences from contemporary global terrorism. We then address the questions of the psychology of individual terrorists and suicide bombers, in lectures conducted by psychologists and psychoanalysts who attempt to develop theoretical models on the basis of their clinical experience and field work. A sociological perspective examines individuals in the context of their social environment, focusing especially on the link between modernity and the rise of religious violence. Case studies of the Islamic Jihad, Christian fundamentalism in the United States, and atrocities committed by Japan during WWII add breadth to this exploration. *Also PSYC 610a.*

INRL 560a,Economic Analysis. Cheryl Doss.
MW 9–10.15
Introduces IR students to more advanced concepts in economics. Course emphasizes reading and evaluating the economic content of articles on a wide range of topics including consumer behavior, firm behavior, comparisons of welfare, labor markets, capital markets, and cost-benefit analysis. These articles represent research from both developed and developing economies. *Also ECON 544a.*

INRL 561b,International Economic Analysis. Guillermo Mondino.
M 1–3.20
A continuation of 560a. Extends the use of economic analysis to international economic issues including international trade, growth and development, and international finance. In addition, emphasis is placed on quantitative tools and analysis of data to address international economic issues and evaluate policies. *Also ECON 708b.*

INRL 577b,Colonialism and Underdevelopment in South Asia. Anand Swamy.
HTBA
How did colonialism shape the evolution of the economies of South Asia? There is much controversy on this issue, beginning with whether the colonial economy really represented a radical break from the past. With this as our starting point, we discuss major themes in the literature, including the theory of "drain" (of economic surplus from the colonies), "deindustrialization" due to competition from cheap British manufactured goods, the impact of colonial legal institutions and land tenure arrangements, and colonial policies with respect to education infrastructure, trade, and financial markets. The course concludes with an assessment of the extent to which the economies of India, Pakistan, and Bangladesh still reflect their colonial past, and the consequences thereof.

INRL 700a,International Affairs: Core Issues and Approaches. Nancy Ruther.
TH 1–3.50
Current and traditional issues facing international-affairs professionals explored through case study analysis, simulation, readings, and discussion with faculty from related disciplines and professions as well as current practitioners. Focus on negotiation and strategic management tools for understanding and analyzing the complex interactions of different aspects of international affairs. Course emphasizes refining problem solving, presentation, and organizational skills needed by professionals entering the field. For first-year IR students.

INRL 730a[u], The United Nations and the Maintenance of International Security. James Sutterlin.
T 1.30–3.20
Consideration of the role of the U.N. in preventing diplomacy, using force for peacekeeping, peace enforcement, and peace building, with consideration of the evolution of the U.N. and its role in a post-Cold War international system. For IR students and undergraduates only.

INRL 750b,Challenges in International Relations: Policy and Practice. Cheryl Doss.
TH 2–5
The Yale Stimson Seminar is taught by a series of practitioners who address three major international policy themes in three modules from the perspective of government, NGOs, and business. Recent themes have included: information technology and diplomacy, investment and international development, government of the global environment, rethinking national and international security, and avoiding disaster in global public health. Open to all graduate and professional students. Admission is by application only.

INRL 900a or b,Directed Reading.
By arrangement with faculty.

INVESTIGATIVE MEDICINE

Department of Medicine
Edward S. Harkness Building (ESH), basement 18–20, 785.6842
Ph.D.

Director of Graduate Studies
Keith Joiner (*Internal Medicine*) (invmed@info.med.yale.edu)

Deputy Director
Sharon Inouye (*Internal Medicine*)

Faculty
A broad range of faculty from clinical and basic science departments participate in this program.

Fields of Study

The purpose of this program is to create a special training pathway for highly select physicians in clinical departments who are interested in careers in biomedical research. This program is designed to develop a broad knowledge base, analytical skill, creative thinking, and the hands-on experience demanded of clinical researchers devoted to disease-oriented and patient-oriented investigation. It will provide the candidate with individualized experience encompassing formal course work and practical experience, under the supervision and mentorship of a senior faculty member.

Trainees enter the program with a broad range of experience and interests. Trainees can undertake thesis work in a variety of disciplines, including: evaluating risk factor and interventions for disease using modern concepts in quantitative methods and clinical study design; investigating the biochemical, physiologic, and genetic basis for disease in the setting of a Clinical Research Center; or exploring the molecular basis for a disease from the laboratory standpoint.

Special Admissions Requirements

The Investigative Medicine program is designed for students with an M.D. degree who have completed two or more years of postgraduate clinical training. Application to the program may be made concurrently with application for subspecialty training in a clinical department at Yale. To be eligible for the Investigative Medicine program, the candidate must first be accepted into a subspecialty program (including General Medicine), at which point the candidate may apply to the Investigative Medicine program. Students will typically be involved in clinical training in their subspecialty for the first twelve to twenty-four months after arrival, and thus will enter the Investigative Medicine program after having completed two to five years of postgraduate clinical training. Prospective students who are already in a subspecialty clinical program at Yale may also apply to the Investigative Medicine program anytime during the first two years of that training (approximate).

The most important criterion for selection into the program is the commitment of the applicant to rigorous training in clinical investigation. Successful candidates will also need evidence of high academic achievement in undergraduate and medical-school courses and completion of residency training. Test scores from the USMLE are required, and (if available) the American Board of Internal Medicine, Pediatrics, Neurology, or other relevant subspecialty disciplines.

Special Requirements for the Ph.D. Degree

The minimum course requirements for the doctorate program are nine (9) courses. These consist of three one-term core courses: Principles of Clinical Research, Translational Research and Molecular Tools Part I, and Practical and Ethical Issues in Clinical Investigation; one yearlong seminar course: either Seminars in Clinical Investigation or Seminars in Molecular Medicine; one intensive practical course: either Translational Research and Molecular Tools Part II or Quantitative Clinical Epidemiology; an introductory biostatistics course; the independent reading course in Investigative Medicine; and a minimum of two electives in the specific research area. Full-time course work will extend over twelve months, usually starting in July. Students must enroll in a minimum of two courses each term. The majority of course requirements may be completed in twelve months, with elective courses often taken in the second year. To complete course requirements, students must achieve the grade of Honors in two courses (one course if a full-year course). When requirements are met (typically at the end of the first year), students submit their thesis proposal and undertake a qualifying exam. In order to be admitted to candidacy, students must pass written and oral examinations and submit a prospectus which has been approved by their qualifying committee. The remaining degree requirements include completion of a dissertation project, the writing of the dissertation, and its oral defense. It is expected that most trainees will complete the program in four years.

Courses

IMED 610, Translational Research and Molecular Tools Part II. Elisabetta Ullu.
MTWThF 8.30–6
This is an intensive, full-time two-week lecture and laboratory course. Currently, the emphasis is on protein and nucleic acid biochemistry, and on gene expression profiling through DNA microarray experiments. The lectures complement and extend the laboratory experience. The laboratory course requires full-time commitment. Consent of instructor required. Two weeks, August.

IMED 620, Translational Research and Molecular Tools Part I. Keith Joiner.
MTWThF 2–5
Genomics: In this section, students learn how genomics is influencing both medical research and health care delivery, and illuminating the genomic discoveries being translated into diagnostic and therapeutic medical applications. This course takes an integrated approach, exploring how genomes are mapped and sequenced, how various computational methods convert this raw data into information about biology, and how new experimental methods can provide comprehensive information about the behavior and function of genes and their products. Lectures are supplemented with computer laboratory sessions to reinforce ideas and to provide practical experience. The majority of the time is spent using computer applications of bioin-

formatics tools. The course is designed to provide practical training in bioinformatics methods including accessing the major public sequence databases, use of the BLAST tools to find sequences, analysis of protein and nucleic acid sequences, detection of motifs or domains in proteins, assembly of protein sequences from genomic DNA, detection of exons and finding intron-exon boundaries, aligning sequences (Clustal W), making phylogenetic trees, and comparative genomics. Structure-Based Drug Design: In this section, students learn the underlying principles in structure-based drug design. Lectures are supplemented with computer sessions devoted to practical learning of basic principles in protein structure determination, analysis, and relationship to molecular design. Clinically relevant examples of this approach are considered. Consent of instructor required. Two weeks, July.

IMED 625,Principles of Clinical Research. Sharon Inouye,David Fiellin.

MTWThF 2–4

The purpose of this two-week intensive course is to provide an overview of the objectives, research strategies, and methods of patient-oriented research. Topics include: competing objectives of clinical research; principles of observational studies; principles of clinical trials; principles of meta-analysis; interpretation of diagnostic tests; prognostic studies; causal inference; qualitative research methods; decision analysis. Sessions include lectures and discussion of readings distributed in advance. Consent of instructor required. Two weeks, July.

IMED 630a,Practical and Ethical Issues in Clinical Investigation. Henry Binder.

W 3.30–5

This termlong course addresses topics which are central to the conduct of clinical investigation, including ethics of clinical investigation, scientific fraud, technology transfer, and interfacing with the pharmaceutical industry. Practical sessions include: scientific presentations and teaching, NIH peer review process, journal peer review process, and career development: models of academia. This course provides guidelines and a framework for the clinical investigator to write, obtain funding for, conduct, and present a clinical study. Consent of instructor required.

IMED 635a or b,Directed Reading in Investigative Medicine. Keith Joiner.

An independent study course for first-year students in the Investigative Medicine program. Topics are chosen by the student, and reading lists are provided by faculty, for weekly meetings to discuss articles. Fourteen sessions are required; dates/times by arrangement. Consent of instructor required.

IMED 640a,b,Seminars in Molecular Medicine. Keith Joiner.

M 3–4.30

This yearlong seminar course focuses on the details of the basic investigation of the biochemistry, cell biology, genetics, immunology, and molecular biology of human disease from a sophisticated perspective. At each session, articles on the basic laboratory investigation of a disease or disease process (which is well understood at the molecular level) are selected by the faculty. Faculty provide an overview of the specific methodologies used to address the hypothesis, followed by discussion of the articles in a seminar format. Consent of instructor required.

IMED 650a,b,Seminars in Clinical Investigation. Sharon Inouye.

F 2–4

This yearlong seminar course explores the interface between clinical strategies and methodologies used to investigate these topics. A variety of topics are covered in an interactive seminar format. Articles are selected by the faculty, and students review and discuss the articles at each session. In addition, students gain experience in critical evaluation of study designs and protocol development (in the fall term), and grant writing and reviewing (in the spring term). Attendance and active participation are required. The course gives new clinical investigators tools to conduct their own research project. Consent of instructor required. Prerequisite: biostatistics training.

ITALIAN LANGUAGE AND LITERATURE

82–90 Wall Street, 432.0595
M.A., M.Phil., Ph.D.

Chair
Giuseppe Mazzotta

Director of Graduate Studies
Kristin Phillips-Court (82–90 Wall,Rm 407, 432.0597,kristin.phillips-court@yale.edu)

Professors
Giuseppe Mazzotta (*on leave* [F]), Paolo Valesio, Sergio Zatti (*University of Pisa, Visiting* [F])

Associate Professor
Olivia Holmes (*on leave* [F])

Assistant Professors
Francesca Cadel, Kristin Phillips-Court

Senior Lector and Language Program Director
Risa Sodi

Visiting faculty from other universities are regularly invited to teach courses in the department.

Fields of Study

The Italian department brings together several disciplines for the study of the Italian language and its literature. Although the primary emphasis is on a knowledge of the subject throughout the major historical periods, the department welcomes applicants who seek to integrate their interests in Italian with wider methodological concerns and discourses, such as history, rhetoric and critical theories, comparison with other literatures, the figurative arts, religious and philosophical studies, medieval, Renaissance, and modern studies, and the contemporary state of Italian writing. Interdepartmental work is therefore encouraged and students are accordingly given considerable freedom in planning individual courses of study, once they have acquired a broad general knowledge of the field through course work and supplementary independent study.

Special Admissions Requirements

The department recognizes that good preparation in Italian literature is unusual at the college level and so suggests that applicants begin as soon as possible to acquire a broad general knowledge of the field through outside reading. At the end of the first year, the progress of beginning students is analyzed in an evaluative colloquium. Applicants who have had little or no experience in Italy are generally urged to do some work abroad during the course of their graduate program. For all students of Italian, a reading knowl-

edge of Latin is essential. This may be acquired during the course of the first year, but applicants are reminded that it is difficult to schedule beginning language courses in addition to a normal graduate program. Students are advised to acquire proficiency in the languages required for the doctoral program before matriculation.

Special Requirements for the Ph.D. Degree

Candidates must demonstrate a reading knowledge of a second Romance language, Latin, and a non-Romance language (German recommended). The Latin examination must be passed, usually before the beginning of the third term of study, and all language requirements must be fulfilled before the Ph.D. qualifying examination. Students are required to take two years of course work (as a rule sixteen courses), including two graduate-level term courses outside the Italian department. Students who join the graduate program with an M.A. in hand, after consultation with the DGS, may get some courses waived.The comprehensive qualifying examination must take place during the third year of residence. It is designed to demonstrate the student's mastery of the language and acquaintance with the literature. The examination, which is both written and oral, will be devised in consultation with members of the department. After the qualifying examination, the student will discuss, in a session with the departmental faculty, a prospectus describing the subject and aims of the dissertation. Students are admitted to candidacy for the Ph.D. upon completion of all predissertation requirements, including the prospectus. Admission to candidacy normally occurs by the end of the sixth term.

Teaching is considered to be an important component of the doctoral program in Italian. Students will be appointed as teaching fellows in the third and fourth years of study. Guidance in teaching is provided by the faculty of the department and specifically by the director of language instruction.

Combined Ph.D. Programs

ITALIAN AND FILM STUDIES

The Department of Italian also offers, in conjunction with the Program in Film Studies, a joint Ph.D. in Italian and Film Studies. For further details, see Film Studies. Applicants to the joint program must indicate on their application that they are applying both to Film Studies and to Italian. All documentation within the application should include this information.

ITALIAN AND RENAISSANCE STUDIES

The Department of Italian also offers, in conjunction with the Renaissance Studies Program, a combined Ph.D. in Italian and Renaissance Studies. For further details, see Renaissance Studies.

Master's Degrees

Only candidates for the Ph.D. degree will be admitted to the program, but the department will, upon request, offer the M.A. and the M.Phil. degrees to students who have completed the general Graduate School requirements for those degrees (see pages

397–98). Alternatively, the Department of Italian Language and Literature offers, in conjunction with the Medieval Studies program, a joint M.Phil. degree. For further details, see Medieval Studies.

Program materials are available upon request to the Director of Graduate Studies, Italian Language and Literature, Yale University, PO Box 208311, New Haven CT 06520-8311.

Courses

ITAL 633b, Topics in the *Divine Comedy*. Olivia Holmes.
M 3.30–5.20
An exploration of Dante's magnum opus, with special attention to representations and discussions of the issues of free will and ethical choice. Attention is also paid to the development of this topic in Dante's epistles, *Vita Nuova*, *Convivio*, and *Monarchia*. In English.

ITAL 640a, Topics in Renaissance Epic. Sergio Zatti.
M 3.30–5.20
This course studies in some detail the two outstanding epics of the Italian Renaissance: Ariosto's *Orlando Furioso* and Tasso's *Gerusalemme Liberata*. It stresses issues such as the continuity of the epic tradition (Vergil, Dante, Pulci, Boiardo, etc.), the re-creation of medieval chivalric and lyrical traditions, and Renaissance literary theory. Its guiding idea is the examination of the question of representation and its impact on the intellectual, historical, and political history of Renaissance Italy.

ITAL 691, Directed Reading. Staff.
HTBA

ITAL 801b, Poetry, Poetics, and Contemporary Society, 1945–Present. Paolo Valesio.
W 3.30–5.20
Italian poetry of the second half of the twentieth century from the end of the war to our days gives life to one of the most remarkable poetic cultures in international literature. The course studies the relationships that poetic texts entertain with their author's ideas about poetry (their poetics) on the one hand and developments in society at large on the other hand. We begin with the poetry of Cesare Pavese, and we go on to a study of poetic currents as well as of important individual figures. We thus examine among other movements the Neo-avant-garde and Neo-realism, and the poems that we analyze include texts by Attilio Bertolucci, Margherita Guidacci, Mario Luzi, the Novissimi poets, Pier Paolo Pasolini, Amelia Rosselli, Giovanni Testori, David Maria Turoldo, and Andrea Zanzotto.

ITAL 904a, Futurism and Beyond: T. F. Marinetti's Poetry, Narrative, and Drama. Paolo Valesio.
W 3.30–5.20
Filippo Tommaso Marinetti, the founder of Futurism (arguably the first great avant-garde movement in modern European literature), is also one of the most remarkable writers of the Italian twentieth century in his own terms. The course explores Marinetti's basic contribution to modern Italian literature, which is a poetical one, studying both his experimental and his more traditional poems as well as his brilliantly original novels and plays. The course uses available editions, but also unpublished materials in the Beinecke archives and the typescripts of forthcoming books. Marinetti's epoch-making contribution is also studied in a comparative European and American context, with particular attention to the relationship between the Italian texts and their French and English versions.

ITAL 920b, Petrarch's Worlds. Giuseppe Mazzotta.

T 3.30–5.20

At the center of Petrarch's vision, announcing a new way of seeing the world, was the individual, a sense of the self that would one day become the center of modernity as well. This self, however, seemed to be fragmented, divided among the works of philosophy, faith, love of the classics, politics, art, religion, and of Italy, France, Greece, and Rome. This course shows how all these fragmentary worlds relate to each other, how these separate worlds are part of a common vision. By pursuing an "encyclopedic" approach and by showing the conversation Petrarch enacts between the arts and sciences, the course focuses on Petrarch's new understanding of culture and self for the modern age. Texts to be examined include the *Canzoniere,* the *Trionfi, Secretum, Invective Against a Physician, On His Own Ignorance,* and letters (selections from the *Familiares* and *Seniles*).

JUDAIC STUDIES

451 College, 432.0843

Chair
Steven Fraade

Professors
Albert Baumgarten (*Visiting, Religious Studies*), Steven Fraade (*Religious Studies*), Benjamin Harshav (*Comparative Literature*), Warren Zev Harvey (*Visiting, Religious Studies*), Christine Hayes (*Religious Studies*), Paula Hyman (*History; Religious Studies*), Robert Liberles (*Visiting, History*), Ivan Marcus (*History; Religious Studies*)

Lecturers
Rebecca Kobrin (*History*), Jonathan Ray (*History*)

Lectors
Ayala Dvoretzky (*Near Eastern Languages & Civilizations*), Neta Stahl (*Near Eastern Languages & Civilizations*)

Judaic Studies is an interdisciplinary and interdepartmental field drawing upon the study of languages, history, literature, religion, and culture of the Jews. Jewish society, texts, ideologies, and institutions are studied in comparative perspective in the context of the history and culture of the nations among whom Jews have lived and created throughout the ages and across the continents.

Graduate-level programs are available through the following departments: *History* (Medieval and Modern Jewish History), *Religious Studies* (Ancient Judaism, Medieval and Modern Jewish History), *Near Eastern Languages and Civilizations* (Northwest Semitic, Hebrew Language and Literature), *Comparative Literature* (Hebrew and Comparative Literature). Applications are made to a specific department and programs of study are governed by the degree requirements of that department.

Other resources include the Judaica collection of Sterling Memorial Library and its Judaica Bibliographer, the Fortunoff Archive for Holocaust Testimonies, the biweekly faculty/graduate student Judaic Studies Seminar, several lecture series, postdoctoral fellowships, and graduate fellowships in Judaic Studies.

Program materials are available on request to the director of graduate studies of the department of intended specialization, or to the Chairperson, Judaic Studies Program, Yale University, PO Box 208287, New Haven CT 06520-8287.

COUNCIL ON LATIN AMERICAN AND IBERIAN STUDIES

Luce Hall, 34 Hillhouse, 432.3422

Chair
Gilbert Joseph (*History*)

Professors
Rolena Adorno (*Spanish & Portuguese*), Mark Ashton (*Forestry & Environmental Studies*), Michele Barry (*Medicine*), Frank Bia (*Medicine*), Arturo Bris (*School of Management*), Richard Burger (*Anthropology*), Hazel Carby (*African American Studies; American Studies*), Carlos Eire (*History*), Eduardo Engel (*Economics*), Owen Fiss (*Law*), Paul Freedman (*History*), Roberto González Echevarría (*Spanish & Portuguese*), K. David Jackson (*Spanish & Portuguese*), Gilbert Joseph (*History*), Ilona Kickbusch (*Epidemiology & Public Health*), Vera Kutzinski (*American Studies; African American Studies; English*), Juan Linz (*Emeritus, Political Science; Sociology*), Florencio Lopez-de-Silanes (*School of Management*), Josefina Ludmer (*Spanish & Portuguese*), Enrique Mayer (*Anthropology*), Robert Mendelsohn (*Forestry & Environmental Studies*), Mary Miller (*History of Art*), Florencia Montagnini (*Forestry & Environmental Studies*), Gustav Ranis (*Economics*), Michael Reisman (*Law*), T. Paul Schultz (*Economics*), Stuart Schwartz (*History*), James Scott (*Political Science*), Robert Thompson (*History of Art*), Noël Valis (*Spanish & Portuguese*)

Associate Professors
Patricia Pessar (*Adjunct, American Studies*), Linda-Anne Rebhun (*Anthropology*)

Assistant Professors
Jennifer Bair (*Sociology*), Jennifer Baszile (*History*), Richard Bribiescas (*Anthropology*), Marcello Canuto (*Anthropology*), José Cheibub (*Political Science*), Seth Fein (*History*), Mary Habeck (*History*), Guillermo Irizarry (*Spanish & Portuguese*), Kellie Jones (*History of Art*), Jaime Lara (*Divinity*), Oscar Martín (*Spanish & Portuguese*), Kathleen McAfee (*Forestry & Environmental Studies*), Stephen Pitti (*History*), Lidia Santos (*Spanish & Portuguese*), Alicia Schmidt-Camacho (*Spanish & Portuguese*), Andrew Schrank (*Sociology*), Michael Veal (*Music*)

Lecturer
Nancy Ruther (*Political Science*)

Although there is no advanced degree in Latin American and Iberian Studies at Yale, graduate and professional students may draw upon resources of many departments in order to make Latin America and/or Iberia their field of concentration while working toward their respective degrees in conventional disciplines. In addition, a graduate program in International Relations offers an M.A. degree centered on political science and economics with possibilities for a Latin American emphasis, and the Department of History and the Council on Archaeological Studies offer M.A. degree programs that allow a

Latin American concentration. In all cases, the University's Council on Latin American and Iberian Studies can assist the graduate student in designing a balanced and coordinated curriculum.

The council supplements the graduate curriculum with term-long, thematically integrated lecture series and special seminars as well as conferences that bring visiting speakers to campus. The council also serves as a communications and information center for a vast variety of enriching events in Latin American studies sponsored by other departments, schools, and independent groups at Yale, and as the link between Yale and Latin American centers in other universities, and between Yale and educational programs in Latin America and Iberia.

The Latin American Collection of the University library has approximately 445,000 printed volumes, plus newspapers and microfilms, CD-ROMs, films, sound recordings, maps, and musical scores. The library's Latin American Manuscript Collection is one of the finest in the United States for unpublished documents for the study of Latin American history. Having the oldest among the major Latin American collections in the United States, Yale offers research opportunities unavailable elsewhere.

The Yale library's Iberian collections comprise several hundred thousand volumes as well as newspapers, microfilms, electronic publications, films, maps, and musical scores. The collections are particularly strong in literature and history. Works collected include all languages and literatures of the peninsula, including Catalan, Gallegan, Basque, and Bable. The Yale libraries also have substantial collections of publications and research materials from Spain and Portugal, relating to most disciplines in the humanities and social sciences.

Program materials are available upon request to the director of graduate studies of the department of intended specialization. Information about supplemental resources in Latin American studies should be addressed to the Council on Latin American and Iberian Studies, Yale University, PO Box 208206, New Haven CT 06520-8206; e-mail, latin.america@yale.edu; Web site, www.yale.edu/las/.

LINGUISTICS

370 Temple, Rm 204, 432.2450
M.A., M.Phil., Ph.D.

Chair
Stephen Anderson

Director of Graduate Studies
Louis Goldstein (370 Temple St., Rm 312, 432.2453, louis.goldstein@yale.edu)

Professors
Stephen Anderson, Paul Bloom, Carol Fowler (*Adjunct*), Roberta Frank, Louis Goldstein, Laurence Horn, Stanley Insler, Frank Keil, Hugh Stimson

Associate Professor
Dianne Jonas

Assistant Professors
Maria Babyonyshev, Darya Kavitskaya, Maria Piñango, Charles Yang

Lecturer
Julie Ann Legate

Lector
Seema Khurana

Director, African Language Program
Ann Biersteker

Director, Center for Language Study
Nina Garrett

Supporting Faculty in Other Departments
Stephen Colvin (*Classics*), J. Joseph Errington (*Anthropology*), William Hallo (*Near Eastern Languages & Civilizations*)

Fields of Study

Fields include linguistic theory (phonology, morphology, syntax, semantics, pragmatics), experimental phonetics, brain and language, language and cognition, Indo-European, Germanic linguistics, and African linguistics.

Special Admissions Requirements

Two terms of two ancient Indo-European languages, preferably Latin and Greek, are required for the Indo-European program.

Special Requirements for the Ph.D. Degree

Language Requirements: By the end of the second year, students must demonstrate knowledge of two research languages, either by passing a translation examination in the language, or by presenting a piece of research which relies in significant part on sources in the foreign language. A one-term language description course, a field methods course, or a course in the structure of a non-Indo-European language is also required.

Course Requirements: Sixteen term courses at the graduate level. Required courses in syntax, phonology, phonetics, morphology, semantics, and historical linguistics will be taken during the first two years. Remaining course work during the first two years in residence will be selected so as to prepare the student in some substantial subfield of linguistics.

Program Requirements: At the end of the second year, each student will take an examination in some subfield of linguistics and also present samples of work demonstrating knowledge of the core areas of the field: syntax, phonology, and historical linguistics. By the end of the third year, the student should have presented two substantial research papers of publishable quality in different areas of linguistics. By the end of the seventh semester, students should have defended a dissertation prospectus.

Dissertation Requirements: Students are expected to complete their dissertations by the end of the sixth year. A dissertation defense is required after submission.

Teaching Fellow and Research Assistantship Requirements: Teaching experience is regarded as an integral part of the graduate training program in Linguistics. All students are required to serve as Teaching Fellows for a minimum of two terms, usually in the third or fourth years of study. Two additional terms of assistantship are also required, either in the form of additional participation in the Teaching Fellow Program, through participation in externally supported, supervised research (e.g., NSF Fellowship), or by serving as an assistant on a research project. Research assistantships are provided by the Linguistics faculty (e.g., from research grants) and by various Yale and Yale-affiliated units. Before accepting a research assistantship in fulfillment of the academic requirement, students must receive approval from the director of graduate studies. To be approved, an assistantship must meet the following criteria: (1) It must be under the supervision of a departmental faculty member or faculty at an affiliated unit, such as the Haskins Laboratories or the Yale School of Medicine. (2) It must provide research experiences that complement the student's academic plan of study. (3) It must provide at least 10 hours of experience per week. If a research assistantship is accepted in fulfillment of the department's academic requirement and if the assistantship provides a stipend less than the standard departmental stipend, a University Fellowship will be provided to bring the combined stipends up to the standard departmental stipend.

Master's Degrees

M.Phil. See Graduate School requirements, pages 397–98.

M.A. (en route to the Ph.D.). Students in the doctoral program who successfully complete the examinations and work samples required by the end of the second year of graduate study (see above) may petition for an M.A. degree.

Program materials are available upon request to the Department of Linguistics, Yale University, PO Box 208366, New Haven CT 06520-8366.

Courses

LING 510b[u], Introduction to Linguistics. Darya Kavitskaya.
MWF 10.30–11.20
The goals and methods of linguistics. Basic concepts in phonology, morphology, syntax, and semantics. Techniques of linguistic analysis and construction of linguistic models. Trends in modern linguistics. The relations of linguistics to psychology, logic, and other disciplines.

LING 512b[u], Historical Linguistics. Stanley Insler.
MW 1–2.15, 1 HTBA
Types of change that a language undergoes in the course of time: sound change, analogy, syntactic and semantic change, borrowing. Techniques for recovering earlier linguistic stages: philology, internal reconstruction, the comparative method. Language change and linguistic theory.

[**LING 513a[u], Introduction to Indo-European Linguistics.**]

[**LING 515[u], Elementary Sanskrit.**]

LING 517a[u], Language and Mind. Maria Piñango.
TTh 11.30–12.45
Knowledge of language as a component of the mind: mental grammars, the nature and subdivisions of linguistic knowledge in connection to the brain. The logical problem of language acquisition. The "universal grammar hypothesis," according to which all humans have an innate ability to acquire language. The connection between language acquisition and general cognitive abilities. Representation of language in the brain. Use of linguistic knowledge in speaking: processing. Comparison between human spoken natural language and other systems (signed languages; nonhuman communication).

LING 520a[u], General Phonetics. Louis Goldstein.
MW 2.30–3.45
Investigation of possible ways of describing the speech sounds of human languages. Tools to be developed: acoustics and physiology of speech; computer synthesis of speech; practical exercises in producing and transcribing sounds.

LING 532a[u], Introduction to Phonological Analysis. Darya Kavitskaya.
TTh 1–2.15
The structure of sound systems in particular languages. Phonemic and morphophonemic analysis, distinctive-feature theory, formulation of rules, and problems of rule interpretation. Emphasis on problem solving.

LING 535b[u], Phonological Theory II. Stephen Anderson.
MW 2.30–3.45
Topics in the architecture of a theory of sound structure. Levels of representation; classical phonological rules and their interaction. Ordering paradoxes; cyclicity and Lexical Phonology. Motivations for replacing a system of rules with a system of constraints. Optimality theory: constraint types and their interactions. Correspondence theory. Opacity and stratal OT. Prerequisite: LING 532a or permission of instructor.

[**LING 541b[u], Language and Computation.**]

LING 553a[u], Syntax I. Julie Ann Legate.
MW 11.30–12.45, 1 HTBA
Introduction to generative syntactic theory and argumentation. Phrase-structure analysis, constituent structure, motivation for syntactic transformations, constraints on rule application, and conditions on representations.

LING 561a[u], Introduction to Psycholinguistics. Maria Babyonyshev.
TTh 11.30–12.45
The course covers central topics in three major areas of psycholinguistic research: Language Acquisition, Language Impairment, and Real-Time Processing. The emphasis is on the relevance of this research to the study of the human mind and on the importance of theoretical linguistics as a tool of psycholinguistic investigation.

LING 563b[u], Language Acquisition. Maria Babyonyshev.
TTh 11.30–12.45
Language Learnability, acquisition of the lexicon. Development of syntactic knowledge. Parameter-setting model of language acquisition and maturation. Experimental methods in developmental psycholinguistics.

LING 565a[u], Development of Phonology. Louis Goldstein.
TTh 4–5.15
The growth of phonology in infants and young children and the principles guiding this growth. Topics include the innate sensorimotor link and imitation; articulatory gestures as primitives of the phonological system; phonology as a system for combining gestures into coordinated structures; parallels to self-organization in other combinatoric systems; the role of universal principles, language-particular tuning, and the developing lexicon in the emergence of phonological structures.

LING 580b[u], Morphology. Maria Piñango.
TTh 11.30–12.45
The theory of word structure within a formal grammar. Relation to other areas of grammar (syntax, phonology); basic units of word structure; types of morphology (inflection, derivation, compounding).

[**LING 602b[u], Comparative Old Germanic.**]

[**LING 621b[u], The Relation of Speech to Language.**]

[**LING 624a[u], Formal Foundations of Linguistic Theories.**]

LING 631a[u], Neurolinguistics. Maria Piñango.
TTh 2.30–3.45
The role of linguistic theory in understanding language-brain relations. The role of neurolinguistic evidence (aphasia, neuroimaging) in understanding language knowledge.

LING 636b[u], Articulatory Phonology. Louis Goldstein.
TTh 4–5.15
Introduction to phonology as a system for combining units of speech (constriction gestures of the vocal organs) into larger structures. Course includes both theory (reading) and practice (analysis of articulatory movement data; modeling using techniques of dynamical systems). Emphasis on universal vs. language-particular aspects of gestural combination and coordination.

LING 640a[u], Topics in Phonology: Sound Change. Stephen Anderson.
W 1.30–3.20
Discussion of the phonetic, phonological, and morphological bases of the traditional category of Sound Change (and its antagonist, Analogy), with the goal of understanding how this basic construct of historical linguistics should be understood within current linguistic theory. Prerequisites: LING 512b, 520a, 532a, 535b, or equivalents.

[**LING 641a[u], Field Methods.**]

LING 642b[u], Topics in Phonology: Lenition and Fortition. Darya Kavitskaya.
T 1.30–3.20
Phonology and phonetics of processes affecting consonantal strength, such as voicing alternations, (de)gemination, consonant gradation; their connection with syllable structure, prosody, and phonotactics; weakening and strengthening as sound change.

LING 647b[u], Structure of Swahili. Ann Biersteker.
TTh 4–5.15
Study of Swahili grammar. Phonology, morphology, and syntax of Swahili examined in detail. Topics also include Swahili dialects, history of Swahili, and comparison with other Bantu languages. *Also AFST 647b[u].*

LING 649b[u], Structure of Korean. Seungja Choi.
TTh 9–10.15
Study of the core grammatical structure of Korean. Topics include word order, case markers, nominalizers, the postpositional marker *nun,* and five sentence structures in which *nun* appears: generic, topic-comment, contrastive, logophoric, and negative sentences.

LING 650b,Structure of Warlpiri. Julie Ann Legate.
MW 11.30–12.45

LING 654b[u], Syntax II. Maria Babyonyshev.
TTh 1–2.15
Recent developments in syntactic theory: Government and Binding, Principles and Parameters, and Minimalist frameworks. In-depth examination of the basic modules of grammar (Lexicon, X-bar theory, Theta-theory, Case theory, Movement theory). Comparison and critical evaluation of specific syntactic analyses.

LING 656b[u], Grammatical Relations. Laurence Horn.
MW 1–2.15
Descriptive and theoretical approaches to grammatical relations (subject, object, etc.) and their role in syntax, argument structure, and universal grammar. Comparison of diverse models: traditional approaches, case grammar, relational grammar, lexical-functional grammar, GB and its developments. Grammatical relations and thematic roles (theta-roles). Grammatical relations in typological and historical perspectives. Prerequisite: 553a or permission of instructor.

LING 660b[u], Topics in Syntax: The Mental Lexicon. Maria Piñango.
Th 1.30–3.20
A discussion of theories of real-time language comprehension and how they interact with theories of linguistic representation. It focuses on computational and representational models of the mental lexicon which are evaluated in the context of online processing evidence, as well as lesion and imaging studies. *Also PSYC 650b[u].*

[**LING 661b[u], Topics in Syntax: Celtic Syntax.**]

LING 662a[u], Topics in Syntax: Bilingualism. Maria Babyonyshev.
Th 9.30–11.20
An investigation of the interactions between the two grammars of a bilingual speaker. Topics include transfer, first language attrition, and code-switching. Focus on the implications of these processes for syntactic theory. Prerequisite: one course in syntax or permission of instructor. *Also PSYC 649a[u].*

LING 663a[u], Semantics. Laurence Horn.
TTh 2.30–3.45
Lexical and truth-conditional semantics. Word meaning and semantic roles. Survey of propositional, predicate, and modal logic. Compositional theories of sense and reference. Opacity, intentionality, and belief contexts; entailment and presupposition. The relations between semantics and pragmatics, and between semantics and syntax.

LING 675b[u], Pragmatics. Laurence Horn.
TTh 2.30–3.45
Linguistic acts and the context in which they are performed. Implicature, presupposition, and speech act theory. Role of pragmatics in lexical choice and lexical change.

LING 680a[u], Topics in Morphology: Clitics. Stephen Anderson.
M 1.30–3.20
The analysis of clitics within a formal theory of grammar. Phonological vs. morphosyntactic dimensions of clitic structure ("Simple" vs. "Special" clitic status). Prosodic and segmental correlates of clitic elements. The adequacy of syntactic mechanisms for describing the grammar of clitics. Rules vs. constraints in the description of clitic positioning. Extensions of the analysis of clitics to other phenomena, especially Verb-second. Prerequisites: LING 532a[u], 553a[u], 580b[u], or permission of instructor.

[**LING 720b[u], Basics of Digital Signal Processing and Speech Acoustics.**]

INDC 751b,Indian Grammarians. Stanley Insler.
T 1.30–3.20
Introduction to the grammar of Panini and the native Indian grammatical tradition. Readings from Mahabhasya and the Kasika. Prerequisite: one term of Sanskrit.

[**LING 760b,Seminar in Information Structure.**]

[**LING 761a,Seminar in Argument Structure.**]

[**LING 770a,Learnability and Development.**]

[**LING 771a,Language Creation and Language Change.**]

LING 777b,Current Research in Phonetics. Louis Goldstein.
W 2.30–4.20
Intensive discussion of selected research topics in phonetics, primarily in the areas of gestural structure and coordination, dynamical modeling, and articulatory-acoustic relations. Experimental, analytical, and simulation methods are evaluated. Students are expected to have ongoing research projects and to present regular reports on their progress.

LING 830a or b,Directed Research in Linguistics.
By arrangement with faculty.

LING 831a or b,Directed Research in Phonetics.
By arrangement with faculty.

LING 840a or b,Directed Research in Phonology.
By arrangement with faculty.

LING 850a or b,Directed Research in Grammar.
By arrangement with faculty.

LING 860a or b,Directed Research in Semantics.
By arrangement with faculty.

HNDI 515u, Elementary Hindi. Seema Khurana.
TTh 1–2.15, W 4–5.15, 1 HTBA
An in-depth introduction to modern Hindi including the Devanagari script. Through a combination of graded texts, written assignments, audiovisual material, and computer-based exercises, this course provides cultural insights and is geared toward increasing proficiency in understanding, speaking, reading, and writing Hindi. Emphasis is placed on spontaneous self-expression in the language.

HNDI 530u, Intermediate and Advanced Hindi. Seema Khurana.
TTh 11.30–12.45, W 2.30–3.45, 1 HTBA
Through extensive use of cultural documents including feature films, radio broadcasts, as well as graded literary and nonliterary texts, this course continues to build students' proficiency in understanding, speaking, reading, and writing Hindi. Provides a space for meaningful interaction with authentic materials and their related cultures. Furthers the student's appreciation of cultural nuances. Introduces various Hindi literary traditions in the second half of the course. Prepares the student for further academic and nonacademic use of Hindi. Emphasis is placed on spontaneous self-expression in the language. After HNDI 515 or satisfactory placement test.

HNDI 557bu, Topics in Hindi Literature: Diaspora Literature. Seema Khurana.
TTh 4–5.15, W 1 HTBA
An advanced language course designed to develop overall language skills through selected readings of Hindi literature and the study of popular culture of the Indian diaspora. Focus on the works of Suaham Bedi, Sunita Jain, Umes Agnihotri, etc.; various art forms including theater and films; debates informing the political, social, and cultural dimensions as found in news articles and television programs.

The following courses are also of particular value to students in Linguistics:

ANTH 513bu, Language,Culture,and Ideology. J. Joseph Errington.

ANTH 533au, Bilingualism in Social Context. J. Joseph Errington.

[**ANTH 669au, Language,Nationalism,and Ideology.**]

MANAGEMENT

135 Prospect, 432.3955
M.A., M.Phil., Ph.D.

Director of Graduate Studies
Subrata Sen (55 Hillhouse, Rm 306, 432.6028, subrata.sen@yale.edu)

Professors
Rick Antle, Paul Bracken, Garry Brewer, Zhiwu Chen, Judith Chevalier, Ravi Dhar, Jonathan Feinstein, William Goetzmann, Jonathan Ingersoll, Edward Kaplan, Owen Lamont, Lode Li, Florencio Lopez-de-Silanes, Paul MacAvoy, Theodore Marmor, Barry Nalebuff, Sharon Oster, Benjamin Polak, Douglas Rae, K. Geert Rouwenhorst, Fiona Scott-Morton, Martin Shubik, Matthew Spiegel, Shyam Sunder, Arthur Swersey, Jacob Thomas, Victor Vroom, Ivo Welch, Dick Wittink

Associate Professors
Arturo Bris, K. Sudhir

Participating Faculty from the School of Management
On Amir, Keith Chen, Martijn Cremers, Stanley Garstka, Roger Ibbotson, Andrew Jeffrey, Nathaniel Keohane, Jonathan Koppell, Erin Mansur, Dina Mayzlin, Brian Mittendorf, Ganapathi Narayanamoorthy, Nathan Novemsky, Rodney Parker, Antti Petajisto, Peter Schott, Sandra Spataro

Fields of Study

Current fields include Accounting, Financial Economics, and Marketing. Other applied management fields may be added in subsequent years.

Special Admissions Requirements

The GRE General Test is required by the Graduate School. The GMAT Test may be accepted in some cases. Applicants whose native language is not English must take the Test of English as a Foreign Language (TOEFL).

Special Requirements for the Ph.D. Degree

Admission to candidacy will be based on the requirements of the Graduate School (see page 396), among which are the submission of a prospectus, duly approved by the faculty. Students must maintain a satisfactory grade record in the first year to remain in the program. Students shall, in addition, fulfill the requirements stated below. The process of admission to candidacy will include a faculty review of the student's entire academic record once all requirements have been successfully completed, and must be concluded by the end of the third year.

Core requirements: Two core courses are required of each student, General Economic Theory: Microeconomics, and Policy Modeling. During the first two years in the program, each student is required to complete a two-course sequence in empirical methods and a two-course sequence in one of the social sciences. Both of these sequences are usu-

ally taken during the first year. In addition, each student must prepare an original paper during his or her first summer and submit it to the faculty at the beginning of the third term in residence. Further, a second-year research paper must be submitted to the faculty by November 1 of the fifth term in residence.

In-depth requirement: The in-depth requirement consists of five courses selected by the student with the consent of the area faculty and the DGS. This in-depth study is designed to focus on a particular research paradigm and to prepare the student for the dissertation. In addition, a qualifying examination prepared by the area faculty must be passed. Currently offered in-depth areas are Accounting, Financial Economics, and Marketing.

Breadth requirement: The breadth requirement consists of two courses that are outside of the student's depth area. At least one of these courses must be from an *applied* area of management different from the student's own depth area. Breadth courses are selected by the student with the consent of the area faculty and the DGS.

Course requirement: Each student must complete a total of sixteen courses, achieving a grade of Honors in at least two courses, and a High Pass average in the other fourteen courses.

Teaching: Teaching is considered to be an important part of the doctoral program in Management. The program expects students to serve as teaching fellows, beginning in the spring term of the first year and continuing through the fourth year of study.

Master's Degrees

M.Phil. A student who is admitted to candidacy will be eligible to receive the M.Phil. upon the recommendation of the program's faculty and the approval of the Graduate School.
M.A. (en route to the Ph.D.). A student who completes the sixteen required courses with a High Pass average and the first-year paper will be eligible for the M.A. degree upon the recommendation of the program's faculty and the approval of the Graduate School.

Program materials are available upon request to the Director of Graduate Studies, Management, Yale University, PO Box 208200, New Haven CT 06520-8200. For information on the M.B.A. degree, please contact the admissions office at the School of Management.

Courses

MGMT 700a and 701b,Seminar in Accounting Research I and II. Rick Antle,Brian Mittendorf,Ganapathi Narayanamoorthy, Shyam Sunder, Jacob Thomas.
This course examines research into accounting institutions. Topics are generally drawn from areas of income measurement, managerial evaluation, industry structure and regulation in the accounting industry, informational efficiency of public markets, and asset valuation models under incomplete markets.

MGMT 703b,Experimental Economics. Shyam Sunder.
This semester-long seminar introduces participants to experimental methods in economics research and conducts a survey of experimental results. Depending on the interests of the participants, we may cover topics from auctions, asset markets, game theory, monetary theory,

public goods, corporate finance, market microstructure, institutional economics, or other fields. The seminar participants are expected to design and conduct their own experiment and write a term paper.

MGMT 710a,Mathematical Models for Management. Susana Mondschein.
Students learn how to formulate and solve optimization problems. Topics include linear and integer programming, nonlinear optimization, dynamic programming, and queueing theory. Many real problems from various areas in manufacturing and service operations are covered throughout the course.

MGMT 740a,Financial Economics I. Zhiwu Chen.
Current issues in theoretical financial economics addressed through the study of current papers. Focuses on the development of the problem-solving skills essential for research in this area. *Also ECON 670a.*

MGMT 741b,Financial Economics II. Jonathan Ingersoll.
Current issues in theoretical financial economics addressed through the study of current papers. Focuses on the development of the problem-solving skills essential for research in this area. *Also ECON 671b.*

MGMT 742a,Corporate Finance and Market Microstructure. Matthew Spiegel.
This course covers recent journal articles in the area of corporate finance and market microstructure. Topics from corporate finance include optimal debt levels, bankruptcy, security design, initial public offers, and mergers and acquisitions. The market microstructure half of the course covers inventory models, trading with asymmetric information in the presence of strategic and competitive traders, the social welfare impact of informed trading, bid-ask spreads, information disclosure, and the optimal design of a stock exchange.

MGMT 750a and 751b,Seminar in Marketing I & II. Dina Mayzlin,K.Sudhir.
Current issues in marketing related to product planning, pricing, advertising, promotion, sales force management, channels of distribution, and marketing strategy are addressed through the study of state-of-the-art papers.

MGMT 752a and b,Marketing Workshop. Nathan Novemsky.

MGMT 780a and b, Ph.D. Student Research Workshop. Subrata Sen.

MGMT 781a and b,Accounting/Finance Workshop. Arturo Bris.

MGMT 782a and b,Doctoral Student Pre-Workshop Seminar. Subrata Sen.

MGMT 791a or b,Independent Reading and Research.
By arrangement with individual faculty.

MGMT 792a or b,Predissertation Research.
By arrangement with individual faculty.

MATHEMATICS

10 Hillhouse, 432.4172
M.S., M.Phil., Ph.D.

Chair
Gregory Margulis

Director of Graduate Studies
Roger Howe (450 DL, 432.4686, howe@math.yale.edu)

Professors
Donald Brown (*Economics*), Andrew Casson, Ronald Coifman, Michael Frame (*Adjunct*), Igor Frenkel, Hillel Furstenberg (*Visiting*), Howard Garland, Roger Howe, Peter Jones, Ravindran Kannan (*Computer Science*), Mikhail Kapranov, Serge Lang, Alexander Lubotzky (*Adjunct*), Benoit Mandelbrot, Gregory Margulis, Vincent Moncrief (*Physics*), Steven Orszag, Ivan Penkov (*Visiting*), Ilya Piatetski-Shapiro, David Pollard (*Statistics*), Vladimir Rokhlin (*Computer Science*), David Sattinger (*Adjunct*), Gregg Zuckerman

Gibbs Assistant Professors
Serguei Arkhipov, Tsachik Gelander, Angela Gibney, Harald Helfgott, Yosi Keller, Daniel Krashen, Tim Riley, Song Wang

Gibbs Instructors
Greg Friedman, Gabriel Rosenberg

Fields of Study

Fields include real analysis, complex analysis, functional analysis, classical and modern harmonic analysis; linear and nonlinear partial differential equations; dynamical systems and ergodic theory; homological algebra; homotopy theory; the theory of fiber bundles; finite and infinite groups; Lie algebras, Lie groups and discrete subgroups; representation theory; automorphic forms, L-functions; algebraic number theory and algebraic geometry; mathematical physics, relativity; differential topology and algebraic K-theory; numerical analysis; combinatorics and discrete mathematics.

Special Requirements for the Ph.D. Degree

All students are required to: (1) complete eight term courses at the graduate level, at least two with Honors grades; (2) demonstrate a reading knowledge of two of the following languages: French, German, or Russian; (3) pass qualifying examinations on their general mathematical knowledge; (4) submit a dissertation prospectus; (5) participate in the instruction of undergraduates; (6) be in residence for at least three years; and (7) complete a dissertation that clearly advances understanding of the subject it considers. The normal time for completion of the Ph.D. program is four years. Requirement (1) normally includes basic courses in algebra, analysis, and topology; these should be taken during the first year. The first language examination must be completed by the beginning of the

third year of study, the second no later than the end of that year. A sequence of three qualifying examinations (algebra and number theory, real and complex analysis, topology) is offered each term, at intervals of about one month. All qualifying examinations must be taken by the end of the third term. The thesis is expected to be independent work, done under the guidance of an adviser. This adviser should be contacted not long after the student passes the qualifying examinations. A student is admitted to candidacy after completing requirements (1)–(6) and obtaining an adviser.

Honors Requirement

Students must meet the Graduate School's Honors requirement by the end of the fourth term of full-time study (see pages 394–95).

Master's Degrees

M.Phil. In addition to the Graduate School requirements (see pages 397–98), a student must undertake a reading program of at least two terms' duration in a specific significant area of mathematics under the supervision of a faculty adviser and demonstrate a command of the material studied during the reading period at a level sufficient for teaching and research.

M.S. (en route to the Ph.D.). A student must complete six term courses with at least one Honors grade, pass one language examination, perform adequately on the general qualifying examination, and be in residence at least one year.

Master's Degree Program. Students may also be admitted to a terminal master's degree program that has the same requirements as the M.S. en route to the Ph.D., except that a sophisticated computer language may be substituted for French, German, or Russian in fulfillment of the language requirement. Full-time students must complete the program in two years, part-time students in three years. No financial aid is available.

Program materials are available upon request to the Director of Graduate Studies, Mathematics Department, Yale University, PO Box 208283, New Haven CT 06520-8283.

Courses

MATH 500a[u], Modern Algebra. Serguei Arkhipov.
MWF 1.30–2.20

MATH 501b[u], Modern Algebra II. Serguei Arkhipov.
MW 1–2.15

MATH 515b[u], Intermediate Complex Analysis. Song Wang.
MW 2.30–3.45

MATH 520a[u], Measure Theory and Integration. Gabriel Rosenberg.
TTh 1–2.15

MATH 525b[u], Introduction to Functional Analysis. David Sattinger.
TTh 1–2.15

MATH 544a,Introduction to Algebraic Topology. Andrew Casson.
HTBA

MATH 545b,Introduction to Algebraic Topology II. Andrew Casson.
HTBA

MATH 974a,Math Tools/Biomed Signal Process. Elvir Causevic.
Th 4–7
Application-intensive approach to biomedical signal processing and application of mathematical tools. Review of signals and systems theory. Fourier analysis, sampling theorem, discrete signal processing. Noise characteristics of real-world biosignals — biologic, sensor, electronics, and digital processing noise. Linear and adaptive filtering. Wavelet representation, including wavelet packet decomposition. Denoising, compression, classification/feature extraction applications to 1D and image biosignals. Review of practical considerations in medical device design as relates to signal processing, scalability, robustness, testability, algorithm complexity, and regulatory issues. *Also ENAS 974a.*

Each term between ten and twelve advanced courses in different fields of study are offered by junior and senior faculty. In addition to the graduate courses, there are regular weekly seminars in algebra, analysis, topology, discrete mathematics, Lie groups, applied mathematics, and mathematical physics.

MECHANICAL ENGINEERING

Dunham Laboratory, 432.4250
M.Eng., M.S., M.Phil., Ph.D.

Chair
Marshall Long

Professors
Ira Bernstein (*Emeritus*), Boa-Teh Chu (*Emeritus*), Juan Fernández de la Mora, Alessandro Gomez, Robert Gordon, Amable Liñan-Martinez (*Adjunct*), Marshall Long, Manohar Panjabi, Lisa Pfefferle, Daniel Rosner, Ronald Smith, Mitchell Smooke, Katepalli Sreenivasan (*Adjunct*), George Veronis, Peter Wegener (*Emeritus*), Forman Williams (*Adjunct*)

Associate Professors
Jacek Cholewicki, Udo Schwarz, Wei Tong

Assistant Professors
Jerzy Blawzdziewicz, Corey O'Hern, Ainissa Ramirez, David Wu, Bjong Yeigh (*Adjunct*)

Lecturers
Beth Anne Bennett, Natalie Jeremijenko, Kailasnath Purushothaman, Glenn Weston-Murphy

FIELDS OF STUDY

Mechanics of Fluids: Dynamics and stability of drops and bubbles; dynamics of thin liquid films; macroscopic and particle-scale dynamics of emulsions, foams, and colloidal suspensions; experimental, theoretical, and computational studies of turbulence; chaos; fractals; aerodynamics; kinetic theory of gases and mixtures; electrospray theory and characterization; combustion and flames; computational methods for fluid dynamics and reacting flows; laser diagnostics of reacting and nonreacting flows; atmospheric turbulence, climate, theoretical and laboratory modeling of large-scale ocean circulation.

Mechanics of Solids/Material Science: Mechanisms of deformation, mass transport, and nucleation within material systems through experimental, analytic, and computational studies; mechanical testing of small-scale structures; characterization of microscale inhomogeneities in plastic flow; impact loading of materials; diffusion of dopants within semiconductor films; evolution of surface roughness during plastic deformation; ion implantation-induced disorder in crystalline films; incorporation of microstructural information into constitutive laws; biomechanics of the heart; electromigration in metallic interconnects; transient nucleation in multicomponent systems; jamming in particulate systems such as glasses, colloids, and granular materials.

For admissions and degree requirements, and for course listings, see Engineering and Applied Science, pages 132–45.

MEDIEVAL STUDIES

53 Wall, Rm 310, 432.0672
M.A., M.Phil., Ph.D.

Chair and Director of Graduate Studies
Paul Freedman

Professors
Marilyn McCord Adams, Robert Babcock, R. Howard Bloch, Gerhard Böwering, Carlos Eire, Margot Fassler, Roberta Frank, Paul Freedman, Ingeborg Glier, Walter Goffart, Harvey Goldblatt, Beatrice Gruendler, Dimitri Gutas, Valerie Hansen, Traugott Lawler, Bentley Layton, Ivan Marcus, Dale Martin, John Matthews, Giuseppe Mazzotta, María Rosa Menocal, Lee Patterson, Barbara Shailor, Paolo Valesio, Craig Wright

Assistant Professors
Jessica Brantley, Mark Burde, Maria Georgopoulou, Matthew Giancarlo, Olivia Holmes, Dianne Jonas, Jaime Lara, Nicole Rice, Ronald Rittgers, Anders Winroth

Fields of Study

Fields in this interdisciplinary program include history, history of art, history of music, religious studies, languages and literatures, linguistics, and philosophy.

Special Admissions Requirements

The General Test of the GRE is required.A writing sample of ten to twenty pages should be included with the application.

Special Requirements for the Ph.D. Degree

Languages required are Latin, French, and German. Proficiency in Latin is tested with an examination administered and evaluated by the department during the first term. Proficiency in French and German is demonstrated by passing the departmental examinations and should be achieved by the third term. Students will design their programs in close contact with the director of graduate studies. During the first two years students take fourteen term courses and must receive an Honors grade in at least four term courses the first year. Students take an oral examination, usually in the fifth term, on a set of three topics worked out in consultation with the director of graduate studies. Then, having nurtured a topic of particular interest, the student submits a dissertation prospectus that must be approved by the end of the third year. Upon completion of all predissertation requirements, including the prospectus, students are admitted to candidacy for the Ph.D. degree. What remains, then, is the writing, submission, and approval of the dissertation during the final two years.

Students in Medieval Studies participate in the Teaching Fellows Program in the third and fourth years.

Master's Degrees

M.Phil. See Graduate School requirements, pages 397–98. In addition, the program offers an M.Phil. in Medieval Studies for students enrolled in the Ph.D. programs of relevant humanities departments. Requirements for this degree are (1) six courses in the medieval area from departments other than that in which the student is enrolled (two of these must be the Medieval Studies interdisciplinary seminar and either a course in research methodology [HIST 540 or NELC 850] or in Latin or Arabic Paleography); (2)proficiency in Latin or Arabic as tested by an examination administered and evaluated by the department; and (3) an oral examination. These requirements are in addition to those in force in the student's home department. The M.Phil. in Medieval Studies thus requires a year of study in addition to the five years required by the student's home department. Fellowships that provide support for this extra year are available from the Graduate School; application forms may be obtained from the program in Medieval Studies.

M.A. (en route to the Ph.D.). Students enrolled in the Ph.D. program may qualify for the M.A. degree upon satisfactory completion of the first year. Minimum requirements include a High Pass average in courses and passing the Latin examination.

Master's Degree Program. For this terminal master's degree students must take at least seven term courses with a general average of High Pass and with at least one term course of Honors. Two languages are required: Latin and either French or German. No thesis is required.

Courses

MDVL 550a or b,Directed Reading.
By arrangement with faculty.

MICROBIOLOGY

354 Boyer Center for Molecular Medicine, 737.2404
M.Phil., Ph.D.

Director of Graduate Studies
Joann Sweasy

Professors
Sidney Altman (*Molecular, Cellular & Developmental Biology*), Norma Andrews (*Microbial Pathogenesis*), Kim Bottomly (*Immunobiology*), Yung-chi Cheng (*Pharmacology*), Donald Crothers (*Chemistry*), Daniel DiMaio (*Genetics*), Jorge Galán (*Microbial Pathogenesis*), Nigel Grindley (*Molecular Biophysics & Biochemistry*), Margaret Hostetter (*Pediatrics*), Keith Joiner (*Internal Medicine*), K. Brooks Low (*Therapeutic Radiology*), Diane McMahon-Pratt (*Epidemiology & Public Health*), Robert Macnab (*Molecular Biophysics & Biochemistry*), I. George Miller (*Pediatrics*), L. Nicholas Ornston (*Molecular, Cellular & Developmental Biology*), Curtis Patton (*Epidemiology & Public Health*), John Rose (*Pathology*), Nancy Ruddle (*Epidemiology & Public Health*), Clifford Slayman (*Cellular & Molecular Physiology*), Dieter Söll (*Molecular Biophysics & Biochemistry*), William Summers (*Therapeutic Radiology*), Peter Tattersall (*Laboratory Medicine*), Elisabetta Ullu (*Internal Medicine*)

Associate Professors
Serap Aksoy (*Epidemiology & Public Health*), Susan Baserga (*Therapeutic Radiology*), Michael Cappello (*Pediatrics*), Erol Fikrig (*Internal Medicine*), Durland Fish (*Epidemiology & Public Health*), Margaret Riley (*Ecology & Evolutionary Biology*), Craig Roy (*Microbial Pathogenesis*), Joann Sweasy (*Therapeutic Radiology*)

Assistant Professors
Louis Alexander (*Epidemiology & Public Health*), S. P. Dinesh-Kumar (*Molecular, Cellular & Developmental Biology*), Roger Ely (*Chemical & Environmental Engineering*), Akiko Iwasaki (*Epidemiology & Public Health*), Christine Jacobs (*Molecular, Cellular & Developmental Biology*), Barbara Kazmierczak (*Internal Medicine*), Walther Mothes (*Microbial Pathogenesis*), Christian Tschudi (*Internal Medicine*), Liangbiao Zheng (*Epidemiology & Public Health*)

Fields of Study

The Graduate Program in Microbiology is a multidepartmental, interdisciplinary Ph.D. program in training and research in the study of microorganisms and their effects on their hosts. The faculty of the program share the view that understanding the biology of microorganisms requires a multidisciplinary approach; therefore, the Microbiology graduate program emphasizes the need for strong multidisciplinary training. The program is designed to provide individualized education in modern microbiology and to prepare students for independent careers in research and teaching. Students can specialize in various areas, including bacteriology, virology, microbe-host interactions,

microbial pathogenesis, cell biology and immunobiology of microbial infections, microbial genetics and physiology, parasitology, and microbial ecology and evolution.

Special Admissions Requirements

To enter the Ph.D. program, students apply to the Microbiology track within the interdepartmental graduate program in the Biological and Biomedical Sciences. An undergraduate major in biology, biophysics, biochemistry, microbiology, or molecular biology is recommended; the GRE General Test or MCAT is required.

Program materials are available upon request from the Microbiology Graduate Program, Section of Microbial Pathogenesis, BCMM 354F, Yale University, New Haven CT 06536.

Special Requirements for the Ph.D.

Course work generally occupies the first two years of study. Each student, together with a faculty committee, outlines a course of study tailored to the individual's background and career goals. A program of course work may include general microbiology, virology, parasitology, and/or microbial genetics, as well as complementary courses in such areas as epidemiology, cell biology, immunology, biochemistry, genetics, ecology, vector biology, and statistics. The program also sponsors journal clubs and seminars in microbiology and related areas. All students participate in three laboratory rotations (MBIO 670a and b), with different faculty members, in their area of interest. Laboratory rotations assure that students quickly become familiar with the variety of research opportunities available in the program. An individualized qualifying exam on topics selected by each student, in consultation with the faculty, is given before the end of the second year. Students then undertake an original research project under the direct supervision of a faculty member. In the third year, students organize their thesis committee and prepare a dissertation prospectus, which is submitted to the Graduate School after approval by their committee. The student is then admitted to candidacy. Upon completion of the student's research project, the Ph.D. requirements conclude with the writing of a dissertation and its oral defense.

An important aspect of graduate training in microbiology is the acquisition of teaching skills through participation in courses appropriate for the student's scientific interests. These opportunities can be drawn from a diverse menu of lecture, laboratory, and seminar courses given at the undergraduate, graduate, and medical school level. Ph.D. students are expected to participate in two terms (or the equivalent) of teaching. Students are not permitted to teach during their first year.

Master's Degree

M.Phil. See Graduate School requirements, pages 397–98. Although the program does not formally offer a master's degree, students who have been admitted to candidacy qualify for an M.Phil.

Courses

MBIO 642a,Roles of Microorganisms in the Living World. L.Nicholas Ornston, Diane McMahon-Pratt,Robert Macnab.

TTh 11.30–12.45

A topical course exploring the biology of microorganisms. Emphasis on mechanisms underlying microbial adaptations and how they influence biological systems. Prerequisites: biology, chemistry, biochemistry. *Also EMD 642a, GENE 642a, MB&B 642a, MCDB 642a.*

MBIO 664b,Biology of Parasitic Protozoa and Helminths. Serap Aksoy, Curtis Patton,Christian Tschudi.

MW 11–12

Human diseases caused by eukaryotic parasites are the most prevalent in the world. They are also important causes of mortality. Malaria alone is the leading killer of children under the age of five. This course focuses on the epidemiology, developmental biology, and cellular and molecular biology of the major eukaryotic parasites. We discuss the impact of these organisms on health in developing countries and also touch on the role of selected parasites on disease burden in the United States. The format consists of two one-hour lectures a week and a total of three laboratory demonstrations. *Also EMD 664b.*

MBIO 670a,b,Laboratory Rotation. Joann Sweasy.

Rotation in three laboratories. Required for all first-year graduate students.

MBIO 680a,b,Advanced Topics in Molecular Parasitology. Diane McMahon-Pratt, Curtis Patton,Christian Tschudi.

F 12–1.30

A broadly based seminar course on current research topics in cell and molecular parasitology, with topics chosen from the current literature. *Also EMD 680a,b.*

MBIO 685b,Molecular Mechanisms of Microbial Pathogenesis. Jorge Galán, Norma Andrews,Craig Roy, Walter Mothes.

TF 10–11.30

The course focuses on current topics related to host pathogen interactions. Each week a lecture is given on the topic followed by student presentations of seminal papers in the field. All participants are required to present a paper.

[**MBIO 700a and b,Seminal Papers on the Foundations of Modern Microbiology.**]

MBIO 701a,b,Research in Progress. Joann Sweasy.

M 2

All students, beginning in their third year, are required to present their research once a year at the Graduate Student Research-in-Progress, held on Mondays at 2 P.M. These presentations are intended to give each student practice in presenting his or her own work before a sympathetic but critical audience and to familiarize the faculty with the research.

MBIO 702a,b,Microbiology Seminar Series. Joann Sweasy.

TH 4

All students are required to attend all Microbiology seminars scheduled throughout the academic year. Microbiologists from around the world are invited to describe their research.

[**MBIO 734a,Molecular Biology of Animal Viruses.**]

COUNCIL ON MIDDLE EAST STUDIES

Luce Hall, 34 Hillhouse, Ste 232, 432.5596

Chair
Abbas Amanat (*History*)

Professors
Abbas Amanat (*History*), Harold Attridge (*Religious Studies*), Ivo Banac (*History*), Gerhard Böwering (*Religious Studies*), Adela Yarbro Collins (*Divinity*), John J. Collins (*Divinity*), Benjamin Foster (*Near Eastern Languages & Civilizations*), Steven Fraade (*Religious Studies*), Beatrice Gruendler (*Near Eastern Languages & Civilizations*), Dimitri Gutas (*Near Eastern Languages & Civilizations*), Frank Hole (*Anthropology*), Stanley Insler (*Linguistics*), Bentley Layton (*Religious Studies*), Ivan Marcus (*History*), Ashgar Rastegar (*Medical School*), W. Michael Reisman (*Law*), Lamin Sanneh (*History*), Harvey Weiss (*Near Eastern Languages & Civilizations*), Robert Wilson (*Religious Studies*)

Associate Professor
Maria Georgopoulou (*History of Art*)

Assistant Professors
John Darnell (*Near Eastern Languages & Civilizations*), Frank Griffel (*Religious Studies*), Pauline Jones Luong (*Political Science*), Kaveh Khoshnood (*Epidemiology & Public Health*), Ellen Lust-Okar (*Political Science*), Leila Parsons (*History*)

Lecturer
Adel Allouche (*History, Religious Studies*)

Senior Lectors
Ayala Dvoretzky, Bassam Frangieh, Fereshteh Amanat-Kowssar

Lector
Neta Stahl

Librarians
Simon Samoeil (*Sterling Memorial Library*), Ulla Kasten (*Babylonian Collection*), Susan Matheson (*Yale University Art Gallery Ancient Arts*)

Students with an interest in the Middle East should apply to one of the University's degree-granting departments, like Anthropology, History, Linguistics, Near Eastern Languages and Civilizations, Political Science, or Religious Studies. The Council on Middle East Studies is part of the Yale Center for International and Area Studies. It has been organized to provide guidance to graduate students who desire to use the resources of the departments of the University that offer Middle East-related courses. The council brings together faculty and students sharing an interest in the Middle East by sponsoring conferences, discussions, films, and a lecture series by scholars from Yale as well as visiting scholars. It provides information concerning grants, fellowships,

research programs, and foreign study opportunities. It also administers research projects in a variety of Middle East-related areas.

In addition to the resources of the individual departments, Yale's library system has much to offer the student interested in Middle East Studies. Of particular note are the collections of Arabic and Persian manuscripts, as well as large holdings on the medieval and modern Middle East.

Inquiries about Middle East Studies should be directed to the Council on Middle East Studies, Yale University, PO Box 208206, New Haven CT 06520-8206.

MOLECULAR BIOPHYSICS AND BIOCHEMISTRY

301 Josiah Willard Gibbs Laboratories, 432.5662
M.S., M.Phil., Ph.D.

Chair
Nigel Grindley

Director of Graduate Studies
Mark Solomon (301 JWG, 432.5662, mbb.grad@yale.edu)

Professors
Donald Crothers (*Emeritus, Chemistry*), Donald Engelman, Joseph Fruton (*Emeritus*), Alan Garen, Sankar Ghosh (*Immunobiology*), Nigel Grindley, Andrew Hamilton (*Chemistry*), Mark Hochstrasser, William Konigsberg, Peter Lengyel (*Emeritus*), Richard Lifton (*Genetics; Internal Medicine* [*Nephrology*]), Robert Macnab, I. George Miller (*Pediatric Infectious Diseases; Epidemiology*), Simon Mochrie (*Physics; Applied Physics*), Peter Moore (*Chemistry*), Anna Pyle, Charles Radding (*Genetics*), Lynne Regan, Frederic Richards (*Emeritus*), Gaston Schmir (*Emeritus*), Robert Shulman (*Emeritus*), Sofia Simmonds (*Emeritus*), Michael Snyder (*Molecular, Cellular & Developmental Biology*), Dieter Söll, Joan Steitz, Thomas Steitz, Scott Strobel, Julian Sturtevant (*Emeritus*), William Summers (*Therapeutic Radiology*), Patrick Sung, David Ward (*Genetics*), Kenneth Williams (*Adjunct, Research*), Harold Wyckoff (*Emeritus*)

Associate Professors
Susan Baserga, Mark Gerstein, Michael Koelle, Anthony Koleske, Andrew Miranker, Mark Solomon, Sandra Wolin (*Cell Biology*)

Assistant Professors
Thomas Biederer, João Cabral, Enrique De La Cruz, Lise Heginbotham, Vinzenz Unger

Fields of Study

The principal objective of members of the department is to understand living systems at the molecular level. Areas of current interest include structure and function of biological macromolecules as determined by amino acid or nucleotide sequencing, diffraction, spectroscopic or computational analyses; mechanisms of enzyme action; bioenergetics, motility, and chemotaxis; structure and function of membranes, viruses, ribosomes, ribogymes, nucleosomes, ribonucleoprotein particles, and other macromolecular assemblies; developmental genetics; animal virology; plant molecular genetics; metabolic regulation; protein degradation; DNA transposition replication, recombination, and repair; regulation of RNA and protein synthesis; cell cycle; molecular immunology; chromosome segregation; nuclear organization.

Special Admissions Requirements

Courses in introductory biology, general chemistry, organic chemistry, physical chemistry, mathematics through differential equations, and one year of physics with calculus are required for admission. Biochemistry is recommended. Applicants must take the GRE General Test, which is preferred, or the MCAT.

To enter the Ph.D. program, students apply to an interest-based track within the interdepartmental graduate program in the Biological and Biomedical Sciences (see pages 65–67).

Special Requirements for the Ph.D. Degree

All first-year students (except M.D./Ph.D.) take three laboratory rotations (MB&B 650a and 651b, Lab Rotation for First-Year Students). All students are required to take, for credit, seven one-term science courses. To obtain the desired breadth and depth of education, students are strongly encouraged to take (or to have taken the equivalent of) the core graduate courses offered by the department in biochemistry, molecular genetics, and structural biology. Additional courses, chosen from within MB&B or from related graduate programs, should form a coherent background for the general area in which the student expects to do dissertation research. All students attend the two departmental seminars: MB&B 675, Seminar for First-Year Students, and MB&B 676b, Responsible Conduct of Research. Students with an extensive background in biochemistry or biophysics are permitted to substitute advanced courses for the introductory courses. There is no foreign-language requirement. The student's research committee (see below) makes the final decision concerning the number and selection of courses required of each student. All students are required to teach two terms during their graduate careers, usually during the second and third years. The student selects a research adviser, usually from the department faculty, by the end of the second term of residence. At that time two additional faculty members are chosen to form a research committee. Requirements for admission to candidacy, which usually takes place after four terms of residence, are: (1) completion of course requirements; (2) completion of the qualifying examination; (3) certification of the student's research abilities by vote of the faculty upon recommendation from the student's research committee; and (4) submission of a brief prospectus of the proposed thesis research. The qualifying examination, taken in the fall of the second year, is an oral defense of two short, written research proposals, one in the same area as the student's thesis research and one in a different area; the three-member oral committee includes at least one of the two members of the research committee excluding the thesis adviser, and the remaining one or two members are selected by the Qualifying Examination Committee. Once final drafts of the thesis chapters have been approved by the research committee, the student presents a dissertation seminar to the entire department, only after which may the thesis be submitted. Students must have written at least one first-author paper that is submitted, in press, or published by the time of the thesis seminar.

Honors Requirement

Students must meet the Graduate School's Honors requirement by the end of the fourth term of full-time study (see pages 394–95).

Master's Degree

M.Phil. See Graduate School requirements, pages 397–98. Awarded only to students admitted to candidacy who are continuing for the Ph.D. Students are not admitted for this degree.

M.S. May be awarded to a student who is in good standing upon completion of at least two terms of graduate study (granted to students who are not continuing in the Ph.D. program). Note that a High Pass average is required for obtaining a master's degree.

M.S. (for industrial affiliates). Scientists working in industry may attend courses and conduct research projects leading to the M.S. degree. Information may be obtained from the director of graduate studies.

Program materials are available upon request to the Director of Admissions, Department of Molecular Biophysics and Biochemistry, Yale University, PO Box 208114, New Haven CT 06520-8114.

Courses

MB&B 600a[u], Principles of Biochemistry I. Donald Engelman,Mark Solomon.
TTh 11.30–12.45
Rigorous introduction to the major concepts of biochemistry and to the process of discovery in this discipline, with emphasis on macromolecular conformation and physical processes in biochemistry. Energy metabolism, hormone signaling, and muscle contraction as examples of complex biological processes whose underlying mechanisms can be understood by identifying and analyzing the molecules responsible for these phenomena.

MB&B 601b[u], Principles of Biochemistry II. Scott Strobel, Joan Steitz.
TTh 11.30–12.45
The chemistry and metabolism of nucleic acids, the mechanism and regulation of protein and nucleic acid synthesis, and selected topics in macromolecular biochemistry.

MB&B 602a,Molecular Cell Biology. Sandra Wolin,Thomas Pollard, Graham Warren,et al.
MW 1.45–3
A comprehensive introduction to the molecular and mechanistic aspects of cell biology for graduate students in all programs. Emphasizes fundamental issues of cellular organization, regulation, biogenesis, and function at the molecular level. *Also CBIO 602a, MCDB 602a.*

MB&B 625a[u], Basic Concepts of Genetic Analysis. Tian Xu, Michael Koelle, Richard Lifton,Shirleen Roeder, Michael Stern.
TTh 1–2.15
The universal principles of genetic analysis in eukaryotes are discussed in lectures. Students also read a small selection of primary papers illustrating the very best of genetic analysis and dissect them in detail in the discussion sections. While other Yale graduate molecular genetics courses emphasize molecular biology, this course focuses on the concepts and logic underlying modern genetic analysis. *Also GENE 625a, MCDB 625a[u].*

MB&B 642a,Roles of Microorganisms in the Living World. L.Nicholas Ornston, Diane McMahon-Pratt,Robert Macnab.
TTh 11.30–12.45
A topical course exploring the biology of microorganisms. Emphasis on mechanisms underlying microbial adaptations and how they influence biological systems. Prerequisites: biology, chemistry, biochemistry. *Also EMD 642a, GENE 642a, MBIO 642a, MCDB 642a.*

MB&B 650a and 651b,Lab Rotation for First-Year Students. Nigel Grindley.
Required for all first-year graduate students.

[**MB&B 658a,Research Topics in Biophysics.**]

MB&B 675,Seminar for First-Year Students. Michael Koelle,Andrew Miranker, and staff.
F 4
Required for all first-year graduate students.

MB&B 676b,Responsible Conduct of Research. Vinzenz Unger and staff.
F 4
Designed for students who are beginning to do scientific research. The course seeks to describe some of the basic features of life in contemporary research and some of the personal and professional issues that researchers encounter in their work. Approximately six sessions during the spring term, run in a seminar/discussion format. Required for all first-year graduate students.

MB&B 700b[u], Properties of Macromolecules. Lynne Regan,Enrique De La Cruz.
MW 11.30–12.45
Solution properties of macromolecules. Current topics in biophysics including hydrodynamics, stability, kinetics, and multiple equilibria. Techniques for the solution characterization of macromolecules and their interactions, including fluorescence, circular dichroism, calorimetry, and centrifugation. Prerequisite: physical chemistry and biochemistry.

MB&B 701b3[u], DiffractionMethods. João Cabral, Vinzenz Unger.
TTh 9–10.15
Biological applications of X-ray crystallography, small-angle X-ray, and neutron scattering and cryoelectron microscopy.

MB&B 701b4[u], NMR Methods. Andrew Miranker.
TTh 9–10.15
Basic principles of NMR with emphasis on biological applications in the primary literature. Application areas include structure determination, drug binding, molecular recognition, protein folding, and in vivo metabolism. Prerequisites: physical chemistry and biochemistry.

[**MB&B 704a[u], Structural Biology.**]

MB&B 705a[u], Molecular Genetics of Prokaryotes. Nigel Grindley, Charles Radding, Joann Sweasy.
MW 11.30–12.45
Molecular aspects of the storage, replication, evolution, and expression of genetic material in prokaryotes. Required: previous or concurrent introductory courses in genetics and biochemistry. *Also GENE 705a, MCDB 505a[u].*

MB&B 710b4,Electron Cryo-Microscopy for Protein Structure Determination. Vinzenz Unger, Fred Sigworth.
Understanding cellular function requires structural and biochemical studies at an ever-increasing level of complexity. The course is an introduction into the concepts and applications of high-resolution electron cryo-microscopy. This rapidly emerging new technique is

the only tool known to date that allows biological macromolecules to be studied at all levels of resolution ranging from their cellular organization to near atomic detail. *Also C&MP 710b.*

MB&B 741a[u], Structure and Chemistry of Proteins and Nucleic Acids. Anna Pyle, Dieter Söll, João Cabral.
TTh 11.30–12.45
Selected topics in the structure of proteins and nucleic acids; sequence dependent interactions between proteins and nucleic acids; chemical modifications of DNA; chemical studies of DNA-binding proteins; catalytic RNA. Prerequisite: biochemistry.

MB&B 743b[u], Molecular Genetics of Eukaryotes. Anthony Koleske, Anna Pyle, Patrick Sung.
TTh 11.30–12.45
Selected topics in regulation of gene expression, genome structure and evolution, signal transduction, cellular physiology, development, and carcinogenesis. Prerequisite: biochemistry or permission of the instructor.

[**MB&B 746a1, Advanced Biochemical Control.**]

MB&B 749a[u], Medical Impact of Basic Science. Joan Steitz, Patrick Sung, Andrew Miranker, Enrique De La Cruz, Sankar Ghosh.
TTh 1–2.30
Consideration of examples of recent discoveries in basic science that have elucidated the molecular origins of disease or that have suggested new therapies for disease. Emphasis is placed on the fundamental principles on which these advances rely. Reading is from the primary scientific and medical literature, with emphasis on developing the ability to read this literature critically. Aimed primarily at undergraduates. Prerequisite: MB&B 600a[u]/601b[u] or permission of the instructor. *Also GENE 749a.*

MB&B 750a2, Biological Membranes. Lise Heginbotham, Vinzenz Unger, Donald Engelman.
MW 10–11.15
Biological membranes and their resident proteins are essential for cellular function; yet comparatively little is known about their structure and dynamics. This class provides an introduction to the biochemistry and biophysics of lipids, lipid bilayers, and lipid-derived second messengers. In addition, structural as well as functional aspects of the different classes of membrane proteins are discussed along with an outline of experimental approaches used to achieve an understanding of membrane protein structure and function at a molecular level.

MB&B 752a[u], Genomics and Bioinformatics. Dieter Söll, Mark Gerstein.
MW 1–2.15
Genomics describes the determination of the nucleotide sequence and many further analyses to discover functional and structural information on all the genes of an organism. Topics include the methods and results of functional and structural gene analysis on a genome-wide scale as well as a discussion of the implications of this research. Bioinformatics describes the computational analysis of genomes and macromolecular structures on a large scale. Topics include sequence alignment, biological database design, comparative genomics, geometric analysis of protein structure, and macromolecular simulation. Prerequisite: EEB 122b and MATH 115, or permission of the instructor. *Also CPSC 752a[u], MCDB 752a[u].*

[**MB&B 760b4[u], Principles of Macromolecular Crystallography.**]

MB&B 775b, Advanced Seminar in Genetics.

MB&B 800a,Advanced Topics in Molecular Medicine. Susan Baserga and staff.
M 11–1
This seminar course, which covers topics in the molecular mechanisms of disease, illustrates timely issues in areas such as protein chemistry and enzymology, intermediary metabolism, nucleic acid biochemistry, gene expression, and virology. A prior course in biochemistry is a prerequisite. This course accompanies the lectures in MB&B 550a. M.D. and M.D./Ph.D. students only.

MB&B 900a or 901b, Reading Course in Biophysics.
Directed reading course in biophysics. Term paper required. By arrangement with faculty.

MB&B 902a or 903b,Reading Course in Molecular Genetics.
Directed reading course in molecular genetics. Term paper required. By arrangement with faculty.

MB&B 904a or 905b,Reading Course in Biochemistry.
Directed reading course in biochemistry. Term paper required. By arrangement with faculty.

The following courses are for students in the joint B.S./M.S. program with Yale College:

MB&B 569b or MB&B 572b,Independent Research for B.S./M.S. Candidates. Scott Strobel.

MB&B 570a or MB&B 571b, Intensive Research Seminar for B.S./M.S. Candidates. Scott Strobel,Nigel Grindley.

MOLECULAR, CELLULAR, AND DEVELOPMENTAL BIOLOGY

Kline Biology Tower, 432.3538
M.S., Ph.D.

Chair
Michael Snyder

Director of Graduate Studies
Ronald Breaker (708 KBT, 432.9389, ronald.breaker@yale.edu)

Professors
Sidney Altman, Kim Bottomly (*Immunology*), John Carlson, Stephen Dellaporta, Xing-Wang Deng, Mary Helen Goldsmith, Douglas Kankel, Michael Kashgarian (*Pathology*), Haig Keshishian, Perry Miller (*Anesthesiology*), Mark Mooseker, Jon Morrow (*Pathology*), Frederick Naftolin (*Obstetrics & Gynecology*), Timothy Nelson, L. Nicholas Ornston, Thomas Pollard, Shirleen Roeder, Joel Rosenbaum, Alanna Schepartz (*Chemistry*), Steven Segal (*Physiology*), Michael Snyder, Robert Wyman

Associate Professors
Ronald Breaker, Craig Crews, Paul Forscher, Vivian Irish, Archibald Perkins (*Pathology*)

Assistant Professors
Savithramma Dinesh-Kumar, Scott Holley, Christine Jacobs, Frank Slack, Elke Stein, David Wells, Weimin Zhong

Fields of Study

Research in genetics and molecular biology encompasses studies of catalytic RNAs, cell cycle regulation, chromosome segregation, genetic recombination, mutation, transposons, and oncogenes. Research topics in cellular and developmental biology include structure of the cell cytoskeleton, molecular motors, chemical biology, cell surface receptors, protein transport, hormone action, mammalian transcription factors, and the regulation of cell proliferation and differentiation. Research in neurobiology focuses on sensory signal transduction, animal color vision, growth cone motility, neural differentiation, synaptogenesis, and the formation of topographic maps. A Special Program in Plant Sciences provides research and training in the molecular genetics of flowering, the developmental biology of leaves, the physiology of hormone action, sex determination, and the cellular and molecular biology of photomorphogenesis. Because of the breadth of the track, students are provided with unique opportunities for interdisciplinary studies.

To enter the Ph.D. program, students apply to an interest-based track within the interdepartmental graduate program in the Biological and Biomedical Sciences (see pages 65–67).

Special Admissions Requirements

Applicants should have obtained training in the structure, development, and physiology of organisms; the structure, biochemistry, and physiology of cells; genetics; elementary calculus; elementary physics; inorganic and organic chemistry; statistics or advanced mathematics. Lack of some prerequisites can be made up in the first year of graduate study. Students having different science training, such as degrees in chemistry, physics, or engineering, are encouraged to apply. In addition to the GRE General Test, a Subject Test is required, preferably in Biology, or in Biochemistry, Cell and Molecular Biology.

Special Requirements for the Ph.D. Degree

None of the fields of study has a required curriculum of courses. Instead, with the help of a faculty committee, each student plans a specific program that includes appropriate courses, seminars, laboratory rotations, and independent reading fitted to individual needs and career goals. There is no foreign-language requirement. Late in the third term of study the student meets with a faculty committee to decide on a preliminary topic for dissertation work and to define the research areas in which he or she is expected to demonstrate competence. By the end of the second year each student prepares a dissertation prospectus outlining the research proposed for the Ph.D. When this is accepted by a dissertation committee of faculty members, when the committee is satisfied that the student has demonstrated competence in the areas necessary to conduct the proposed work, and when the other requirements indicated above are fulfilled, the student is admitted to candidacy for the Ph.D. (but no later than the end of the second year of study). The remaining requirements include completion of the dissertation research, presentation and defense of the dissertation, and submission of acceptable copies of the dissertation to the Graduate School and to the Kline Science Library. All students are required to teach in two one-term courses during their Ph.D. study excluding the first year.

Honors Requirement

Students must meet the Graduate School's Honors requirement by the end of the fourth term of full-time study (see pages 394–95).

Master's Degree

M.S. (en route to the Ph.D.) The minimum requirements for award of the Master of Science Degree are: (1) two academic years registered and in residence full time in the graduate program; (2) satisfactory completion of the first two years of study and research leading to the Ph.D.; this requirement may be met either (a) by completing a minimum of five courses with an average grade of High Pass, or (b) by successfully completing an approved combination of courses and research and passing the prospectus examination; (3) recommendation by the department for award of the degree, subject to final review and approval by the appropriate degree committee. No courses that were taken prior to matriculation in the graduate program, or in Yale College, or in summer programs may be applied toward these requirements.

Program materials are available upon request to the Director of Graduate Studies, Department of Molecular, Cellular, and Developmental Biology, Yale University, PO Box 208103, New Haven CT 06520-8103.

Courses

MCDB 500a[u], Biochemistry. L.Nicholas Ornston,Robert Macnab.
MWF 9.30–10.20
An introduction to the biochemistry of animals, plants, and microorganisms, emphasizing the relations of chemical principles and structure to the evolution and regulation of living systems.

MCDB 505a[u], Molecular Genetics of Prokaryotes. Nigel Grindley, Charles Radding, Joann Sweasy.
MW 11.30–12.45
Molecular aspects of the storage, replication, evolution, and expression of genetic material in prokaryotes. *Also GENE 705a, MB&B 705a[u].*

MCDB 530a[u], Biology of the Immune System. Kim Bottomly and staff.
MWF 9.30–10.20
The development of the immune system. Cellular and molecular mechanisms of immune recognition. Effector responses against pathogens; autoimmunity. *Also IBIO 530a.*

MCDB 550a[u], Physiological Systems. Steven Segal and staff.
MWF 9.30–10.20
Organ systems of the human body, emphasizing the principles of physiological control. Biophysical properties of cells, tissues, and organs are considered in light of homeostasis and the regulation of body functions. *Also C&MP 550a, ENAS 550a[u].*

[**MCDB 555b[u], Molecular Basis of Development.**]

MCDB 560b[u], Cellular and Molecular Physiology: Mollecular Machines in Human Disease. Michael Caplan,Emile Boulpaep,Mark Mooseker.
MWF 9.30–10.20
Focus on understanding the processes that transfer molecules across membranes. Topics also include the different classes of molecular machines that mediate membrane transport. Emphasis on interactions among transport proteins in determining the physiologic behaviors of cells and tissues. *Also C&MP 560b.*

MCDB 570b[u], Biotechnology. Michael Snyder, Ronald Breaker, Kenneth Nelson, Joseph Wolenski.
MW 11.30–12.45
The principles and applications of cellular, molecular, and chemical techniques that advance biotechnology. Topics include the most recent tools and strategies used by government agencies, industrial labs, and academic research to adapt biological and chemical compounds as medical treatments, industrial agents, or for the further study of biological systems.

MCDB 600Lb,Advanced Biological Techniques. Michael Snyder, Xing-Wang Deng, Scott Holley, Kenneth Nelson, Joseph Wolenski,David Austin.
MW 1–5
A laboratory course to familarize graduate students with state-of-the-art technologies in molecular biology, genomics. Students carry out research projects and incorporate their own projects into the lab. The class meets for two afternoons each week and consists of 2–3 week modules covering the following topics: microarray analysis, plant genetic engineering, mouse genetic engineering, imaging/microscopy, ribozyme enzymol/engineering, phage display/chemical biology.

MCDB 602a,Molecular Cell Biology. Sandra Wolin,Mark Mooseker, Thomas Pollard,Graham Warren.
MW 1.45–3
A comprehensive introduction to the molecular and mechanistic aspects of cell biology for graduate students in all programs. Emphasizes fundamental issues of cellular organization, regulation, biogenesis, and function at the molecular level. *Also CBIO 602a, MB&B 602a.*

MCDB 603a,Seminar in Molecular Cell Biology. Sandra Wolin,Mark Mooseker, Thomas Pollard,Graham Warren.
Th 9–11
A graduate-level seminar course in modern cell biology. The class is devoted to the reading and critical evaluation of classical and current papers. The topics are coordinated with the MCDB 602a lecture schedule. Thus, concurrent or previous enrollment in MCDB 602a is required. *Also CBIO 603a.*

[**MCDB 615b^{u}, Genetics and Molecular Biology of Plant Development.**]

MCDB 625a^{u}, Basic Concepts of Genetic Analysis. Tian Xu,Richard Lifton, Shirleen Roeder, Michael Stern.
TTh 1–2.15
The universal principles of genetic analysis in eukaryotes are discussed in lectures. Students also read a small selection of primary papers illustrating the very best of genetic analysis and dissect them in detail in the discussion sections. While other Yale graduate molecular genetics courses emphasize molecular biology, this course focuses on the concepts and logic underlying modern genetic analysis. *Also GENE 625a, MB&B 625a^{u}.*

MCDB 630b,Biochemical and Biophysical Approaches in Molecular and Cellular Biology. Thomas Pollard and staff.
This graduate course introduces the theory and application of biochemical and biophysical methods to study the structure and function of biological macromolecules. The course considers the basic physical chemistry required in cellular and molecular biology but does not require a previous course in physical chemistry. One class per week is a lecture introducing a topic. The second class is a small group discussion of one or two research papers utilizing those methods.

MCDB 642a,Roles of Microorganisms in the Living World. L.Nicholas Ornston, Diane McMahon-Pratt,Robert Macnab.
TTh 11.30–12.45
A topical course exploring the biology of microorganisms. Emphasis on mechanisms underlying microbial adaptations and how they influence biological systems. *Also EMD 642a, GENE 642a, MB&B 642a, MBIO 642a.*

MCDB 660a^{u}, Structure,Function,and Development of Vascular Plants. Graeme Berlyn.
TTh 2.30–3.45
Morphogenesis and adaptation of vascular plants considered from seed formation and germination to maturity. Physiological and developmental processes associated with structural changes in response to environment discussed from both a phylogenetic and an adaptive point of view.

MCDB 670b,Advanced Seminar in Biochemistry and Genetics. Sidney Altman, Ronald Breaker, Stephen Dellaporta.
W 1.30–3.45
New aspects of the molecular biology of RNA, ribonucleoproteins, and prions. Topics include the localization and function of RNA and ribonucleoproteins; the role of RNA in dosage compensation, chromosome silencing, and gene regulation; novel ribozymes and RNA technology; prions. Discussion; involvement and attendance are required.

MCDB 677b,Mechanisms of Development. Lynn Cooley, Xing-Wang Deng, Scott Holley, Valerie Reinke, Frank Slack,Michael Stern, Kevin White.

M 9.45–11, F 1.30–3

An advanced course on the mechanisms of animal development focusing on the genetic specification of cell organization and identity during embryogenesis and somatic differentiation. The use of evolutionarily conserved signaling pathways to carry out developmental decisions in a range of animals is highlighted. Course work includes student presentations and critical analysis of primary literature. *Also GENE 777b.*

MCDB 685b[u], Evolutionary Developmental Biology. Günter Wagner, Vivian Irish, Kevin White.

TTh 2.30–3.45

This course is an introduction into an emerging biological discipline, evolutionary developmental biology. The course provides an introduction to the evolutionary biology of developmental processes as well as the developmental underpinnings of major evolutionary transformations. Topics include the evolution of Hox genes and other developmental genes, the origin of multicellular organisms, the evolution of flowers, and the origin of the arthropod and vertebrate Bauplan. The course has a mixed lecture/seminar format and thus engages the student to do independent study and prepare papers. Entering graduate students are expected to complete a unique research project and present in a lecture format to the class. *Also E&EB 685b[u].*

[**MCDB 692a,Advanced Seminar in Cell Biology: Mechanisms of Signal Transduction.**]

MCDB 720a[u], Neurobiology. Haig Keshishian, Paul Forscher.

MWF 11.30–12.20

Examination of the excitability of the nerve cell membrane as a starting point for the study of molecular, cellular, and intercellular mechanisms underlying the generation and control of behavior. *Also NBIO 720a, NSCI 720a.*

MCDB 721La[u], Laboratory for Neurobiology. Haig Keshishian,Robert Wyman.

T or W 1.30–6

Optional laboratory. Introduction to the neurosciences. Projects include the study of neuronal excitability, sensory transduction, CNS function, synaptic physiology, and neuroanatomy.

MCDB 735b[u], Seminar in Brain Development and Plasticity. Weimin Zhong.

MW 2.30–3.45

Interpretation of primary literature including recent reviews and basic research papers in the areas of neuron generation and regeneration, neuron phenotype determination, axon guidance systems, and the role of activity in organizing and increasing the efficiency of synaptic connections. *Also NSCI 504b.*

MCDB 750b,Core Topics in Biomedical Informatics. Perry Miller and staff.

T 1.30–3.20

Introduction to common unifying themes that serve as the foundation for different areas of biomedical informatics, including clinical, neuro-, and genome informatics. Emphasis is on understanding basic principles underlying informatics approaches to biomedical data modeling, interoperation among biomedical databases and software tools, standardized biomedical vocabularies and ontologies, and other topics of interest. The course involves lectures, class discussions, student presentations, and significant programming assignments. Prerequisite: previous computer programming experience and permission of the instructor.

MCDB 752a[u], Genomics and Bioinformatics. Dieter Söll,Mark Gerstein, Michael Snyder.
MW 1–2.15
Genomics describes the determination of the nucleotide sequence and many further analyses to discover functional and structural information on all the genes of an organism. Topics include the methods and results of functional and structural gene analysis on a genome-wide scale as well as a discussion of the implications of this research. Bioinformatics describes the computational analysis of genomes and macromolecular structures on a large scale. Topics include sequence alignment, biological database design, geometric analysis of protein structure, and macromolecular simulation. *Also CPSC 752a[u], MB&B 752a[u].*

MCDB 861b[u], Global Problems of Population Growth. Robert Wyman.
TTh 2.30–3.45
The worldwide population explosion in its human, environmental, and economic dimensions. Sociobiological bases of reproductive behavior. Population history and the cause of demographic change. Interactions of population growth with economic development and environmental alteration. Political, religious, and ethical issues surrounding fertility; human rights; and the status of women.

MCDB 900a and 901b,First-Year Introduction to Research. Susan Ferro-Novick, Ronald Breaker, Michael Stern.
Lab rotations, grant writing, and ethics for Molecular Cell Biology, Genetics, and Development track students. *Also CBIO 900a, 901b; GENE 900a, 901b.*

MCDB 950a and 951b,Second-Year Research.
By arrangement with faculty.

The following courses are required for students in the joint B.S./M.S. program with Yale College:

MCDB 585b,Research in MCDB for B.S./M.S. Candidates.
A two-credit course taken in the third-to-last term (typically the second term of the junior year). At the end of this course, students complete a detailed prospectus describing their thesis project, and the work completed thus far. An oral and written presentation of this prospectus is evaluated by the adviser and two faculty members; the evaluation will determine whether the student may continue in the program.

MCDB 595,Intensive Research in MCDB for B.S./M.S. Candidates.
A four-credit course (two credits each term) that is similar to MCDB 495 and spans the last two terms (i.e., typically the senior year). During this course, students give an oral presentation describing their work. At the end, a comprehensive thesis is turned in and evaluated by the adviser and two other faculty members. Students must earn a B grade or higher in this course in order to receive the M.S. degree.

MUSIC

143 Elm, 432.2985
M.A., M.Phil., Ph.D.

Chair
Patrick McCreless

Director of Graduate Studies
James Hepokoski (143 Elm, 432.2991, james.hepokoski@yale.edu)

Professors
Margot Fassler, Allen Forte, Michael Friedmann (*Adjunct*), Daniel Harrison, James Hepokoski, Patrick McCreless, Robert Morgan, Leon Plantinga, Ellen Rosand, Craig Wright

Associate Professors
Kathryn Alexander, Richard Lalli (*Adjunct*), Kristina Muxfeldt

Assistant Professors
David Clampitt, Eric Drott, John Halle, Robert Holzer, Michael Veal

Fields of Study

Fields include music theory and music history. (Students interested in performance or composition should apply to the Yale School of Music.)

Special Admissions Requirements

Previous training in music theory or music history is required. Samples of the applicant's previous work including extended papers, advanced exercises, and analyses must be submitted. The GRE General Test is required by the Graduate School. Applicants whose native language is not English must take the Test of English as a Foreign Language (TOEFL).

Special Requirements for the Ph.D. Degree

Two years of course work, comprising sixteen courses, are normally required. Students in the music theory program must pass examinations in two foreign languages: German and normally French, Latin, or Italian. For students in the music history program, German and two other languages are required. Language examinations, partly with dictionary and partly without, are administered at the beginning of each term. A musicianship exam (ear training, keyboard, and basic theory and analysis) is given to all entering students. Admission to candidacy for the Ph.D. must occur before the end of the third year of study. It is granted if the student has received a grade of Honors in two full-year courses or in four term courses, has passed the language and qualifying examinations, and has submitted an acceptable dissertation prospectus. The departmental qualifying examination is given near the beginning of the third year and all language requirements must be satisfied by that time. Students attend a weekly prospectus/dissertation seminar

during the third year of study. Before the end of that year, the student must submit a dissertation prospectus for faculty approval.

The faculty considers teaching to be essential to the professional preparation of graduate students in Music. Students in Music participate in the Teaching Fellows Program in their third and fourth years.

Combined Ph.D. Program: Music and Renaissance Studies

The Department of Music also offers, in conjunction with the Renaissance Studies Program, a combined Ph.D. in Music and Renaissance Studies. For further details, see Renaissance Studies.

Master's Degrees

M.Phil. See Graduate School requirements, pages 397–98.

M.A. (en route to the Ph.D.). Students enrolled in the Ph.D. program qualify for the M.A. degree upon the successful completion of eight courses, at least six of which are seminars given in the department, along with the passing of an examination in one foreign language. Of the six departmental seminars, at least two grades must be Honors; the remaining six grades must average High Pass.

Master's Degree Program. The department offers admission to a small number of students in a terminal M.A. program. Candidates must pass eight term courses achieving an average of High Pass and at least one Honors, complete a special project, and pass an examination in one foreign language.

Program materials are available upon request to the Director of Graduate Studies, Department of Music, Yale University, PO Box 208310, New Haven CT 06520-8310.

Courses

MUSI 618b, Hildegard of Bingen: The Composer as Theologian. Margot Fassler.
Th 1.30–3.20

An introduction to the "lived" theology of monastic medieval life through one of its greatest champions, the nun Hildegard. This course focuses for half of its time upon careful reading of her theology and biblical exegesis in English translation, and the other half of the time upon her music, poetry, drama, and illuminations. It is hoped that an interdisciplinary mix of students will be present, and that individual projects will develop out of specialized expertise. The course also provides an introduction to manuscript study via twelfth-century sources, and to the theological landscape of the twelfth century. The class is limited in size to twenty-five students and permission of the instructor is required. *Also REL 736b.*

MUSI 702a, Theory and Aesthetics: Pre-1600. Craig Wright.
W 10-12

This course investigates the writings of the principal Western music theorists from Greek antiquity to 1600—Aristoxenus, Boethius, Guido, Franco, Philippe de Vitry, Tinctoris, Gaffurius, Glareanus, Zarlino, and Morley among them. Issues of modality, scalar structures, chromatic inflections, counterpoint and voice leading, as well as aesthetic questions concerning the meaning of music and its function in society, are discussed. Whenever possible, relevant musical compositions are analyzed to exemplify theoretical principles.

MUSI 705b,Theory and Aesthetics: The Nineteenth Century. Leon Plantinga.
T 1.30–3.20
A consideration of nineteenth-century European thought about music approached from four vantage points: philosophical views of the arts and music; literary romanticism and the arts; music criticism; theories of harmony, acoustics, and musical form.

MUSI 732b.Practicum in German Translation. Kristina Muxfeldt.
W 10–12
Intensive work in translating German, using texts in music history and theory drawn from a broad range of historical periods. The course considers various theories of translation and practices a range of strategies for gaining facility in both quick paraphrase and accurate and idiomatic scholarly translation. Prerequisite: an elementary course in German or the equivalent knowledge. This course may supplement but cannot replace one of the three required departmental seminars offered in this term.

MUSI 814a,Directed Studies in the History of Music.
By arrangement with faculty.

MUSI 814b,Directed Studies in the History of Music.
By arrangement with faculty.

MUSI 817b,Alban Berg's *Lulu*. Robert Holzer.
W 1.30–3.20
A wide-ranging historical and critical examination of Alban Berg's second opera. Issues to be considered include Frank Wedekind's Lulu plays and German theater at the turn of the twentieth century; German opera and cinema of the 1920s; the development of Berg's style after his adoption of serialism; Berg's fashioning of the libretto from the play; the meanings of tonal allusion and stylistic parody; Berg as autobiographer; feminism and anti-feminism in Austria and Germany; and the opera's reception.

MUSI 822b,Handel and Ariosto. Ellen Rosand.
Th 10–12
Ariosto's Renaissance romance *Orlando furioso* was a favorite source for opera librettos of the eighteenth century, including three by Handel: *Orlando* (1732), *Ariodante* (1734), and *Alcina* (1735). Like the librettos of most of Handel's operas, these are derived from previous texts that had been set to music by a variety of composers active in Italy in the early decades of the century. In addition to surveying Handel's compositional materials for the three works (autograph scores, revisions, borrowings), we consider the source librettos and their settings, by such composers as Vivaldi and Pollarolo, as well as contemporary operas based on other texts drawn from Ariosto. Such a study not only provides an introduction to Handel's operas in general (bibliography, sources, questions of genre, performance traditions) but may also allow us to draw broader conclusions regarding the reception of Ariosto in the eighteenth century.

MUSI 850a,Sonata Theory. James Hepokoski.
T 1–4
A genre-based approach to analyzing sonata form and the multimovement sonata, ca. 1770–1800. Hierarchies of compositional options and principles of deviation. Intersections with other analytical methodologies in current usage. Issues in sonata hermeneutics.

MUSI 875a, Topics in Criticism: Life, Work,and Narrative. Kristina Muxfeldt.
Th 1.30–3.20
The debates surrounding the function and value of Beethoven sketch studies, "genetic" criticism in literary studies, and relations between biography and work in the writings of such figures as T. S. Eliot, Benjamin, Rosen, Dahlhaus, and Berlioz. The seminar includes a mix of theoretical readings and close case studies.

MUSI 901a, Tonal Analysis I. Allen Forte.
M 9–11
A systematic coverage of basic Schenkerian concepts, together with instruction in the creation of graphic representations of analyses of shorter tonal works. Following a schedule to be provided by the instructor, participants present their work for discussion in the seminar. As relevant to the course, readings are assigned and given critical attention.

MUSI 901b, Tonal Analysis II. Robert Morgan.
T 10–12
Continuing study of Schenkerian concepts, practice in graphic analysis, and critical readings of writings both by and about Schenker.

MUSI 904b, The Pedagogy of Music Theory. Daniel Harrison.
Th 1.30–3.20
An examination of various "systems of presentation" (Schoenberg) for material common to music-theory courses at the college level. Various current texts and approaches are evaluated, rehearsed, and critiqued, and their role in the curricula of both liberal arts and conservatory degree programs is considered. Some historical methods are also surveyed in connection with the history of institutional music instruction. Special problems in the teaching of music are covered: aural and keyboard skills, tutorial and private lessons, the appropriate role of technology, and introductory approaches useful for general students (those without previous formal training).

MUSI 914b, Directed Studies in the Theory of Music.
By arrangement with faculty.

MUSI 933a, Richard Wagner's *Parsifal*. Patrick McCreless.
Th 10–12
An analytical and interpretive study of Wagner's final music drama. Readings include analytical work on *Parsifal* from Alfred Lorenz to the neo-Riemannians, David Lewin, and Warren Darcy. Also to be considered are the place of *Parsifal* in Wagner's oeuvre as a whole and questions of hermeneutics and meaning.

MUSI 914a, Directed Studies in the Theory of Music.
By arrangement with faculty.

MUSI 998a, Prospectus Workshop. Ellen Rosand
T 4–5.20

MUSI 999b, Dissertation Colloquium. Ellen Rosand.
T 4–5.20

NEAR EASTERN LANGUAGES AND CIVILIZATIONS

314 Hall of Graduate Studies, 432.2944
M.A., M.Phil., Ph.D.

Chair
Dimitri Gutas

Director of Graduate Studies
Eckart Frahm (319 SML, 432.5584, eckart.frahm@yale.edu)

Professors
Hans-Werner Fischer-Elfert (*Visiting*), Benjamin Foster, Beatrice Gruendler, Dimitri Gutas, Bentley Layton, William Simpson, Harvey Weiss

Assistant Professors
John Darnell, Eckart Frahm, Hala Nassar

Lecturers
Adel Allouche, Karen Foster

Senior Lectors
Fereshteh Amanat-Kowssar, Ayala Dvoretzky, Bassam Frangieh

Lectors
Siam Bhayro, Neta Stahl, Kevin van Bladel

Fields of Study

Fields include Arabic and Islamic studies (also with interdisciplinary minor), Greco-Arabic studies, Archaeology of the Ancient Near East, Assyriology, and Egyptology.

Special Admissions Requirements

Applicants should state their specific field of study and intended specialization. Evidence of a reading knowledge of *both* French and German is required of all students. Proficiency in one of these languages is normally prerequisite for admission and deficiency in the second language must be rectified before admission to a second year of study. Proficiency will be certified by passing a departmental examination upon registration at Yale. Students admitted with only one of the two required languages or who fail the departmental examination are expected to enroll in an appropriate full-year course given by the French or German departments at Yale. Completion of such a course with a grade of A or B will be accepted as fulfilling the proficiency requirement in either language; exceptions, e.g., for native speakers of French or German, may be made by the department upon recommendation of the director of graduate studies.

Special Requirements for the Ph.D. Degree

Course Work: The department normally requires three full years of course work, four year courses or eight term courses per year being considered a full load. This may be reduced to two years in cases of exceptional background in Near Eastern languages. Normal progress in course work is considered to be consistent achievement of grades of High Pass or better, and at least four term courses or two year courses with Honors per year.

Special Language and Course Requirements: Course work should be planned to meet two departmental general standards: core languages for the primary fields of study, and minimum competence in a secondary field. The core languages in each of the major fields of study are as follows: *Arabic and Islamic Studies:* Arabic, Persian (Farsi) or Syriac or Greek; *Archaeology of the Ancient Near East:* at least one ancient language relevant to the student's area of interest; majors in archaeology are also required to take at least one term of archaeological method and theory and at least one term of descriptive and inferential statistics; *Assyriology:* Sumerian and Akkadian; *Egyptology:* Egyptian and at least four terms of Demotic or Coptic. Minimum competence in a secondary field of study is defined as follows: at least two terms of a Near Eastern language to be evaluated either by examination or with a course grade of High Pass or better, or at least two terms of nonlanguage courses outside the area of specialization. A minimum grade of High Pass in these courses will be considered successful fulfillment of this requirement.

In Arabic and Islamic Studies, the minimum competence can be extended to an interdisciplinary course of study in a minor field. Minors may include six to eight term courses in the following departments and programs: Anthropology, Comparative Literature, French, German Studies, Greek and Classics, History, History of Medicine and Science, Judaic Studies, Italian, Linguistics, Medieval Studies, Political Science and Sociology, Philosophy, Religious Studies, Spanish and Portuguese, or others, by permission of the director of graduate studies. Students in all programs of the department will be expected to declare their choice of a secondary language or area, or a minor field, by their third term of study. *Examinations and the Dissertation:* The comprehensive examination is normally taken at the end of the third year of study or, where advanced standing has been granted, at the end of the second year, but in no case later than September of the academic year following the last year of the student's required course work. The scope of the examination will be determined by the director of graduate studies in consultation with the student and department member(s) in whose area the student's studies are concentrated. The examination will consist of written and oral portions and will cover no fewer than five and no more than six areas. In the case of the program in Arabic and Islamic Studies with an interdisciplinary minor, the written portion will consist of two language examinations and one subject in the minor field, and the oral of two subjects in Arabic studies and one in the minor field. The written examinations will be set by the individual faculty members responsible for particular areas of study, but the oral portion will be

conducted by the full staff of the department. The dissertation proposal is normally submitted one month following the completion of the qualifying examination. Successful completion of the comprehensive examination and submission of an acceptable prospectus will qualify the student for admission to candidacy for the Ph.D. degree. After completion of the dissertation, the candidate may receive a final examination concerned primarily with the defense of the thesis.

Master's Degrees

M.Phil. See Graduate School requirements, pages 397–98. Alternatively, the department of Near Eastern Languages and Civilizations offers, in conjunction with the Medieval Studies Program, a joint M.Phil. degree. For further details, see Medieval Studies. In addition to the Graduate School requirements (see pages 397–98), the dissertation prospectus must have been accepted.

M.A. Applicants who do not wish to enroll in the Ph.D. program may pursue a Master of Arts degree. Students enrolled in such a program should complete a minimum of twelve term courses with at least two term grades of Honors and an average of High Pass in the remaining courses, and will be required to submit a master's thesis no later than April 1 of the fourth term of study. No financial aid is available. Students enrolled in the Ph.D. program are also eligible for this degree by meeting the same requirements.

Program materials are available upon request from the Director of Graduate Studies, Department of Near Eastern Languages and Civilizations, Yale University, PO Box 208236, New Haven CT 06520-8236.

Courses

ARBC 501[u], Elementary Modern Standard Arabic. Bassam Frangieh, Kevin van Bladel.
MTWThF 1.30–2.20
Develops a basic knowledge of modern standard Arabic. Emphasis on grammatical analysis, vocabulary acquisition, and the development of reading and writing skills.

ARBC 502[u], Spoken Modern Standard Arabic. Bassam Frangieh.
TTh 2.30–3.45
A supplement to the elementary course in modern standard Arabic, emphasizing oral skills. Corequisite or prerequisite: NELC 821[u] or permission of instructor.

ARBC 503[u], Intermediate Modern Standard Arabic. Bassam Frangieh, Kevin van Bladel.
MW 11.30–12.45
Intensive review of grammar; readings from contemporary and classical Arab authors with emphasis on serial reading of unvoweled Arabic texts, prose composition, and formal conversation.

ARBC 504[u], Advanced Modern Standard Arabic. Hala Nassar.
MW 1–2.15
Focus on improving the listening, writing, and speaking skills of students who already have a substantial background in the study of modern standard Arabic.

ARBC 505a[u] or b[u], Arabic Seminar. Dimitri Gutas.
T 3.30–5.20
Study and interpretation of classical Arabic texts for advanced students.

ARBC 511a,Greco-Arabic Seminar. Dimitri Gutas.
M 3.30–5.20

ARBC 521b,Seminar in the Philosophy of Avicenna. Dimitri Gutas.
M 3.30–5.20

ARBC 551a[u], East Meets West: Drama and Theater in the Arab World. Hala Nassar.

ARBC 552b[u], Gender and Nationalism in Arab Women's Literature. Hala Nassar.

ARBC 570a[u], The History of the Islamic Near East from Mohammad to the Mongol Invasion. Adel Allouche.
TTh 11.30–12.45
An examination of the shaping of society and polity from the rise of Islam to the Mongol conquest of Baghdad in 1258. The origins of Islamic society; conquests, and social and political assimilation under the Ummayyads and Abbasids; the changing nature of political legitimacy and sovereignty under the caliphate; provincial decentralization; and new sources of social and religious power. *Also HIST 829a[u].*

ARBC 572b[u], Greek into Arabic into Latin: Foundations of Western Culture.
TTh 10.30–11.20, 1 HTBA

CPTC 501[u], Biblical Coptic: Elementary Course. Paul Dilley.

CPTC 504b,The Making of Monasticism. Bentley Layton.

EGYP 501[u], Introduction to Classical Hieroglyphic Egyptian. Colleen Manassa.
An introduction to the language of ancient pharaonic Egypt (Middle Egyptian) and its hieroglyphic writing system, with short historical, literary, and religious texts. Grammatical analysis with exercises in reading, translation, and composition.

EGYP 531,Egyptian Historical Texts. William Simpson.

EGYP 533,Egyptian Literary Texts. William Simpson.

HEBR 501[u], Elementary Modern Hebrew. Ayala Dvoretzky, Neta Stahl.
MTWThF 10.30–11.20
Introduction to the language of contemporary Israel, both spoken and written. Fundamentals of grammar; extensive practice in speaking, reading, and writing under the guidance of a native speaker.

HEBR 502[u], Modern Hebrew II. Ayala Dvoretzky, Neta Stahl.
MW 11.30–12.45
Introduction to modern Hebrew literature, with readings selected from contemporary prose and verse. Review and continuation of grammatical study leading to a deeper comprehension of style and usage. Prerequisite: NELC 661[u] or equivalent.

HEBR 503b[u], Advanced Modern Hebrew: Ideological and Social Discourse. Neta Stahl.
MW 1–2.15
An examination of major controversies in Israeli society. Readings include newspaper editorials and academic articles as well as documentary and history-based plays. Advanced grammatical structures are introduced and practiced. Conducted in Hebrew. Prerequisite: NELC 662[u] or equivalent.

HEBR 504a[u], Introduction to Modern Israeli Literature. Ayala Dvoretzky.
MW 1–2.15
Reading, discussion, and analysis of short stories, poetry, and magazine articles representative of contemporary Israeli culture, with attention to different styles. Conducted in Hebrew. Prerequisite: NELC 662[u] or equivalent.

MESO 501[u], Elementary Akkadian. Elizabeth Payne.
MWF 11.30–12.45

MESO 502b,Advanced Akkadian. Benjamin Foster.

MESO 531,Beginning Sumerian. Thomas Eby [F],Emmanuelle Salgues [Sp].

[**MESO 532b,Intermediate Sumerian.**]

MESO 533a or b,Advanced Sumerian. Benjamin Foster.

MESO 539a or b,Directed Readings: Sumerian.

MESO 543a,Neo-Assyrian History. Eckart Frahm.
T 3–5

MESO 544b,Mesopotamian Selected Texts: Scholarly Texts. Eckart Frahm.
T 3–5

MESO 559a or b,Directed Readings: Assyriology.

MESO 571a[u], Tales from Before Homer: An Introduction to Sumerian and Babylonian Literature. Eckart Frahm.
MW 2.30–3.45

PERS 501[u], Elementary Persian. Fereshteh Amanat-Kowssar.
MWF 9.30–10.20
An introduction to modern Persian, with emphasis on grammar and syntax as well as writing and reading simple prose. Both literary and classical Persian are taught in the second term.

PERS 502[u], Intermediate Persian. Fereshteh Amanat-Kowssar.
MWF 10.30–11.20
Detailed analysis of Persian usage and syntax through the study of modern and classical texts in prose and poetry. Readings from newspapers, textbooks, historical writings, travelogues, classical and modern literature.

PERS 503, Persian Seminar: Identity and Awakening. Fereshteh Amanat-Kowssar.
MW 11.30–12.45

PERS 859a or b,Directed Readings: Persian.

SMTC 521[u], Elementary Syriac. Siam Bhayro.
MW 3.30–4.45
The Mesopotamian Christian form of Aramaic widely used in the Roman and Byzantine Near East. Thorough grounding in grammar and vocabulary as a basis for reading biblical, historical, poetic, and theological texts.

SMTC 522a,Syriac Prose Texts. Siam Bhayro.

SMTC 523b, Syriac Poetic Texts. Siam Bhayro.
F 10–12

SMTC 531a[u], Aramaic Survey I: First Millennium B.C.E. Siam Bhayro.
Th 2-4
This course introduces different dialects of Aramaic attested in the first millennium B.C.E. and consists of seminars in which prepared readings are analyzed and discussed with reference to historical and philological problems. Prerequisite: knowledge of Hebrew.

SMTC 532b[u], Aramaic Survey II: Dialects of the Common Era. Siam Bhayro.
TH 2-4
The course, which aims to introduce students to the different dialects of Aramaic attested in the Common Era, consists of seminars in which prepared readings are analyzed and discussed with reference to historical and philological problems. Prerequisite: knowledge of Hebrew.

SMTC 542b,Ethiopic. Siam Bhayro.
F 2–4

TKSH 501[u], Elementary Turkish. Staff.
MTWTHF 9–10

TKSH 502[u], Intermediate Turkish. Staff.
TTH 11.30–12.45

NELC 503a,The Art of Ancient Palaces. Karen Foster.

NELC 504b[u], Art of the Ancient Near East and Aegean. Karen Foster.
Introduction to the art and architecture of Mesopotamia, Egypt, and the Aegean, with attention to cultural and historical contexts.

NELC 506b,History of Mesopotamia: Third Millennium B.C.E. Benjamin Foster.

[**NELC 507a,History of Mesopotamia: Second Millennium B.C.E.**]

[**NELC 508b,History of Mesopotamia: First Millennium B.C.E.**]

[**NELC 510a[u], Conflicts that Shaped Pharaonic Egypt.**]

[**NELC 511b[u], Ancient Egypt from the Ramesside to the Ptolemaic Periods.**]

[**NELC 512b[u], Egyptian Religion through the Ages.**]

[**NELC 544a,Mesopotamian Selected Texts: Bilingual.**]

[**NELC 545b,Neo-Babylonian.**]

[**NELC 563b[u], From Pictograph to Pixel: Changing Ways of Human Communication.**]

[**NELC 566a,Late Period Historical Texts: Napatan Historical Inscriptions.**]

[**NELC 566b,Literary Texts in Late Egyptian.**]

NELC 567a,Egyptian Religious Texts.

[**NELC 568a,Selected Egyptian Literary Texts.**]

[**NELC 569b,Ptolemaic and Roman Hieroglyphic Texts.**]

[**NELC 571a or b,Selected Egyptian Wisdom Texts.**]

[**NELC 572b,Ramesside Texts.**]

[**NELC 573b,Introduction to Demotic.**]

[**NELC 576a,Ancient Egyptian Epistlography.**]

[**NELC 577b,Ancient Egyptian Cosmographic Texts.**]

[**NELC 578a,Egyptian Religious Texts: The Ancient Egyptian Netherworld Books.**]

NELC 579a or b, Directed Readings: Egyptology.

[**NELC 586b[u], Origins of Cities and States in Greater Mesopotamia.**]

NELC 587b[u], Environmental History of the Near East.
TH 9.30–11.20
Natural and anthropogenic climate and environmental changes of the Holocene studied in the lake, marine, and terrestrial records of West Asia. Periodic adaptations to these changes through the modern period within regional habitat-tracking, agricultural innovation and pastoralism, political expansion and disintegration, and ideological reformulation. *Also ANTH 736b[u], ARCG 736b[u].*

NELC 588b[u], Civilizations and Collapse. Harvey Weiss.
TH 2.30–4.20
Collapse documented in the archaeological and early historical records of the Old and New Worlds, including Mesopotamia, Mesoamerica, the Andes, and Europe. Analysis of politicoeconomic vulnerabilities, resiliencies, and adaptations in the face of abrupt climate change, anthropogenic environmental degradation, resource depletion, "barbarian" incursions, or class conflict. *Also ANTH 773b[u], ARCG 773b[u].*

[**NELC 590a,Coffin Texts.**]

[**NELC 591b,Ancient Egyptian Love Poetry.**]

[**NELC 592b,Death and Afterlife in Ancient Egypt.**]

[**NELC 595a,Ancient Egyptian Art and Archaeology.**] .

[**NELC 621,Ugaritic.**]

[**NELC 726a[u], Introduction to the History of Christianity in the Ancient World: Jesus to Augustine.**]

[**NELC 735b[u], Gnostic Religion and Literature.**]

NELC 741b[u], Introduction to Gnostic Texts in Coptic. Bentley Layton.
TTH 11.30–12.45

NELC 745a[u], Egyptian Monastic Literature in Coptic. Bentley Layton.
TTH 11.30–12.45

[**NELC 772a,Classical Syriac Historiography.**]

[**NELC 773b,Theological and Literary Texts in Syriac.**]

[**NELC 807b[u], Modern Islamic Thought.**]

[**NELC 808b[u], Islamic Law: Concepts and Controversies.**]

[**NELC 809a[u], Science in the Islamic World.**]

[**NELC 810a[u], Memory, Fiction,and the Creation of Meaning in Classical Arabic Literature.**]

[**NELC 811a[u], Love,Desire,and the Erotic in Classical Arabic Literature.**]

[**NELC 812b,Abbasid Poetry in Context.**]

[**NELC 818b[u], Early Arabic Philosophy.**]

[**NELC 829b,History of the Arabic Language.**]

[**NELC 832b,Introduction to Medieval Arabic Literary Criticism.**]

[**NELC 834b,Arab Historical Writing.**]

[**NELC 836b,Classical Arabic Biography.**]

[**NELC 844b,Arabic Palaeography and Textual Criticism.**]

[**NELC 845a,Plato's *Laws* in Arabic.**]

[**NELC 847a,Medieval Islamic Ethics.**]

[**NELC 848a,Seminar in Islamic Theology.**]

NELC 849a or b,Directed Readings: Arabic.

NELC 850a,Introduction to Arabic and Islamic Studies. Dimitri Gutas.
W 2.30–4.20
Comprehensive survey of the various subjects treated in Arabic and Islamic studies, with representative readings from each. Detailed investigation into the methods and techniques of scholarship in the field, with emphasis on acquiring familiarity with the bibliographical and other research tools.

NEUROBIOLOGY

C300 Sterling Hall of Medicine, 785.4323
M.S., M.Phil., Ph.D.

Chair
Pasko Rakic

Director of Graduate Studies
Amy Arnsten (SHM B428, 785.4431, amy.arnsten@yale.edu)

Director of Medical Studies
Michael Schwartz (SHM C314, 785.4324, michael.schwartz@yale.edu)

Professors
Colin Barnstable, Benjamin Bunney, Nigel Daw, Patricia Goldman-Rakic, Charles Greer, Susan Hockfield, Jeffery Kocsis, Robert LaMotte, Csaba Leranth, David McCormick, Pasko Rakic, Joseph Santos-Sacchi, Ilsa Schwartz, Gordon Shepherd, Stephen Strittmatter, Stephen Waxman

Associate Professors
Meenakshi Alreja, Amy Arnsten, Charles Bruce, Nihal de Lanerolle, Tamas Horvath, Thomas Hughes, Bita Moghaddam, Marina Picciotto, Anna Roe, Michael Schwartz, Flora Vaccarino, Christopher van Dyck

Assistant Professors
Hal Blumenfeld, Wei Chen, Maria Donoghue Velleca, Reiko Maki Fitzsimonds, Mark Laubach, Dhasakumar Navaratnam, Vincent Pieribone, Nenad Sestan, Ning Tian, Mark Yeckel

Fields of Study

Fields include the development, neuronal organization, and function of the mammalian central nervous system. The range of methods includes molecular and cellular neurobiology, neuroanatomy, receptor biochemistry, neuropharmacology, neurophysiology, and behavior. An integrative, multidisciplinary approach is encouraged.

Special Requirements for the Ph.D.

Four terms of course work, selected in consultation with faculty advisers, are required. Neurobiology 500b and an advanced course in cell biology are required. It is expected that the student maintain a better than passing record in the area of concentration. The Graduate School requires two term grades of Honors during the first two years of study. The qualifying examination is given at the end of the second year of study. The remaining degree requirements include the submission of a prospectus, after which a student may be admitted to candidacy; research under the supervision of the adviser; and the submission of the dissertation. There is no formal foreign language requirement.

An important aspect of graduate training in neurobiology is the acquisition of teaching skills through participation in courses appropriate for the student's scientific interests. These opportunities can be drawn from a diverse menu of lecture, laboratory, and seminar courses given at the undergraduate, graduate, and medical school level. Ph.D. students are expected to participate in two terms (or the equivalent) of teaching. Students are not expected to teach during their first year.

To enter the Ph.D. program, students apply to the Neuroscience track within the Biological and Biomedical Sciences (see pages 65–67).

Master's Degrees

M.Phil. See Graduate School requirements, pages 397–98. Awarded only to students who are continuing for the Ph.D. degree. Students are not admitted for this degree.
M.S. Awarded only to students who are not continuing for the Ph.D. degree but who have successfully completed one year of the doctoral program. Students are not admitted for this degree.

Program materials are available upon request to the Director of Graduate Studies, Department of Neurobiology, Yale University, PO Box 208001, New Haven CT 06520-8001.

Courses

NBIO 500b,Structural and Functional Organization of the Human Nervous System. Pasko Rakic,Michael Schwartz,and staff.
An integrative overview of the structure and function of the human brain as it pertains to major neurological and psychiatric disorders. Neuroanatomy, neurophysiology, and clinical correlations are interrelated to provide essential background in the neurosciences. Lectures in neurocytology and neuroanatomy survey neuronal organization in the human brain, with emphasis on long fiber tracts related to clinical neurology. Weekly three-hour laboratory sessions devoted to neuroanatomy in which students dissect the human brain and examine histological sections in close collaboration with faculty members. Lectures in neurophysiology cover various aspects of neural function at the cellular level, with a strong emphasis on the mammalian nervous system. Each student may participate in a weekly physiology conference with a faculty member, covering such topics as vision, sensory physiology, motor systems, simple nervous systems, or general neurophysiology. Clinical correlations consist of five sessions given by one or two faculty members representing both basic and clinical sciences. These sessions relate neurological symptoms to cellular processes in various diseases of the brain. Variable class schedule; contact course instructor. *Also NSCI 510b.*

NBIO 501a,Principles of Neuroscience. Marina Picciotto,Reiko Fitzsimonds.
WF 3.15–4.45
General neuroscience seminar: lectures, readings, and discussion of selected topics in neuroscience. Emphasis is on how approaches at the molecular, cellular, physiological, and organismal levels can lead to understanding of neuronal and brain function. *Also NSCI 501a.*

NBIO 502a,Structure and Function of Neocortex. Patricia Goldman-Rakic and faculty.
This seminar/lecture course covers anatomical, biochemical, and physiological organization of selected sensory, motor, and association regions of cortex. Sample topics discussed include

development, evolution of multiple representations, columnar organization, and plasticity of neocortex. Permission of instructor required.

[**NBIO 507b,Cellular and Molecular Mechanisms of Neurologic Disease.**]

[**NBIO 509b,Synaptic Organization of the Nervous System.**]

NBIO 510,Introduction to Methods in Cellular and Molecular Neurobiology. Faculty.
Firsthand insight into various techniques and approaches used in neuroscience. Light microscopic techniques include various metallic impregnation methods, autoradiography, anterograde and retrograde axonal transport methods, hybridoma and recombined DNA technology, deoxyglucose metabolic method, fluorescent and immunocytochemical methods. Electron microscopy encompasses transmission, electronmicroscopic autoradiography, and immuno-peroxidase methodology. Choice of techniques and hours to be arranged with individual faculty or staff members of the Department of Neurobiology.

NBIO 511,Introduction to Techniques Used in Electrophysiological Analysis at the Cellular Level. Faculty.
Includes practical training in in vivo and in vitro nervous system preparations, extracellular and intracellular recordings, sensory stimulation, dye injections, and selected neuropharmacological procedures. Choice of techniques and hours to be arranged with individual faculty or staff members of the Department of Neurobiology.

[**NBIO 520a, Vision: Cellular and Network Dynamics of the Cerebral Cortex.**]

[**NBIO 524a,The Regulation of Cell Fate during CNS Development.**]

[**NBIO 530b,Neurobiology of Schizophrenia.**]

NBIO 550,Introduction to Neuroinformatics. Gordon Shepherd, Perry Miller, and staff.

NBIO 570a,Cellular and Network Dynamics of Sensory and Motor Functions. Charles Bruce and faculty.

NBIO 601, Topics in Olfactory Physiology. Gordon Shepherd.
Advanced tutorial course.

NBIO 610b,Fundamentals in Neurophysiology. Vincent Pieribone, Fred Sigworth.
This course is designed for students who wish to gain a theoretical and practical knowledge of modern neurophysiology. Graduate students specializing in neurophysiology and non-neurophysiology are encouraged to attend, as the course begins at a very basic level and progresses to more complicated topics. Topics include properties of ion channels, firing properties of neurons, synaptic transmission, and neurophysiology methodology.

NBIO 720a,Neurobiology. Haig Keshishian, Paul Forscher.
MWF 11.30–12.20
Examination of the excitability of the nerve cell membrane provides a starting point for the study of molecular, cellular, and intracellular mechanisms underlying the generation and control of behavior. *Also MCDB 720a[u], NSCI 720a.*

NEUROSCIENCE

L-200 Sterling Hall of Medicine, 785.5932
M.S., M.Phil., Ph.D.

Directors of Graduate Studies
Haig Keshishian (*Molecular, Cellular & Developmental Biology*) (KBT 640, 432.3478, haig.keshishian@yale.edu)
Charles Greer (*Neurosurgery;Neurobiology*) (LSOG 221, 785.4034, charles.greer@yale.edu)

Professors
George Aghajanian (*Psychiatry; Pharmacology*), Colin Barnstable (*Ophthalmology & Visual Science; Neurobiology*), Linda Bartoshuk (*Surgery; Epidemiology; Psychology*), Walter Boron (*Cellular & Molecular Physiology*), Benjamin Bunney (*Psychiatry; Pharmacology*), John Carlson (*Molecular, Cellular & Developmental Biology*), Lawrence Cohen (*Cellular & Molecular Physiology*), Nigel Daw (*Ophthalmology & Visual Science; Neurobiology*), Pietro De Camilli (*Cell Biology*), Ronald Duman (*Psychiatry; Pharmacology*), Barbara Ehrlich (*Pharmacology; Cellular & Molecular Physiology*), Patricia Goldman-Rakic (*Neurobiology; Psychology*), Charles Greer (*Neurosurgery, Neurobiology*), Susan Hockfield (*Neurobiology*), Marcia Johnson (*Psychology*), Leonard Kaczmarek (*Pharmacology; Cellular & Molecular Physiology*), Kenneth Kidd (*Genetics; Molecular, Cellular & Developmental Biology; Psychiatry*), Jeffery Kocsis (*Neurology; Neurobiology*), Robert LaMotte (*Anesthesiology; Neurobiology*), Thomas Lentz (*Cell Biology*), Laura Manuelidis (*Neuropathology*), David McCormick (*Neurobiology*), Bita Moghaddam (*Psychiatry; Neurobiology*), Mark Mooseker (*Molecular, Cellular & Developmental Biology; Cell Biology*), Frederick Naftolin (*Obstetrics & Gynecology; Molecular, Cellular & Developmental Biology*), Angus Nairn (*Psychiatry*), Pasko Rakic (*Neurobiology*), J. Murdoch Ritchie (*Pharmacology*), Robert Roth (*Psychiatry; Pharmacology*), Gary Rudnick (*Pharmacology*), W. Mark Saltzman (*Chemical Engineering; Biomedical Engineering*), Joseph Santos-Sacchi (*Surgery; Neurobiology*), Ilsa Schwartz (*Surgery; Neurobiology*), Steven Segal (*Epidemiology; Cellular & Molecular Physiology*), Gordon Shepherd (*Neurobiology*), Frederick Sigworth (*Cellular & Molecular Physiology*), Stephen Strittmatter (*Neurology; Neurobiology*), Allan Wagner (*Psychology*), Stephen Waxman (*Neurology; Pharmacology*), Robert Wyman (*Molecular, Cellular & Developmental Biology*), Steven Zucker (*Computer Science*)

Associate Professors
Meenakshi Alreja (*Psychiatry; Neurobiology*), Amy Arnsten (*Neurobiology*), Charles Bruce (*Neurobiology*), Nihal de Lanerolle (*Neurosurgery; Neurobiology*), Paul Forscher (*Molecular, Cellular & Developmental Biology*), James Howe (*Pharmacology*), Marina Picciotto (*Psychiatry; Pharmacology; Neurobiology*), George Richerson (*Neurology; Cellular & Molecular Physiology*), Michael Schwartz (*Neurobiology*), Jane Taylor (*Psychiatry*), Flora Vaccarino (*Child Study Center; Neurobiology*), Michael Westerveld (*Neurosurgery*), Anne Williamson (*Neurosurgery; Neurobiology*), Tian Xu (*Genetics*)

Assistant Professors
Patrick Allen (*Psychiatry*), Hal Blumenfeld (*Neurology; Neurobiology*), Angélique Bordey (*Neurosurgery*), Wei Chen (*Neurobiology*), R. Todd Constable (*Diagnostic Radiology; Neurosurgery*), Maria Donoghue Velleca (*Neurobiology*), Reiko Maki Fitzsimonds (*Cellular & Molecular Physiology*), Karyn Frick (*Psychology*), Lise Heginbotham (*Molecular Biophysics & Biochemistry*), Anthony Koleske (*Molecular Biophysics & Biochemistry*), Mark Laubach (*Neurobiology*), Christy Marshuetz (*Psychology*), Dhasakumar Navaratnam (*Neurology; Neurobiology*), Vincent Pieribone (*Cellular & Molecular Physiology*), Maria Mercedes Piñango (*Linguistics*), Elke Stein (*Molecular, Cellular & Developmental Biology*), Ning Tian (*Ophthalmology & Visual Science*), David Wells (*Molecular, Cellular & Developmental Biology*), Mark Yeckel (*Neurobiology*), David Zenisek (*Cellular & Molecular Physiology*), Weimin Zhong (*Molecular, Cellular & Developmental Biology*)

Research Scientists
Joel Black (*Neurology*), Nicholas Carnevale (*Psychology*)

Fields of Study

The Interdepartmental Neuroscience Program offers flexible but structured interdisciplinary training for independent research and teaching in neuroscience. The goal of the program is to ensure that degree candidates obtain a solid understanding of cellular and molecular neurobiology, physiology and biophysics, neural development, systems and behavior, and neural computation. In addition to course work, graduate students participate in a regular journal club, organize the *Interdepartmental Neuroscience Program Seminar Series*, and attend other seminar programs, named lectureships, symposia, and an annual research retreat.

Special Admissions Requirements

Applicants to the Neuroscience Program should have a B.S. or B.A. Most applicants have had course work in neuroscience, psychobiology, physiological psychology, mathematics through calculus, general physics, general biology, general chemistry, organic chemistry, biochemistry, computer science, or engineering. Deficiencies in these areas can be corrected through appropriate course work in the first year of residence. Laboratory research experience is desirable but is not a formal requirement. Scores for the GRE (General Test required; Subject Test recommended) or MCAT, three letters of recommendation, transcripts of undergraduate grades, and a statement of interest must accompany the application.

To enter the Ph.D. program, students apply to an interest-based track within the interdepartmental graduate program in the Biological and Biomedical Sciences (see pages 65–67).

Special Requirements for the Ph.D. Degree

Each entering student is assigned a faculty advisory committee to provide guidance. This committee is responsible for establishing the student's course of study and for monitoring his or her progress. This committee will be subsequently modified to include faculty

with expertise in the student's emerging area of interest. Although each student's precise course requirements are set individually to take account of background and educational goals, the course of study is based on a model curriculum beginning with three core courses (Principles of Neuroscience, Neurobiology, and Structural and Functional Analysis of the Human Nervous System) designed to ensure broad competence in modern neuroscience. Students are also required to complete at least three additional courses from a broad set of neuroscience-related courses. The Graduate School uses grades of Honors, High Pass, Pass, and Fail and requires two term grades of Honors during the first two years of study. Students are expected to maintain at least a High Pass average. A series of at least two laboratory rotations during the first year of the program also ensures that degree candidates obtain a solid background in systems, cellular, and molecular approaches to neuroscience. Admission to candidacy requires passing a qualifying examination normally given during the second year, and submission of a dissertation prospectus (NIH grant format) before the end of the third year. In accordance with the expectations of the BBS program, Ph.D. students are expected to participate in two terms (or the equivalent) of teaching. Thesis committee meetings are required annually. Also required is the completion and satisfactory defense of the thesis.

Requirements for M.D./Ph.D. students are the same as for Ph.D. students with the following differences: five courses are required (Principles of Neuroscience and Structural and Functional Analysis of the Human Nervous System, and three elective graduate level courses). M.D./Ph.D. students are required to serve for one term as teaching assistants; however, two terms of teaching are preferred.

Master's Degrees

M.Phil. See Graduate School requirements, pages 397–98.
M.S. Awarded only to students who are not continuing for the Ph.D. degree but who have successfully completed one year of the doctoral program. Students are not admitted for this degree.

Program materials are available upon request to the Director of Graduate Studies, Neuroscience, Yale University, PO Box 208074, New Haven CT 06520-8074.

Courses

NSCI 501a,Principles of Neuroscience. Marina Picciotto,Mark Yeckel.
WF 3.15–4.45
General neuroscience seminar: lectures, readings, and discussion of selected topics in neuroscience. Emphasis is on how approaches at the molecular, cellular, physiological, and organismal levels can lead to understanding of neuronal and brain function. *Also NBIO 501a.*

NSCI 504b,Seminar in Brain Development and Plasticity. Weimin Zhong.
MW 2.30–3.45
Weekly seminars (Monday) and discussion sessions (Wednesday) to explore recent advances in our understanding of brain development and plasticity, including neuronal determination, axon guidance, synaptogenesis, and developmental plasticity. *Also MCDB 735b*[u].

[**NSCI 506b,Introduction to Brain and Behavior.**]

NSCI 507b,Cellular and Molecular Mechanisms of Neurological Disease. Dhasakumar Navaratnam,Stephen Strittmatter, Stephen Waxman.
Focuses on those diseases in which modern neuroscience has advanced mechanistic explanations for clinical conditions. The application of pathophysiologic understanding to therapeutics is considered.

[**NSCI 508a,Functional Properties of Cortical Neurons and Circuits.**]

NSCI 510b,Structural and Functional Organization of the Human Nervous System. Michael Schwartz, Pasko Rakic.
An integrative overview of the structure and function of the human brain pertaining to major neurological and psychiatric disorders. *Also NBIO 500b.*

[**NSCI 514a, The Regulation of Cell Fate during CNS Development.**]

NSCI 519a/b, Tutorial.
By arrangement with faculty and approval of the director of graduate studies.

[**NSCI 521a,Neuroimaging in Neuropsychiatry.**]

NSCI 539b,Synaptic Organization of the Nervous System. Gordon Shepherd, Anne Williamson,Michael Hines.
An integrative introduction to the principles underlying the organization of neural systems. The focus is on the best-understood systems, including spinal cord, olfactory bulb, retina, cerebellum, thalamus, basal ganglia, and cerebral cortex. Students integrate experimental findings from anatomy, electrophysiology, and neuropharmacology with computational models at the cellular and circuit level.

[**NSCI 540a,Introduction to Statistics in Psychology.**]

NSCI 600a,Experimental Methods in Neuroscience. R. Todd Constable.
TTh 2–4
This course examines the experimental techniques currently available for the neuroscientist. It explores the kinds of information obtainable in studying phenomena ranging from electrophysiological recordings of individual neurons to metabolic processes, from ensembles of neurons to behavioral output. Techniques covered include microscopic methods (light, electron), electrophysiology (extracellular/intracellular single cell recordings, multiple cell recording methods, brain slices), macroscopic methods (ERP, MEG, TMR), metabolic measures (microdialisis, biosensors, MR spectroscopy), imaging approaches (optical tomography, PET, SPECT, functional MRI), and interventional techniques (lesions, cortical stimulation, knockout genetics, surgery, drugs). The knowledge gained from each of these approaches, the limitations of the methods, and future developments are considered.

[**NSCI 605b, Pathways of Discovery in Neuroscience.**]

NSCI 614a,Neurobiology of Learning and Memory. Thomas Brown.
M 11.30–2
This seminar integrates hypotheses and research methods used to elucidate the neurobiological mechanisms underlying learning and memory. Levels of analysis range from molecular and cellular to systems and behavioral, with a primary focus on cellular and systems neurophysiology. Discussion includes the philosophy and rationale underlying some of the more successful and interesting methods. A goal is to evaluate critically how one might connect synaptic phenomena such as long-term potentiation and depression to behavioral changes such as acquisition and extinction. Focus is on combining in vitro and in vivo methods that offer the possibility for yielding quantitative theoretical or computational models. *Also PSYC 572a.*

[**NSCI 646,Advances in Cognitive Neuroscience: Prefrontal Cortex and Memory.**]

NSCI 654b,Sensory Processes. Lawrence Marks, Joseph Stevens.
A course on the senses, emphasizing functional properties of human vision, hearing, taste, smell, and skin senses.

NSCI 720a,Neurobiology. Haig Keshishian, Paul Forscher.
MWF 11.30–12.20
Examination of the excitability of the nerve cell membrane provides a starting point for the study of molecular, cellular, and intracellular mechanisms underlying the generation and control of behavior. *Also MCDB 720a[u], NBIO 720a.*

The following course is also of particular value to students in Neuroscience:

MCDB 721La[u], Laboratory for Neurobiology. Haig Keshishian,Robert Wyman.

PHARMACOLOGY

B-334 Sterling Hall of Medicine, 785.4545
M.S., M.Phil., Ph.D.

Chair
Joseph Schlessinger

Director of Graduate Studies
William Sessa (BCMM 436, 737.2291, william.sessa@yale.edu)

Director of Medical Studies
Karen Anderson

Professors
George Aghajanian, Karen Anderson, G. Peter Beardsley, Harold Behrman, B. Stephen Bunney, Evangelo Canellakis (*Emeritus*), Yung-chi Cheng, J. G. Collins, Jack Cooper (*Emeritus*), Priscilla Dannies, Ronald Duman, Barbara Ehrlich, Robert Handschumacher (*Emeritus*), Leonard Kaczmarek, Edward Moczdlowski, Perry Molinoff (*Adjunct*), William Prusoff (*Emeritus*), J. Murdoch Ritchie (*Emeritus*), Sara Rockwell, Robert Roth, Gary Rudnick, Alan Sartorelli, William Sessa, Joseph Schlessinger, Stephen Waxman

Associate Professors
Anton Bennett, Edward Chu, Valentin Gribkoff (*Adjunct*), Robert Heimer, James Howe, Elias Lolis, Guiseppe Pizzorno, Todd Verdoorn (*Adjunct*)

Assistant Professors
Michael DiGiovanna, Marina Picciotto, Ya Ha

Lecturers
Louise-Marie Dembry, Gregory Gardiner, Robert Levine, John Pawelek, Alexander Scriabine

Fields of Study

Major emphases in the department are in the areas of molecular pharmacology, mechanisms of drug action, structural biology, neuropharmacology, and chemotherapy.

Special Admissions Requirements

A bachelor's degree in biology, chemistry, or another science is required. Undergraduate courses should include biology, organic chemistry, physics, and calculus. GRE scores are required; a GRE Subject Test, preferably in Biology or Chemistry, is recommended.

To enter the Ph.D. program, students apply to an interest-based track within the interdepartmental graduate program in the Biological and Biomedical Sciences (see pages 65–67).

Special Requirements for the Ph.D. Degree

Because the field of pharmacology encompasses many disciplines, the department's flexible program of study toward the Ph.D. degree permits students to concentrate in areas of their particular interest. The only common courses required of all students are the basic course in pharmacology, seminars in which students present papers, and laboratory rotations that provide students with exposure to a variety of experimental approaches.

The basic requirements for admission to candidacy for the Ph.D. degree include one and one-half to two years of course work (including the basic course in pharmacology, seminars, and laboratory rotations), during which time the Graduate School Honors requirement and an oral qualifying examination must be completed. There is no foreign-language requirement. A thesis prospectus must be submitted by the end of the third year. Admission to candidacy is usually achieved by the end of the third year. A doctoral dissertation based upon original research, with an oral examination in defense of the dissertation, is required for the degree. The norm for completion of the Ph.D. program is four to five years.

An important aspect of graduate training in pharmacology is the acquisition of teaching skills through the participation in courses appropriate for the student's scientific interests. These opportunities can be drawn from a diverse menu of lecture, laboratory, and seminar courses given at the undergraduate, graduate, and medical school level. Ph.D. students are expected to participate in two terms (or the equivalent) of teaching. Students are not expected to teach during their first year.

Master's Degrees

M.Phil. See Graduate School requirements, pages 397–98.
M.S. (en route to the Ph.D.). Students are eligible for the M.S. degree upon successful completion of the first three terms of the Ph.D. program.

Program materials are available upon request to the Director of Graduate Studies, Department of Pharmacology, Yale University, PO Box 208066, New Haven CT 06520.

Courses

PHAR 502a and b,Seminar in Pharmacology. To be announced.
A seminar given by a department faculty member on his or her area of interest to teach students how to critically evaluate papers and to improve the ability of the students to give oral presentations.

PHAR 504a,Pharmacology I: Maintaining and Restoring Homeostasis. Priscilla Dannies and staff.
MW 10.30–12
Lectures covering drug-receptor interactions, control of messenger systems and channels, and regulation of physiological systems.

PHAR 504b,Pharmacology II: Interfering Selectively. Elias Lolis and staff.
MW 10.30–12
Lectures covering antibiotics, immunotherapy, and chemotherapy.

PHAR 506a and b,Methods in Pharmacological Research (Rotations). William Sessa.
Students work in laboratories of faculty of their choice. The period spent in each laboratory is one term.

PHAR 508b,Neuropharmacology. James Howe.
T 2–4
An intensive examination of current understanding of the sites and mechanisms involved in drug action on single nerve cells and on the brain. Emphasis on basic functions and illustrative examples of their disturbance by drugs.

PHAR 510b,Life Science Business. Gregory Gardiner.
Exploration of where the life sciences intersect with finance and the law from a variety of perspectives including those of industry, academia, and the communications media.

PHAR 518b,Current Topics in Cancer and Viral Therapy. Yung-chi Cheng, Elias Lolis.
W 5.15–7.15

PHAR 522a,Neuroimaging. Julie Staley.
W 4.15–6
Neuroimaging methodologies including Positron Emission Tomography (PET), Single Photon Emission Computed Tomography (SPECT), Magnetic Resonance Imaging (MRI), functional Magnetic Resonance Imaging (fMRI), and Magnetic ResonanceSpectroscopy (MRS) are rapidly evolving tools used to study the living human brain. Neuroimaging has unprecedented implications for routine clinical diagnosis; for assessment of drug efficacy; for determination of psychotropic drug occupancy; and for the study of pathophysiological mechanisms underlying neurologic and psychiatric disorders. This course is designed to provide an overview of the theory and current state of development of the different neuroimaging modalities and their application to neurologic and psychiatric disorders.

PHILOSOPHY

Connecticut Hall, 432.1665
M.A., M.Phil., Ph.D.

Chair
Michael Della Rocca

Director of Graduate Studies
Karsten Harries [Sp] (107 Connecticut Hall, 432.1682, karsten.harries@yale.edu)
Keith DeRose (*Acting* [F]) (keith.derose@yale.edu)

Professors
Marilyn McCord Adams, Robert Adams, Seyla Benhabib, Susanne Bobzien, Jules Coleman, Michael Della Rocca, Keith DeRose, John Hare, Karsten Harries, Robin Jeshion, Shelly Kagan, Amelie Rorty (*Visiting*), Sun-Joo Shin

Associate Professor
Tad Brennan

Assistant Professors
Katalin Balog, Troy Cross, James Kreines, Michael Nelson, Frisbee Sheffield (*Visiting* [F]), Michael Weber

Lecturer
Gregory Ganssle

Fields of Study

Fields include most of the major areas of philosophy. Please write for departmental statement.

Special Requirements for the Ph.D. Degree

In the first two years all students must complete a total of twelve term courses. Graduate courses are grouped: (1) metaphysics, theory of knowledge, philosophy of science; (2) ethics, aesthetics, philosophy of religion, political philosophy, and theory of value; (3) history of philosophy. No more than six and no fewer than two courses may be taken in each group. A course in logic must also be taken, although on the basis of previous work a student may petition to have this requirement waived. Two qualifying papers must be submitted, one in history, the other in another distribution area; normally the first of these papers will be submitted by mid-September, the second by December, of a student's third year. It is expected that these papers will be more substantial and professional than an ordinary term paper. Students must demonstrate competence in at least one of the following languages: French, German, Greek, or Latin, normally by the end of the second year. Students in Philosophy will teach in the third and fourth years. They must have teaching experience in at least two distribution areas. Approval of the dissertation prospectus is expected before the end of the sixth term. Upon completion of all

predissertation requirements, including the prospectus, students are admitted to candidacy for the Ph.D. Admission to candidacy must take place by the end of the third year of study. The norm for completion of the Ph.D. degree is five to six years.

Master's Degrees

M.Phil. See Graduate School requirements, pages 397–98.
M.A. (en route to the Ph.D.). An M.A. degree is awarded to students after completion of six term courses with an average grade of High Pass.

Program materials are available upon request to the Director of Graduate Studies, Department of Philosophy, Yale University, PO Box 208306, New Haven CT 06520-8306. See Philosophy Web page for information (www.yale.edu/philos).

Courses

PHIL 504a[u], Logical Theory I: Philosophical Logic. Sun-Joo Shin.
TTh 11.30–12.45
An introduction to the metatheory of first-order logic, up to and including the completeness theorem for the first-order calculus. An introduction to the basic concepts of set theory is included.

PHIL 505b[u], Logical Theory II. Sun-Joo Shin.
TTh 11.30–12.45
A technical exposition of Gödel's first and second incompleteness theorems and of some of their main consequences in proof theory and model theory, such as Löb's theorem, Tarski's undefinability of truth, provability logic, and nonstandard models of arithmetic.

PHIL 506a[u], Freedom in Nineteenth-Century German Political Thought. Seyla Benhabib.
TTh 11.30–12.20; 1 HTBA
An examination of the concept of freedom and its relation to property, civil society, and intersubjectivity in the works of Kant, Hegel, Fichte, and Marx. *Also PLSC 615a[u].*

PHIL 565a[u], Kant's *Critique of Pure Reason.* James Kreines.
TTh 2.30–3.45
An examination of the metaphysical and epistemological doctrines of Kant's *Critique of Pure Reason.*

PHIL 610a[u], Plato's *Symposium*. Frisbee Sheffield.
T 3.30–5.20
Plato's *Symposium* is primarily about eros (desire). It also explores the nature of the self, motivation, virtue, innate knowledge, and a theory of education. The course, therefore, covers some central ground in Platonic ethics, moral psychology, and epistemology.

PHIL 611b[u], Epictetus. Tad Brennan.
M 1.30–3.20
A Stoic philosopher of the early Roman Empire, Epictetus provides our most extensive source of evidence for ancient Stoicism. We investigate his brand of Stoic philosophy, examining both what is orthodox in his views and what is innovative.

PHIL 612a[u], The Philosophical Theology of John Duns Scotus. Marilyn McCord Adams.
T 3.30–5.20
This seminar examines the principal metaphysical, epistemological, ethical, and theological theories of B. John Duns Scotus by a careful study of some of his major works (*De Primo Prin-*

cipio, Sentence-Commentary selections, *Quodlibet Questions*). An analytical and critical understanding of the text is emphasized. Students may read the works in translation or in Latin. Students are expected to make seminar presentations and write a long final paper on some aspect of Scotus's philosophy of theology. *Also RLST 901a.*

PHIL 613b[u], Hegel. James Kreines.

W 1.30–3.20

An in-depth study of Hegel's philosophy, with special emphasis on his metaphysics and its relation to his philosophy of human agency, freedom, and social life.

PHIL 614b[u], Frege. Susanne Bobzien, Robin Jeshion.

F 1.30–3.20

The purpose of the seminar is to read, understand, and evaluate Gottlob Frege's most important articles, including "On Sense and Reference," "Function and Concept," "Thought," and "Negation." We focus on Frege's contributions and relevance to modern philosophical logic, as opposed to his contributions to the philosophy of mathematics.

PHIL 630a[u], Philosophy of Logic. Sun-Joo Shin.

M 3.30–5.20

An examination of some basic philosophical issues in logic. Topics include justifications of deductive and inductive reasoning, connectives, quantifiers, paradoxes, modal logic, many-valued logic, and diagrammatic logic.

PHIL 641a[u], Metaphysical Idealism. Robert Adams.

W 3.30–5.20

Examination of the view that the existence of physical objects is dependent on, or relative to, a perceiving mind. Alternative versions of the view, and arguments for and against it. Readings from early modern philosophers such as Leibniz, Berkeley, and Kant, as well as more recent philosophers. Intended for students with a strong background in metaphysics and the history of modern philosophy.

PHIL 642a[u], Consciousness—Philosophical Issues. Katalin Balog.

M 1.30–3.20

The problem of consciousness is considered by most philosophers of mind the "hard problem," i.e., the difficult part of the mind-body problem. Arguments against physicalism, i.e., the view that everything is, or is composed of, physical stuff, often take consciousness as their starting point. Discussion of these arguments as well as physicalist proposals for a theory of consciousness.

PHIL 643a[u], Vagueness and the Sorites Paradox. Susanne Bobzien.

F 1.30–3.20

We study some of the main approaches to the Sorites paradox and examine what semantics (if any) can be given for vague expressions as well as what role pragmatic considerations ought to play in an account of vagueness.

PHIL 644a[u], Ontology and Epistemology of the First Person. Robin Jeshion.

T 1.30–3.20

This seminar explores a cluster of topics concerning the possible special status of "the first person." Questions to be considered include: Do we have a special variety of knowledge of our own minds, and if so, what is its scope? Do we refer and think about ourselves in a way that is fundamentally different from the way we do so about others? Should our thought about ourselves as agents impinge on metaphysical questions about personal identity?

PHIL 645b[u], Analyticity. Sun-Joo Shin.

M 3.30–5.20

This seminar explores different views of the concept of analyticity and apriority since Kant. After understanding Carnap's project for the analytic/synthetic distinction, we focus on the Carnap-Quine debate on the issue.

PHIL 646b[u], Disposition and Laws of Nature. Troy Cross.

Th 1.30–3.20

An examination of what might be called the scientific modalities, a tightly knit family of notions including counterfactuals, causation, laws of nature, dispositions, and chance. The central issue is whether all of these notions admit of reduction to the non-modal, and if not, whether one notion is the most basic and ought to be taken as a primitive. Special attention is paid to implications for the epistemology of modality.

PHIL 655a[u], Normative Ethics. Shelly Kagan.

T 1.30–3.20

A systematic examination of normative ethics, the part of moral philosophy that attempts to articulate and defend the basic principles of morality. The bulk of the course surveys and explores some of the main normative factors relevant in determining the moral status of a given act or policy (features that help make a given act right or wrong). Brief consideration of some of the main views about the foundations of normative ethics (the ultimate basis or ground for the various moral principles).

PHIL 656b[u], Theory of the Good. Shelly Kagan.

T 1.30–3.20

What makes one outcome intrinsically better than another? Presumably, one relevant factor concerns how well off the relevant people are, but arguably it is also relevant whether the well-being is distributed equally, or perhaps whether the greatest well-being is going to those who most deserve it. And some have suggested that virtue is itself of intrinsic significance, so that a world with more virtue is better, in and of itself. We consider these four factors — well-being, equality, desert, and virtue — in turn, as part of constructing a plausible overall theory of the good.

PHIL 657b[u], Ethical Theory and the Virtues. Robert Adams.

W 3.30–5.20

Questions about what it is to be a virtuous or morally good person, and what must be true about a personal quality if it is to be a moral virtue or vice, are examined in relation to empirical as well as conceptual issues; and their place in the enterprise of ethical theory is discussed. Readings chiefly from contemporary authors.

PHIL 658a[u], Emotions and the Politics of the Mind. Amelie Rorty.

W 3.30–5.20

A history of conceptions of the emotions, their relation to perception, imagination, reasoning, the will, and personal identity. The rhetoric of the language of the emotions. Aristotle, the Stoics, Descartes, Spinoza, Hume, Rousseau, Freud.

PHIL 659a[u], Rights. Michael Nelson.

W 1.30–3.20

Rights place limits on what can be done to promote overall well-being. And it seems that there are such limits. Even if it would make everyone much better off for someone to be killed, it seems that morality may well not permit that person to be put to death. If there are such limits on the pursuit of the overall well-being, then what is the relationship between morality and overall well-being, and what are the sources of these limits? These are some of the questions we explore in this course.

PHIL 660b[u], Civic Republicanism. Michael Weber.

M 1.30–3.20

An examination of the republican criticism of, and alternative to, liberalism, understood broadly to include any political ideal that emphasizes individual freedom and individual rights, thus including both liberals and conservatives (Democrats, Republicans, and Libertarians). Attention to the contemporary debate, with a focus on the liberalism of John Rawls (*A Theory of Justice* and *Political Liberalism*) and the republicanism of Michael Sandel (*Democracy's Discontent*).

PHIL 662b[u], The Hidden Structure of Political Theories. Amelie Rorty.
W 3.30 – 5.20
The psychological and epistemological assumptions of classical political theories: what do they assume about the uniformity and plasticity of human nature, about standard motives and modes of knowledge? What do they imply about civic education? Plato, Aristotle, Aquinas, Hobbes, Locke, Rousseau, Mill, Marx, Rawls. *Also PLSC 649b[u].*

PHIL 700a,Metaphysics of Christology. Marilyn McCord Adams.
M 3.30–5.20
The Council of Chalcedon declares that in Christ there are two (unconfused) natures and one person. This seminar examines attempts to give this formula a metaphysical interpretation. Readings come from medieval Latin authors (Anselm, Aquinas, Scotus, Ockham), from late nineteenth century kenotic theologians, and from contemporary philosophy of religion (e.g., Thomas Morris, Richard Swinburne). Students are expected to read, take part in discussion, and write a twenty-five-page term paper. (Significant preparation in philosophy or theology is required.) *Also RLST 911a.*

PHIL 702b,Aliens,Citizens,and Residents: Political Philosophy and Political Membership. Seyla Benhabib,C.Emcke.
Th 10.30–12.20
Conditions of membership have not been subjected to rigorous philosophical examination in liberal-democratic theory. How can boundaries and borders be justified? In a world of deterritorialized politics, what is the moral justification, if any, for retaining nation-state borders? By focusing on Rawls, Walzer, Habermas, Arendt, and contemporary theories of citizenship (Beiner, Carens, Nussbaum, Bauboeck), this course deals with the ethics and politics of membership. *Also PLSC 580b.*

PHIL 703a,Necessity and Naming. Michael Della Rocca.
Th 1.30–3.20
An examination of the surprising and powerful ways in which rationalist principles — the rejection of arbitrariness and the demand for explanation — can structure a metaphysical system. Topics to be covered may include identity, persistence, the nature of time, necessitarianism (the thesis that all truths are necessary truths), essentialism. Some attention also to the connections between rationalist themes in metaphysics and certain prevalent strands in recent philosophy of language. Readings by Kripke, Lewis, and other contemporary authors.

PHIL 704b,Epistemology. Keith DeRose.
T 1.30–3.20
A study of some prominent issues in current epistemology. Topics may include skepticism, internalist vs. externalist accounts of knowledge and of justification, the structure of knowledge and justification (foundationalism vs. coherentism), contextualism in epistemology, and the "relevant alternatives" account of knowledge.

PHIL 705b,Schopenhauer's *World as Will and Representation.* Karsten Harries.
T 10.30–12.20
A careful reading, with special emphasis on the reception of Schopenhauer's ideas.

PHIL 706b,Demonstratives in Thought,Language,and Perception. Michael Nelson.
W 1.30–3.20
A demonstrative seems to have its reference determined less by conceptual satisfaction and more by causal connection. Demonstratives seem to play a crucial role in how our thoughts and perceptions hook up with the world. We look at theories of demonstratives and examine the roles they play in thought, language, and perception.

PHIL 750, Tutorial.
By arrangement with faculty.

PHYSICS

35 Sloane Physics Laboratory, 432.3607
M.S., M.Phil., Ph.D.

Chair
Ramamurti Shankar

Director of Graduate Studies
Steven Girvin (35 SPL, 432.3607, graduatephysics@yale.edu)

Professors
Yoram Alhassid, Thomas Appelquist, Charles Bailyn (*Astronomy*), Charles Baltay, Sean Barrett, D. Allan Bromley, Richard Casten, Richard Chang (*Applied Physics*), Paolo Coppi (*Astronomy*), Michel Devoret (*Applied Physics*), Paul Fleury (*Applied Physics*), Moshe Gai (*Adjunct*), Steven Girvin, Robert Grober (*Applied Physics*), Martin Gutzwiller (*Adjunct*), John Harris, Victor Henrich (*Applied Physics*), Jay Hirshfield (*Adjunct*), Pierre Hohenberg (*Adjunct*), Francesco Iachello, Martin Klein, William Marciano (*Adjunct*), Simon Mochrie, Vincent Moncrief, Peter Parker, Daniel Prober (*Applied Physics*), Nicholas Read, Subir Sachdev, Jack Sandweiss, Michael Schmidt, Robert Schoelkopf (*Applied Physics*), Ramamurti Shankar, Charles Sommerfield, A. Douglas Stone (*Applied Physics*), John Tully (*Chemistry*), C. Megan Urry, John Wettlaufer (*Geophysics*), Michael Zeller

Associate Professors
Cornelius Beausang, David DeMille, Colin Gay, Tilo Wettig

Assistant Professors
Charles Ahn (*Applied Physics*), Richard Easther, Andreas Heinz, Homer Neal, Corey O'Hern (*Mechanical Engineering*), Witold Skiba, Jeffrey Snyder

Senior Research Scientists
Robert Adair, Satish Dhawan, Richard Majka, Andrew Szymkowiak, N. Victor Zamfir

Lecturers
Stephen Irons, Henry Kasha

Fields of Study

Fields include atomic physics; nuclear physics; particle physics; astrophysics; condensed-matter; quantum information physics; applied physics; and other areas in collaboration with faculties of Engineering and Applied Science, Mathematics, Geology and Geophysics, and Astronomy.

Special Admissions Requirements

The prerequisites for work toward a Ph.D. degree in physics include a sound undergraduate training in physics and a good mathematical background. The GRE General Test and the Subject Test in Physics are required.

Special Requirements for the Ph.D. Degree

To complete the course requirements students are expected to take a set of nine term courses. A set of five core courses (Dynamics, Electromagnetic Theory, Quantum Mechanics I and II, and Statistical Mechanics) serves to complete the student's undergraduate training in classical and quantum physics. A set of four advanced courses, including required courses in classical and quantum field theory, provides an introduction to modern physics and research. Prior equivalent course work may reduce the course requirement for individual students. In addition, all students are required to be proficient and familiar with mathematical methods of physics (such as that necessary to master the material covered in the five core courses) and to be proficient and familiar with advanced laboratory techniques. These requirements can be met either by having had sufficiently advanced prior course work or by taking a course offered by the department. All students will also attend a seminar during their first term in order to be introduced to the various research efforts and opportunities at Yale.

Students who have completed their course requirements with satisfactory grades (a High Pass average and the Graduate School requirement of two Honors), pass the qualifying examination, and submit an acceptable thesis prospectus are recommended for admission to candidacy. The qualifying examination, normally taken at the beginning of the third term (and no later than the beginning of the fifth term), is a six-hour written examination covering the five core courses and mathematical methods as described above. Students normally submit the dissertation prospectus before the end of the third year of study. Approximately eighteen months after passing the qualifying examination, but no later than the end of the fourth year, students take an oral examination in their chosen field of specialization (the Field Oral Examination).

There is no foreign-language requirement. Teaching experience is regarded as an integral part of the graduate training program. All students are expected to serve as teaching fellows during a portion of their first two years of study. Formal association with a dissertation adviser normally begins in the fourth term after the qualifying examination has been passed and required course work has been completed. An adviser from a department other than Physics can be chosen in consultation with the director of graduate studies, provided the dissertation topic is deemed suitable for a physics Ph.D.

Master's Degrees

M.Phil. See Graduate School requirements, pages 397–98.

M.S. (en route to the Ph.D.). Students who complete the first-year graduate courses with a satisfactory record (i.e., at least two Honors or four High Passes) qualify for the M.S. degree.

Program materials are available upon request to the Director of Graduate Studies, Department of Physics, Yale University, PO Box 208120, New Haven CT 06520-8120; e-mail, graduatephysics@yale.edu; Web site, www.yale.edu/physics/.

Courses

PHYS 500a,Dynamics. Francesco Iachello.
MW 1–2.30
Newtonian dynamics, Lagrangian dynamics, and Hamiltonian dynamics. Small oscillations and rigid bodies. Strings, membranes. Fluids.

PHYS 502b,Electromagnetic Theory I. Jack Sandweiss.
MW 9–10.30
Classical electromagnetic theory including boundary-value problems and applications of Maxwell equations. Macroscopic description of electric and magnetic materials. Wave propagation.

PHYS 504Lb,Modern Physics Measurements. Staff.
A laboratory course with experiments in condensed matter, nuclear, and elementary particle physics. Data analysis provides an introduction to computer programming and to the elements of statistics and probability.

PHYS 506a[u], Mathematical Methods of Physics. Tilo Wettig.
MW 9–10.30
Survey of mathematical techniques useful in physics. Includes vector and tensor analysis, group theory, complex analysis (residue calculus, method of steepest descent), differential and integral equations (regular singular points, Green's functions), and advanced topics (Grassmann variables, path integrals, supersymmetry).

PHYS 508a,Quantum Mechanics I. Thomas Appelquist.
MW 10.30–12
The principles of quantum mechanics with application to simple systems. Canonical formalism, solutions of Schrödinger's equation, angular momentum and spin.

PHYS 512b,Statistical Physics I. Yoram Alhassid.
TTh 9–10.30
Review of thermodynamics, the fundamental principles of classical and quantum statistical mechanics, canonical and grand canonical ensembles, identical particles, Bose and Fermi statistics, phase-transitions and critical phenomena, renormalization group, irreversible processes, fluctuations.

PHYS 515a, Topics in Modern Physics Research. Yoram Alhassid.
M 2–3
A seminar course intended to provide an introduction to current research in physics and an overview of physics research opportunities at Yale.

PHYS 522a,Introduction to Atomic Physics. David DeMille.
MW 10.30–12
This course is intended to develop basic theoretical tools needed to understand fundamental atomic processes. Emphasis given to applications in laser spectroscopy. Experimental techniques discussed when appropriate.

PHYS 524a,Introduction to Nuclear Physics. Richard Casten.
MW 1–2.30
Introduction to a wide variety of topics in nuclear structure, nuclear reactions, and nuclear physics at extremes of angular momentum, isospin, energy, and energy density. The aim is to give a broad perspective on the subject and to develop the key ideas in as simple a way as possible. Physics ideas always have precedence over mathematical formalism. The course assumes no prior knowledge of nuclear physics and only elementary quantum mechanics.

PHYS 526b,Introduction to Elementary Particle Physics. Colin Gay.
MW 10.30–12
An overview of particle physics including a historical introduction to the standard model, experimental techniques, symmetries, conservation laws, the quark-parton model, and a semi-formal treatment of the standard model.

PHYS 538a,Introduction to Relativistic Astrophysics and General Relativity. Vincent Moncrief.
MW 9–10.30
Basic concepts of differential geometry (manifolds, metrics, connections, geodesics, curvature); Einstein's equations and their application to cosmology, gravitational waves, black holes, etc.

PHYS 548a^{u} and 549b^{u}, Solid State Physics I and II. Victor Henrich [F], Robert Schoelkopf [Sp].
TTh 1–2.15
A two-term sequence covering the principles underlying the electrical, thermal, magnetic, and optical properties of solids, including crystal structures, phonon, energy bands, semiconductors, Fermi surfaces, magnetic resonance, phase transitions, and superconductivity. *Also ENAS 850a^{u}, 851b^{u}.*

[**PHYS 570b^{u}, High-Energy Astrophysics.**]

PHYS 600b,Cosmology. Priyamvada Natarajan.
The large-scale contents and structure of the universe and the origin of galaxies. *Also ASTR 600b.*

PHYS 602a,Classical Field Theory. Jack Sandweiss.
TTh 9–10.30
Covariant formulation of electrodynamics, radiation phenomena, and introduction to general relativity.

PHYS 608b,Quantum Mechanics II. Thomas Appelquist.
MW 10.30–12
Approximation methods, scattering theory, and the role of symmetries. Relativistic wave equations. Second quantized treatment of identical particles. Elementary introduction to quantized fields.

PHYS 609a,Relativistic Field Theory I. Witold Skiba.
TTh 10.30–12
The fundamental principles of quantum field theory. Interacting theories and the Feynman graph expansion. Quantum electrodynamics including lowest order processes, one-loop corrections, and the elements of renormalization theory.

PHYS 610b,Many-Body Theory of Solids. A.Douglas Stone.
TTh 10.30–12
Solids as many-particle systems. Second quantization. Green's functions, quantum statistical mechanics, linear response theory. Hartree-Fock theory, perturbation theory, Feynman diagrams at finite temperature. Theory of the electron gas, electron-phonon coupling, BCS theory of superconductivity. *Also ENAS 852b.*

PHYS 624b^{u}, Group Theory. Francesco Iachello.
MW 1–2.20
Lie algebras, Lie groups, and some of their applications. Representation theory. Explicit construction of finite-dimensional irreducible representations. Invariant operators and their eigenvalues. Tensor operators and enveloping algebras. Boson and fermion realizations. Differential realizations. Quantum dynamical applications.

PHYS 628a,Statistical Physics II. Subir Sachdev.
F 12.30–3.30
An introduction to topics in the theory of classical and quantum phase transitions. Order parameters and effective field theory. Critical phenomena and the renormalization group. Duality, topological defects and bosonization.

PHYS 630b,Relativistic Field Theory II. Witold Skiba.
TTh 9–10.30
An introduction to nonabelian gauge field theories, spontaneous symmetry breakdown and unified theories of weak and electromagnetic interactions. Renormalization group methods, quantum chromodynamics, and nonperturbative approaches to quantum field theory.

[**PHYS 631a[u], Computational Physics I.**]

PHYS 634a,Mesoscopic Physics. Michel Devoret.
TTh 9–10.30
Introduction to the physics of nanoscale solid-state systems which are large and disordered enough to be described in terms of simple macroscopic parameters like resistance, capacitance, and inductance, but small and cold enough that effects usually associated with microscopic particles, like quantum-mechanical coherence and/or charge quantization, dominate. Emphasis is placed on transport and noise phenomena in the normal and superconducting regimes. *Also ENAS 818a.*

PHYS 650a,Theory of Solids I. Sohrab Ismail-Beigi.
WF 10.30–12
Theoretical techniques for the study of the structural and electronic properties of solids, with applications. Topics include band structure, phonons, defects, transport, magnetism, and superconductivity. *Also ENAS 856a.*

[**PHYS 651b,Theory of Solids II.**]

SPECIAL TOPICS COURSES

PHYS 661b,The Art of Data Analysis. Thomas Ullrich.
F 1–3
The course is an introduction to mathematical and statistical techniques used to analyze data. The course is fairly practice-oriented and is aimed at students who have, or anticipate having, research data to analyze in a thorough and unbiased way. It covers subjects in statistics, computing/numerical techniques, data analysis, but also topics related to data reconstruction and pattern recognition which are closely linked to the understanding of the data derived from those methods. The intention is to prepare students for a better approach to their own analysis. Many of the topics covered are related to typical problems in experimental high-energy and nuclear physics but are fairly general in nature.

[**PHYS 662a,Special Topics in Particle Physics.**]

[**PHYS 663b,Special Topics in Cosmology and Particle Physics.**]

[**PHYS 664b,Special Topics in Nuclear Physics.**]

PHYS 667b,Special Topics in Condensed Matter Physics: Nonequilibrium Dynamics and Pattern Formation. Pierre Hohenberg.
HTBA
Stationary and time-dependent spatial patterns are studied in extended systems driven away from equilibrium. A variety of mathematical models are introduced to describe phenomena such as bifurcations, ordered spatial patterns, defect patterns, excitability, and spatiotemporal

chaos. The predictions of the models are compared to experiments in fluids (Rayleigh-Benard convection), oscillatory chemical reactions, electrical excitation of heart tissue, and other systems. Prerequisites: graduate courses in statistical physics and mathematical methods. *Also ENAS 860b.*

[**PHYS 668b,Special Topics in Geometry and Modern Field Theory.**]

[**PHYS 671a and b,Special Topics in Nuclear and Particle Physics.**]

[**PHYS 672a or b,Special Topics in Experimental Physics.**]

[**PHYS 673a or b,Special Topics in Atomic Physics.**]

[**PHYS 674b,Quantum Information,Quantum Cryptography, and Quantum Computation.**]

PHYS 675a,Special Topics in Optics. Richard Chang.
TTh 2.30–3.45
A survey of the principles of optics. Topics include geometrical optics, optical imaging, interference, and diffraction. The course is taught from the experimentalist perspective and emphasizes real applications. *Also ENAS 859a.*

[**PHYS 676b,Optical Properties of Semiconductors.**]

POLITICAL SCIENCE

124 Prospect, 432.5241
M.A., M.Phil., Ph.D.

Chair
Ian Shapiro

Director of Graduate Studies
Stephen Skowronek

Professors
Bruce Ackerman, Akhil Amar (*Law*), Arjun Appadurai (*Anthropology*), Seyla Benhabib, Paul Bracken (*Management*), David Cameron, William Foltz, Paul Gaddis (*History*), Alan Gerber, Donald Green, Stathis Kalyvas, Ilona Kickbusch (*Epidemiology*), Theodore Marmor (*Management*), David Mayhew, Barry Nalebuff (*Management*), Douglas Rae, John Roemer, Susan Rose-Ackerman, Frances Rosenbluth, Bruce Russett, James Scott, Ian Shapiro, Stephen Skowronek, Steven Smith, Peter Swenson, Ivan Szelenyi (*Sociology*), John Wargo (*Forestry & Environmental Studies*), Ernesto Zedillo (*Center for the Study of Globalization*)

Associate Professor
Jose Cheibub

Assistant Professors
Khalilah Brown-Dean, Keith Darden, Anna Grzymala-Busse, Jacob Hacker, Ange-Marie Hancock, Gregory Huber, Anastassios Kalandrakis, Pauline Jones Luong, Pierre-François Landry, John Lapinski, Ellen Lust-Okar, Jennifer Pitts, Rose Razaghian, Nicholas Sambanis, Kenneth Scheve, James Vreeland

Fields of Study

Fields include contemporary theory, political philosophy, international relations, comparative politics, American politics, political economy, and empirical analysis and research methodology.

Special Admissions Requirement

The department requires that scores from the GRE General Test accompany an application.

Special Requirements for the Ph.D. Degree

Students are required to pass fourteen term courses during their first two years in the program, and receive a grade of Honors in at least two Political Science courses. Two of the courses may be in departments other than Political Science. Students are normally expected to complete seven courses in the first year. Courses are offered in seven fields: Contemporary Theory; Political Philosophy; International Relations; Comparative Politics; American Politics; Political Economy; and Empirical Analysis and Research Methodology. Each student must demonstrate competence in three of the seven fields by

the beginning of the third year. Competence is demonstrated by passing the comprehensive examination in the field. The department also allows students to petition for the creation of a special field of study and examination in exceptional cases.

As part of the second year of courses, all students are required to take the two-term course in Research and Writing, which is devoted to the preparation of a manuscript based on original research on a topic of the student's choice. The course is conducted as a seminar including all second-year students and directed by two members of the faculty. Performance in the first-term course (540a) is graded on a Satisfactory/Unsatisfactory basis. The second-term course (541b) carries conventional letter grades that are assigned retroactively to 540a at the end of the second term.

Students are required to take a one-term course in statistical methods, successful completion of which satisfies the statistics requirement. All students are also required to demonstrate at least an elementary reading competence in one foreign language. Such competence is usually demonstrated by taking, or having completed, two years of undergraduate course work. Alternatively the language requirement can be satisfied by successfully completing two terms of formal theory at the graduate level, in addition to the required course in statistical methods.

In order to be admitted to candidacy for the Ph.D. degree, the student must have a prospectus approved by a dissertation director and two other members of the faculty. This must occur by no later than May 1 of the student's third year.

Students are admitted to candidacy by the end of the third year, but only after all courses, including those involving statistics, language, and Research and Writing, and approval of the dissertation prospectus have been completed.

Almost without exception, those who successfully complete the Ph.D. in Political Science will join the faculties of colleges and universities. For that reason, learning what is involved in teaching and gaining teaching experience is an essential and central component of graduate education. The department normally expects students to devote themselves exclusively to course work and comprehensive examinations in their first two years in the Ph.D. program. Students in Political Science typically teach in their third and fourth years.

A joint Ph.D. degree is available with African American Studies. Students must apply to and be acepted by both departments independently. Consult that department for details.

Master's Degrees

M.Phil. The academic requirements for the M.Phil. degree are the same as for the Ph.D. degree except for the completion of the dissertation.

M.A. (en route to the Ph.D.). The M.A. degree is awarded upon completion of a full year of course work in the program (i.e., at least seven term courses) with an average of High Pass or better. The course must include one each in at least three of the department's substantive fields and a basic course in statistical analysis. Language requirements are the same as for the Ph.D. degree.

Program materials are available upon request to the Director of Graduate Studies, Political Science Department, Yale University, PO Box 208301, New Haven CT 06520-8301.

Courses

EMPIRICAL ANALYSIS AND RESEARCH METHODOLOGY

PLSC 500a, Statistics. Alan Gerber.
TTh 9–10.30
The goal of this course is to introduce basic statistical theory and techniques for Political Science graduate students. The first part of the course covers probability theory, while the second part is devoted to estimation and inference, including an introduction to the classic multiple linear regression framework. Although emphasis is on the development of the relevant theory and statistical concepts, a series of applications and examples is considered on a variety of political science problems, such as turnout, crime, elections, party systems, etc.

PLSC 503b,Advanced Quantitative Methods. Donald Green.
HTBA
This course provides an extensive treatment of the linear regression model. It covers a wide array of regression techniques including those which address problems of measurement error, reciprocal causation, and nonlinearities. Time series and pooled time-series-cross-sectional models are also covered. The aim is to make students intelligent consumers of published quantitative research and to prepare them to conduct original research in political science. The course assumes students have command of the material covered in PLSC 500 including basic knowledge of probability theory.

PLSC 504a,Special Topics in Advanced Quantitative Methods. Kenneth Scheve.
M 1.30–3.20, Th 10–12
This course provides an extensive treatment of the likelihood theory of statistical inference that underlies many of the statistical methods used in political science. After the foundational material is presented, I introduce a large variety of statistical models. These include dichotomous and polychotomous response models, models for censored and truncated data, sample selection models, duration models, and models for count data. We also cover methods for time series and pooled time-series-cross-sectional data with an emphasis on approaches for limited dependent variables. Finally, the course introduces some basic ideas and methods from Bayesian data analysis. The aim is to make students intelligent consumers of published quantitative research and to prepare them to conduct original research in political science. The course assumes students have command of the material covered in PLSC 500 and PLSC 503 including basic probability theory, matrix algebra, and the linear regression model.

PLSC 517a,Fundamentals of Modeling. John Roemer, Woojin Lee.
Th 10.30–12.30
Topics include: preferences, utility functions, Pareto efficiency, economic equilibrium, voting for public goods, Nash equilibrium, Downs-Nash political equilibrium, Wittman-Nash political equilibrium, social welfare functions, the Arrow Impossibility Theorem, the prisoners' dilemma, elements of probability, von Neumann-Morgenstern utility, Harsanyi's veil of ignorance, games in extensive form, subgame perfect Nash equilibrium. The necessary mathematics is introduced as needed, but students are advised to review elementary calculus before the class begins.

PLSC 540a,541b,Research and Writing. Ian Shapiro, Kenneth Scheve.
M 10–12
This is a required course for all second-year students. Although it is designated as a spring-term course, in fact it meets for the first six weeks of the fall term and the first six weeks of the spring term. The fall meetings are devoted to discussion of research design as well as individual student projects. These meetings supplement 540a, the individual meetings with faculty advisers. The spring meetings are devoted to discussion of drafts of student papers. The work of the spring-term seminar includes criticism of the organization, arguments, data evaluation, and writing in each student's paper by the instructors and the other students. Using this crit-

icism, and under the supervision of the instructors, each student conducts additional research, if necessary, rewrites the paper as required, and prepares a final paper representing the best work of which the student is capable. Students must submit a one-page outline of the proposed project for the first fall-term meeting and a complete draft of the paper at the first meeting in the spring. Six weeks in beginning of fall term; six weeks in beginning of spring.

CONTEMPORARY THEORY

PLSC 553a, Justice. Bruce Ackerman.
MT 4.10–6
Examines contemporary theories, together with an effort to assess their practical implications. *Also LAW 20104.*

PLSC 557a[u], Theories of Social Justice. Casiano Hacker-Cordon.
T 1.30–3.20
The aim of the course is to provide each student with the conceptual wherewithal to refine her or his own sense of the most fundamental political problem. To this end, we proceed by close reading of theories of distributive justice in light of some of the urgent social problems that characterize today's world and in light of the perennial problem of adequate justification.

PLSC 558a,Issues in Democratic Theory. Ian Shapiro.
T 3.30–5.20
This seminar deals with contemporary scholarship on democracy. Among the topics to be covered: competing definitions of democracy; the causes of transitions to democracy and the sources of democratic stability; the relations between democracy and other values such as equality, efficiency, community, justice, and truth; participation, representation, and delegation in decision making; the roles for argument, deliberation, contestation, and opposition; courts and constitutionalism; the impact of democracy on the distribution of income and wealth; membership, diversity, and group rights. Students are expected to write a research paper or take a twenty-four-hour take-home exam. Graduate students only. A maximum of eighteen are admitted, with preference to Political Science Ph.D. students.

PLSC 573b,Theory and Practice. Bruce Ackerman.
W 2.10–4
A writing seminar devoted to the exploration of the practical significance of the theories of justice considered in the fall-term course Justice, which is generally a requirement for admission into this seminar. Students with exceptional backgrounds in political philosophy may be admitted directly upon satisfying the instructor that they have in fact read and pondered the texts discussed in the fall-term course. *Also LAW 21130.*

PLSC 580b,Aliens,Citizens,and Residents: Political Philosophy and Political Membership. Seyla Benhabib,C.Emcke.
Th 10.30–12.20
Conditions of membership have not been subjected to rigorous philosophical examination in liberal-democratic theory. How can boundaries and borders be justified? In a world of deterritorialized politics, what is the moral justification, if any, for retaining nation-state borders? By focusing on Rawls, Walzer, Habermas, Arendt, and contemporary theories of citizenship (Beiner, Carens, Nusbbaum, Bauboeck), this course deals with the ethics and politics of membership. *Also PHIL 702b.*

PLSC 586a[u], Feminism,Imperialism,and Global Justice. Casiano Hacker-Cordon.
W 1.30–3.20
This is an exploratory course in political theory with a constructive purpose. What is the best way to negotiate the affinities and tensions between feminist and anti-imperialist political ideals? We take a broad understanding of imperialism as including both political-economic and cultural domination. Our analyses are thus applicable to both international relations theory and theory of multiculturalism.

PLSC 595a, Theories of Distributive Justice. John Roemer.
W 10–12
We survey the main theories of distributive justice proposed by economists and political philosophers in the last half-century, critiquing each theory from both the economic and philosophical perspective. Including Arrow's impossibility theorem and its resolution, axiomatic bargaining theory (J. Nash and followers), utilitarianism according to J. Harsanyi, egalitarianism according to J. Rawls and A. Sen, procedural justice according to R. Nozick, resource egalitarianism according to R. Dworkin, and equality of opportunity according to R. Arneson, G.A. Cohen, and J. Roemer. The main text is *Theories of Distributive Justice* (J.E. Roemer, 1996).

POLITICAL PHILOSOPHY

PLSC 602a[u], Ancient and Medieval Political Thought. Robert Wokler.
MW 9–10.15
An intensive study of the foundations of political philosophy. An analysis of the origins of political philosophy in Socratic and Platonic thought, followed by Machiavelli's comprehensive critique of the Socratic tradition.

PLSC 615a[u], Freedom in Nineteenth-Century German Political Thought. Seyla Benhabib.
TTh 11.30–12.20, 1 HTBA
An examination of the concept of freedom, and its relation to property, civil society, and intersubjectivity in the works of Kant, Hegel, Fichte, and Marx. *Also PHIL 506a[u]*.

PLSC 619b[u], The Problem of Happiness in Political Philosophy. Michael Kochin.
W 3.30–5.20
We explore the problem of happiness by examining the life of pleasure, the life of political activity, and the life of theoretical contemplation. We then explore whether these lives are available to contemporary men and women.

PLSC 621b[u], Constitutionalism and Democracy: Montesquieu and Tocqueville. Steven Smith.
M 1.30–3.20
Are democracy and constitutional government compatible or do they offer contending political goods? Democracy is a form of popular rule, while constitutionalism provides a check to political power whether of the one, the few, or the many. This course examines the problem of how to constrain the growth of centralized political power through a close reading of Montesquieu's *Spirit of the Laws* and Tocqueville's *Democracy in America*. A further goal is to see how American constitutional democracy has been shaped by the writings of these two French aristocrats.

PLSC 622b[u], The Age of Enlightenment and Its Critics. Robert Wokler.
Th 1.30–3.20
Introduction to central themes and currents of European social and political thought in the eighteenth century, including notions of religious toleration, civilization and progress, and the emancipation of women, slaves, and Jews. Analysis of twentieth-century claims that modern totalitarianism and even the Holocaust may be traced to Enlightenment principles.

PLSC 649b[u], The Hidden Structure of Political Theories. Amelie Rorty.
W 3.30–5.20
Normative political theories depend on a set of presuppositions about human nature, about the roles of rationality and the imagination in choice and action. This course explores the presuppositions of classical political theories, their views about the aims of political association,

and the qualifications for political participation. It also analyzes and contrasts the kind of educational system projected by a variety of theories, those of Plato and Aristotle, Hobbes, Locke and Rousseau, Mill, Marx, and Rawls. *Also PHIL 662b[u].*

INTERNATIONAL RELATIONS

PLSC 650b[u], Theories of War and Peace. Bruce Russett.

T 3.30–5.20

Comprehensive review and analysis of the theoretical literature on the causes of war and survey of some major ongoing research programs on war and peace. Includes structural systemic, dyadic, domestic political, bureaucratic/organizational, and psychological approaches.

PLSC 657a[u], Foreign Policy Decision Making. Alex Mintz.

T 3.30–5.20

Examination of leading theories of decision making (expected utility theory, cybernetic theory, bureaucratic politics, prospect theory, and poliheuristic theory) and their applications in international relations. Sequential decision making, interactive decision making, group decision making, framing and affect in foreign policy decision making. Factors affecting foreign policy decisions.

PLSC 661a, Business, Government, and Globalization. Paul Bracken.

HTBA

Transformational forces of globalization and technology are changing the configuration of business and government throughout the world. This course applies to countries the tools and frameworks developed for studying business. A comparative approach (East and South Asia, Europe, the U.S.) is used to analyze the politics and strategy of the multinational corporation. Topics covered include technology strategies, risk and the global corporation, the Global Compact, and organizational formats for multinational enterprise. *Also MGT 580a.*

PLSC 662a[u], Strategy, Technology, and War. Paul Bracken.

HTBA

The interrelationship of strategy, foreign policy, and military technology since 1900. Examination of classic and modern formulations of this relationship, including new post-Cold War theories of the role of force in international affairs. Topics include multipolarity and the emergence of new competitors; developments in military technology and their impact on the balance of power and U.S. international position; proliferation of weapons of mass destruction; information warfare and the revolutionary impact of new technologies. *Also MGT 586a.*

PLSC 664a, A Multi-Method Approach to International Relations. Alex Mintz.

M 3.30–5.20

The purpose of this course is to introduce the student to the main methodological approaches to the study of international relations. We do so by applying three sets of methodologies (statistical, formal, and experimental) to some of the most important theoretical puzzles in the field of international relations: deterrence, the arms race, armament and escalation, democratic peace, decision making, defense and development, and the diversionary use of force.

PLSC 672b[u], NATO in the Post-Cold War World: Adaptation or Decline? Jolyon Howorth.

W 1.30–3.20

The course analyzes the attempts by NATO to adapt to the post-Cold War world. It assesses the impassioned debates between Europeans and Americans over burden-sharing, "going global," and enlargement. It assesses the lessons to be learned from NATO's reluctant involvement in crisis management and scrutinizes the prospects for genuine alliance transformation since 9/11.

PLSC 688a[u], European Union: U.S. Relations Since the End of the Cold War. Jolyon Howorth.

T 3.30–5.20

This course focuses on the changing nature of relations between the U.S. and the EC/EU since the late 1980s. The course is predicated on the assumption that two major policy areas (foreign and security policy and economic and trade policy) have undergone significant transformations over the past fifteen years.

PLSC 715a,Studies in Grand Strategy, Part II. John Gaddis, Paul Kennedy.

M 1.30–3.20

This two-term course begins in January with readings in classical works from Sun Tzu to Clausewitz to Kissinger. Students identify principles of strategy and examine the extent to which these were or were not applied in historical case studies from the Peloponnesian War to the post-Cold War period. During the summer, students undertake research projects or internships designed to apply resulting insights to the detailed analysis of a particular strategic problem or aspect of strategy, whether of a historical or contemporary character. Written reports on these projects are presented and critically discussed early in the fall term. The seminar then turns its attention to strategic dilemmas currently facing governments, corporations, and nongovernmental organizations. Students must take both terms, fulfill the summer research/internship requirement, and attend additional lectures on grand strategy to be scheduled throughout the spring and fall terms. For the first term, students from the Graduate School receive a grade of FY (full year), which converts to a final grade for both terms upon completion of the course. Other students receive grades in accordance with the grading systems of their respective schools. In both semesters the seminar meets during reading week and holds a total of fourteen weekly sessions. Admission is by competitive application only; forms are available at International Security Studies. *Also HIST 985a.*

COMPARATIVE POLITICS

PLSC 702a[u], South African Democracy in Comparative Perspective. Courtney Jung.

T 3.30–5.20

This seminar is an intensive examination of South African politics, ranging over the rise and fall of Apartheid, the negotiated transition to democracy, and the period of democratic consolidation that has been under way since 1994. The South African political experience is located in two theoretical debates. The first concerns the dynamics of transition negotiations: why they begin and what makes them succeed or fail. Here the comparative points of reference are other successful transitions in Latin America and the post-communist world, as well as failed transition negotiations in the Middle East and the sputtering one in Northern Ireland. Our question is: What light, if, any, does South Africa's success to date shed on these and other cases? The second debate concerns the distributive politics in new democracies, with particular attention to the structure and social composition of inequality following transitions to democracy. Here the questions revolve around the failure of previously excluded groups to use their new access to the political system to achieve significant redistribution, land reform, or in many cases even minimal economic security. Again our concern is to understand the degree to which the South African experience mirrors, or departs from, patterns in Latin America and the post-communist world, and to account for the similarities and differences that we find. *Also AFST 702a[u].*

PLSC 712b,Comparative Political Economy. Frances Rosenbluth.

F 10–12

The course introduces graduate students to the basic theoretical and methodological approaches to political economy (most notably rational choice and game theory), as well as

analyzing important empirical questions and providing a forum for students to undertake their own research. Some of the empirical topics include transitions to democracy and the market, political competition and economic outcomes, globalization, deregulation, environment, regional integration, federalism, and corruption.

PLSC 714a,Corruption,Economic Development,and Democracy. Susan Rose-Ackerman.

T 2.10–4

A seminar on the link between political and bureaucratic institutions on the one hand, and economic development on the other. Consideration is given to the role of international aid and lending organizations such as the World Bank. A particular focus is the impact of corruption on development. *Also LAW 20098.*

PLSC 717b[u], The Political Evolution of French-Speaking Africa. William Foltz.

T 1.30–3.20

The political history of French-speaking Africa from colonization to the present. French colonial theory and practice; African elites under the Third and Fourth Republics; decolonization; distinctive properties of francophone states; French postcolonial influence. A good reading knowledge of French is essential. *Also AFST 717b[u].*

PLSC 719b, Labor and Capital in Advanced Capitalist Democracies. Peter Swenson.

W 10–12

This course examines some of the economic, social, technological, political, and institutional logics behind labor and capital market governance in economically advanced democratic polities. From the logics of regulation, the course proceeds to analysis and explanation of major and current macropolitical issues like the shift from Keynesianism to monetarism, the centralization of industrial relations, the creation of financial systems and independent central banks, the foundations and transformations of welfare states, and international pressures forcing change if not necessarily convergence on distinct national systems of governance. Material for the course is drawn largely from the literature on Western Europe, the U.S., and Japan.

PLSC 728a,Ethnic Violence in South Asia. Arjun Appadurai.

W 10–12

This course focuses on large-scale ethnic violence in South Asia, especially in the last fifteen years. Major emphasis is placed on Hindu-Muslim conflicts in India, but some comparative attention is also paid to violence against various ethnic minorities in Sri Lanka and Pakistan. The purpose of the course is to explore the relationship between large-scale identities, new religious movements, and changes in regional politics and economy linked to globalization. Limited to fifteen students. *Also ANTH 590a.*

PLSC 731b[u], Pathways from Authoritarianism in Asia. Pierre Landry.

M 3.30–5.20

Drawing on comparative theory, this course analyzes how and why authoritarian regimes respond to internal and external pressures for political change, with a focus on East and Southeast Asian cases. It analyzes why some authoritarian systems "choose" to democratize (Taiwan, South Korea, Mongolia, Indonesia) while others have instead incrementally evolved, but fallen short of full-fledged democratization (China, Vietnam, Cambodia, North Korea). Students are expected to produce a research paper and present their finding in class.

PLSC 733a[u], Power and Authority in China's Localities. Pierre Landry.

M 1.30–3.20

An examination of the relationship between "reforms" and the political evolution of Chinese localities in contemporary China. Topics include the "village" literature, namely the lowest level of aggregation of China's local institutions, and the issue of political authority in the broader contexts of cities and provinces.

PLSC 734a,b,Comparative Research Workshop. Ivan Szelenyi,Andrew Schrank.
W 6–8
This workshop is a weekly interdisciplinary seminar at which work-in-progress by distinguished visiting scholars, Yale graduate students, and faculty from various social science disciplines is discussed. Papers are distributed a week ahead of time and also posted at the Web site of the Center for Comparative Research. Students who take the course for a letter grade have to present a paper the term they are enrolled for credit. *Also SOCY 560a,b.*

PLSC 738a[u], Resource, Wealth, Political Regimes,and Economic Growth. Pauline Jones Luong.
T 1.30–3.20
Is there in fact a "resource curse"? This course explores the proposition that a state with abundant natural resources is more often cursed than blessed by this wealth. Countless studies document the correlation between resource wealth, poor economic performance, unbalanced growth, weakly institutionalized states, and authoritarian regimes. But what, if any, causal mechanisms underlie this empirical correlation?

PLSC 739a,Comparative Political Behavior. Kenneth Scheve.
T 3.30–5.20
This course is an introduction to the study of comparative mass political behavior. The seminar focuses on research questions about cross-national differences and similarities in public opinion and voting behavior. Topics covered include cultural, interest, elite, and media-centered explanations of individual opinion formation about politics. The seminar also evaluates recent cross-national voting studies that have examined issue voting in national elections, coordination problems in alternative electoral systems, ideology and partisanship in voting decisions, ethnicity and voting behavior, and individual decision making in referendums.

PLSC 752b[u], The International Political Economy of Development. Gustavo Vega-Cánovas.
M 1.30–3.20
This course focuses on the changing global economy, its impact on the development of distinctive regions, and the ways nations and regions are responding to rapid globalization and economic change. Latin America, Asia, and Africa are the primary regions of focus.

PLSC 755a[u], European Politics. David Cameron.
W 1.30–3.20
A comprehensive survey of politics in Europe. Attention is concentrated on the development of the European Union as a supranational organization—including recent developments associated with economic, monetary, and political union, and the developments that have occurred throughout Eastern Europe since 1989.

PLSC 759a,Issues in the Analysis of African Politics. William Foltz.
M 1.30–3.20
Subjects include the influence of pre-colonial systems and colonial rule on contemporary politics, states and statelessness, the politics of economic performance, communal conflict, and attempts at regional and sub-regional unity. Students prepare two bibliographic essays, one on the politics of an African country, one of an analytic problem area. *Also AFST 759a.*

PLSC 764b, Civil Wars. Stathis Kalyvas.
M 5–7
This is a seminar about cutting-edge research on civil wars, violent ethnic conflict, and the dynamics of violence. We read recent and forthcoming work, as well as older pieces, and discuss various approaches and methods. Although the readings include some historical material and a few case studies, the emphasis is analytical and theoretical. This seminar also aims to

address questions of research design in comparative politics, with a particular emphasis on conceptually ambiguous phenomena and data-poor environments.

PLSC 772b[u], Varieties of Capitalism and the State. David Soskice.
W 3.30–5.20
This course examines the relationship between national and transnational business regimes and the state (including the political and policy-making systems) in the developed world, in East Asia, and in Latin America under the impact of globalization.

PLSC 774b[u], Comparative Perspective on Middle East Politics. Ellen Lust-Okar.
T 1.30–3.20
This course has two purposes. First, it examines political liberalization and regime change in the Middle East. Second, it considers the extent to which work on the Middle East differs from comparative theories developed in other areas. It begins with a brief overview of the recent debates over the relationship between scholarship on the Middle East and that of comparative politics more generally. It then examines literature on liberalization in the Middle East. Works read include Norton; Baaklini, Denouex, and Springborg; Brynen, Korany, and Noble; Piro and Chaudhry.

PLSC 776a[u], States and Regimes in Comparative Perspective. Anna Grzymala-Busse.
T 3.30–5.20
This graduate seminar is designed to analyze the state as a responsive, if not necessarily a unitary, political actor. Main topics include theories of the state; analytical issues in "measuring the state"; the rise of bureaucracy, patronage, corruption, and rent-seeking; state engineering of economic and administrative policies; the state under a variety of political systems; the colonization of the state by political parties, interest groups, and economic classes; state collapse and regeneration. Principal readings include Bates, *States and Markets;* Scott, *Seeing Like a State;* Bunce, *Subversive Institutions.*

PLSC 777a,Comparative Politics I: Research Design. Stathis Kalyvas.
M 5–7
Comparative Politics I and II is a seminar in two parts designed to introduce graduate students to the fundamentals of comparative politics, including the major debates, topics, and methods. Comparative Politics I explores questions of methodology with an emphasis on research design. Comparative Politics II focuses on substantive issues. Students read and discuss several classic and more recent works that represent a major theme and/or theory in comparative politics, including Karl Polyani's *The Great Transformation,* Charles Tilly's *Coercion, Capital and European States,* Theda Skocpol's *States and Social Revolutions,* and Adam Przeworski, Michael E. Alvarez, Jose Cheibub, and Fernando Limongi's *Democracy and Development*. It is strongly recommended that students take both parts of the seminar and that they do so consecutively.

PLSC 778b, Comparative Politics II. Pauline Jones Luong.
T 1.30–3.20
See description under PLSC 777a.

PLSC 779a,Agrarian Societies: Culture,Society, History, and Development. James Scott,Michael Dove, Paul Freedman,Robert Harms.
M 1.30–5.20
An interdisciplinary examination of agrarian societies, contemporary and historical, Western and non-Western. Major analytical perspectives from economics, history, political science, and environmental studies are used to develop a meaning-centered and historically grounded account of the transformations of rural society. Team taught. *Also ANTH 541a, F&ES 753a, HIST 965a.*

PLSC 784b[u], Africa and the Disciplines. William Foltz.
W 1.30–3.20
This seminar is designed to introduce students to the study of Africa from the perspective of the several disciplines, specifically history, anthropology, politics and economics, law, literature, linguistics, and art history. It examines how Africa has been studied from the perspectives of the different disciplines, and also shows how the study of Africa has in turn contributed to the disciplines themselves. *Also AFST 764b[u].*

PLSC 790b, Workshop on Political Economy. John Roemer.
W 4–6
In this seminar, outside speakers present their recent work in the area of formal political economy. Students present previews of upcoming papers or related material.

PLSC 794b, Political Economy of the Welfare State. Jacob Hacker, Theodore Marmor.
M 1.30–3.20
All the economies of rich democracies are mixed, in that government spending and regulation modify the free play of market forces and the distribution of market rewards. Nonetheless, advanced economies still differ tremendously in the degree and nature of government involvement, in the organizational characteristics of production, and in the distribution of income and economic security. This course considers the nature and source of these differences, focusing on three leading areas of inquiry in comparative political economy: the welfare state, public and private risk-sharing, and the family-workplace nexus. The key analytic debates concern the power of business and labor, the influence of partisanship, the role of political institutions, the effect of path dependence, the impact of economic integration, and the future of the welfare state.

AMERICAN POLITICS

PLSC 800a,Introduction to American Politics. David Mayhew.
T 1.30–3.20
An introduction to the analysis of U.S. politics. Approaches given consideration include classical separation of powers, political culture, civil society, the state, the public sphere, attitudes, power and influence, ideology, on-site contextual, econometrics of elections, rational actors, and formal theories of institutions. Assigned authors include J. Madison, A. de Tocqueville, R. Putnam, T. Skocpol, S. Skowronek, D. Mayhew, J. Zaller, R. Dahl, R. Neustadt, J. Gerring, R. Fenno, D. R. Kiewiet, R. Erikson, A. Downs, M. Olson, and K. Krehbiel. Students are expected to read and discuss each week's assignment, and, for each of five weeks, write a three- to five-page analytic paper that deals with a subject addressed or suggested by the reading.

PLSC 813b,Intersecting Identities: Nation,Race,and Gender. Ange-Marie Hancock.
T 3.30–5.20
This seminar explores the value of approaching political identity from an intersectional perspective, primarily using the political philosophies of Hannah Arendt, W. E. B. Du Bois, and democratic theory. *Also AFAM 809b.*

PLSC 822a,b,American Politics Workshop. Alan Gerber.
M 12–1.30
For graduate students in American Politics, serving as a forum for presentation and discussion of the work in progress of students, Yale faculty members, and invited speakers. Students taking the course for a grade are required to make a presentation and submit a research paper.

PLSC 823b, Race and Ethnicity. Khalilah Brown-Dean.
HTBA
This course is an introduction to research on race and ethnicity in American politics. Topics include the social construction of race; intersections between race and gender; black, Latino, and Asian American public opinion and political participation; minority representation; the relationship between race, racism, and public policy; immigration and citizenship; state politics; the psychology of racial politics; and the role of race in campaigns. We discuss and debate the empirical contributions of this literature, as well as questions of theory, methodology, and research design. *Also AFAM 814b.*

PLSC 831a[u], The U.S. Congress. Rose Razaghian.
W 3.30–5.20
The U.S. Congress is the primary democratic institution in the American political system. Elections provide the mechanisms through which Members of Congress are evaluated and held accountable; congressional rules and internal organization shape the outcome of legislation; and Congress provides a check on the powers of the executive and judicial branches of government. The objective of this course is to develop a detailed and critical understanding of the U.S. Congress, focusing on the individual Congresspersons, on the institutional features of Congress, and on the role of Congress within the larger Separation-of-Powers system.

PLSC 842b, The Constitution: Philosophy, History, and Law. Bruce Ackerman.
MT 4.10–6
An inquiry into the foundations of the American Constitution, at its founding and at critical moments in its historical transformation—most notably in response to the Civil War, the Great Depression, and the Civil Rights Movement. Philosophically speaking, do we still live under the Constitution founded by the Federalists, or are we inhabitants of the Second or Third or Nth Republic? Institutionally, in what ways are the patterns of modern American government similar to, and different from, those in post-Revolutionary (1787–1860) and post-Civil War (1868–1932) America? Legally, what is or was the role of constitutional law in the organization of each of these historical regimes? Through asking and answering these questions, the course tries to gain a critical perspective on the effort by the present Supreme Court to create a new constitutional regime for the twenty-first century. Examination. *Also LAW 21046.*

PLSC 844b[u], Money and American Elections. Alan Gerber.
M 3.30–5.20
An examination of the role money plays in elections in the United States and the political consequences of the campaign finance system. Topics include who gives money to candidates and why, how money affects election outcomes, campaign fund raising by women and minority candidates, the effect of campaign contributions on public policy, constitutional law and campaign finance, and a careful evaluation of various proposals for campaign finance reform.

PLSC 845b, The Politics of Tax Policy: Research Seminar. Ian Shapiro, Michael Graetz.
T 4.10–6
This seminar is designed for Law and graduate Political Science students who plan to do research papers on the politics of tax policy making. During the first half of the term we discuss various books and articles on this topic. After spring break the seminar becomes a workshop to discuss student research projects. Among the issues discussed are the politics of the 2001 repeal of the estate tax; the popularity among politicians of tax credits over direct spending as a means of addressing the nation's social and economic problems; the role of budget rules and the procedural rules of the House and Senate in shaping the tax law; the role of political contributions and lobbyists in the tax legislative process; and the role of tax policy in the distribution of income and wealth. Limited enrollment. For Law students, substantial paper credit is available. *Also LAW 21393.*

PLSC 849a, The American Presidency. Stephen Skowronek.
W 3.30–5.20
An examination in depth of a selected topic on the American presidency. Topics vary from year to year. Examples include the presidency of Lyndon Johnson, the Republican presidents, the politics of leadership, and the reorganization of the executive branch.

PLSC 853a[u], U.S. National Elections. David Mayhew.
W 1.30–3.20
A research seminar centering on presidential and congressional elections. Topics include electoral realignments, current presidential alignments, the electoral college, voter turnout, aggregate House election patterns, House incumbency advantage, challenger quality, career decisions, election laws, House and Senate constituencies, campaign finance, Senate elections, and divided party control. Assigned authors include R. Erikson, E. Tufte, G. Jacobson, A. Abramowitz, M. Fiorina, R. Wolfinger, E. Ladd, G. King, J. Snyder, and B. Grofman. Students are expected to read weekly assignments and write a twenty- to thirty-page research paper.

PLSC 863b[u], Bureaucratic Politics in the United States. Rose Razaghian.
T 1.30–3.20
In this course we examine the organization of the U.S. bureaucracy in detail. We study the role of information and delegation, agency design, direct and indirect oversight, the impact on public policy, and its historical development. We pay particular attention to the choice of research questions and the methodology employed to address these questions.

PLSC 867b[u], American Political Institutions. John Lapinski.
M 1.30–3.20
This course explores the origins and development of American political institutions, especially in relation to how institutions shape the policy process. Issues of temporality, policy feedback, and policy substance are examined.

PLSC 871b, Health, Law, and Policy. Theodore Marmor, Jerry Mashaw.
HTBA
This course provides a general introduction to health law, policy, politics, and economics. Topics include, among others, access to health care, patients' rights, the meaning and effects of "managed care," the relationship of health care to public health, and selected issues in bioethics. Treatment of these issues in foreign health care systems is analyzed to provide perspective on domestic issues. Examination with a limited paper option. *Also MGT 661b, LAW 21416.*

PLSC 876a[u], The American Welfare State in Comparative Perspective. Jacob Hacker.
T 1.30–3.20
An exploration of the causes and consequences of America's comparatively distinctive social welfare framework. Consideration of competing analytic and normative perspectives in the context of selected policy issues and political episodes, including health care, retirement pensions, economic inequality, the New Deal, the Great Society, and current debates over Medicare and Social Security.

PLSC 883a[u], New Haven/The Problem of Change in the American City. Douglas Rae, Cynthia Farrar, Alan Plattus, Steven Lassant.
TTh 11.30–12.20
Examination of the rapid transformation of New Haven and other American cities over the past century as a case study of urban change and urban policy. One of New Haven's neighborhoods' history and prospects considered in detail through studies of amelioration, gateways, gentrification, and common gain. Themes include the planning and policy implications of the flow of higher-income populations away from the inner city. Discussion of the creation of communities of common gain in depopulated urban cores.

PSYCHOLOGY

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M.S., M.Phil., Ph.D.

Chair
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Professors
Woo-kyoung Ahn, J. Truett Allison (*Veterans Administration Medical Center*),Stephen Anderson (*Linguistics*), John Bargh, Linda Bartoshuk (*Surgery; Otolaryngology*), Sidney Blatt (*Psychiatry*), Paul Bloom, Thomas Brown, Kelly Brownell, Marvin Chun, Ravi Dhar (*School of Management*), Carol Fowler (*Haskins Laboratories*), Patricia Goldman-Rakic (*Neurobiology*), Louis Goldstein (*Linguistics*), Donald Green (*Political Science; ISPS*), James Hampton (*Visiting*), Marcia Johnson, Alan Kazdin, Frank Keil, Marianne LaFrance (*Women's & Gender Studies*), James Leckman (*Pediatrics*), Lawrence Marks (*Epidemiology & Public Health*), David Pauls (*Child Study Center*), Donald Quinlan (*Psychiatry*), Peter Salovey, Jerome Singer, Robert Sternberg, Fred Volkmar (*Child Study Center*), Victor Vroom (*School of Management*), Allan Wagner, Karen Wynn

Associate Professors
Larry Davidson (*Psychiatry*), Elena Grigorenko (*Child Study Center*), Jeannette Ickovics (*Epidemiology & Public Health*), Robert Kerns (*Veterans Administration Medical Center*), Linda Mayes (*Child Study Center*), Mary Schwab-Stone (*Child Study Center*), Kathleen Sikkema (*Psychiatry*)

Assistant Professors
David Armor, Maria Babyonyshev (*Linguistics*), Geoffrey Cohen, William Corbin, Richard Eibach, Karyn Frick, Jeremy Gray, Joseph Mahoney, Christy Marshuetz, Douglas Mennin, Nathan Novemsky (*School of Management*), Maria Piñango (*Linguistics*), Mitchell Prinstein, Laurie Santos, Mark Schaefer (*Child Study Center*), Glenn Schafe, Brian Scholl, Teresa Treat, Robin Weersing (*Child Study Center*)

Lecturers
Mark Brackett, Nancy Close, Nelson Donegan, Carla Horwitz, Kent Kiehl, Janet Kremenitzer, Kristi Lockhart, Michelle Patterson, Leonid Rozenblit, Golan Shahar, Joseph Stevens

Fields of Study

Fields include behavioral neuroscience; clinical psychology; cognitive psychology; developmental psychology; social/personality psychology; and abilities and expertise.

Special Admissions Requirement

The department requires that scores from the GRE General Test accompany an application.

Special Requirements for the Ph.D. Degree

In order to allow each student to be trained in accordance with his or her own interests and career goals, the general requirements of the department are kept to a minimum. The formal requirements are: (1) Course work selected to meet the individual's objectives with a minimum of three basic-level courses and one course in data analysis. Two of the three required basic-level courses must be in two different areas of psychology outside the student's main area of concentration. The basic-level course requirement must be completed by the end of the second year. Students must attain an Honors grade in at least two term courses by the end of the second year of study. (2) Nine units of teaching are required in years two through four. (3) Completion of a predissertation research project, to be initiated not later than the second term and completed not later than March 15 of the second year. Certification of this research project as well as performance in course work and other evidence of scholarly work at a level commensurate with doctoral study, as judged by the faculty, is necessary for continuation beyond the second year. (4) Submission of a dissertation prospectus, a dissertation area review of the literature, and a theme essay that demonstrates the candidate's comprehensive knowledge and understanding of the area of concentration. Certification of the theme essay completes the qualifying examination. (5) Approval of the dissertation by an advisory committee and the passing of an oral examination on the dissertation and its general scientific implications. The theme essay and the dissertation prospectus are completed during the third year. Students are then formally admitted to Ph.D. candidacy. The dissertation area review of the literature must be approved prior to receipt by the readers of a preliminary draft of the dissertation. There are no language requirements.

The faculty considers teaching to be an essential element of the professional preparation of graduate students in Psychology. For this reason participation in the Teaching Fellow Program is a degree requirement for all doctoral students. They are expected to serve as teaching fellows for a total of nine teaching fellow units over the course of the second through fourth years in the program. Opportunities for teaching are matched as closely as possible with students' academic interests.

Combined Ph.D. Program

A combined Ph.D. degree with African American Studies is available. Consult departments for details.

Master's Degrees

M.Phil. The academic requirements for the M.Phil. degree are the same as for the Ph.D. degree except for the submission of a prospectus, a dissertation area review, and the completion and defense of a dissertation, which define the Ph.D.

M.S. (en route to the Ph.D.). The M.S. degree is awarded upon satisfactory completion of the second year of the program leading to the Ph.D. degree and also of the departmental predissertation research requirement.

Program materials are available upon request to the Registrar, Department of Psychology, Yale University, PO Box 208205, New Haven CT 06520-8205.

Courses

[**PSYC 501a, Perception.**]

PSYC 502b,Learning Theory. Allan Wagner.
TTh 9–10.15
The development of learning theory from its beginnings in associationism, behaviorism, and the Darwinian revolution to its present "connectionistic," neural-network expressions.

[**PSYC 503a,Memory.**]

PSYC 504b,Cognitive and Social Neuroscience. Christy Marshuetz.
T 1.30–4.20
In this course, we discuss core issues in cognitive psychology and social cognition from the perspective of cognitive and social neuroscience. The emphasis is on understanding the importance of an interplay of traditional experimental psychology, neuroimaging research, and evidence from patient populations in understanding how "brain" gives rise to "mind." Students without a background in cognitive neuroscience are welcome; in addition to attending regular class meetings, students are required to attend selected lectures in PSYC 320.

[**PSYC 505a,Creativity.**]

[**PSYC 506b,Introduction to Brain and Behavior.**]

[**PSYC 507,Health Psychology: Clinical and Social Foundations.**]

[**PSYC 509b,Social Development.**]

[**PSYC 510a,Self and Identity.**]

[**PSYC 511b,Cognitive Development.**]

[**PSYC 512b,The Cognitive Sciences.**]

[**PSYC 513b, Personality Development and Psychopathology.**]

PSYC 514b,Applied Developmental Science. Joseph Mahoney.
Th 2.30–5
This course surveys the emerging, broad discipline of applied developmental science. Course content includes the applications of developmental theory and research to salient contemporary social issues/problems, and how current social and historical changes have impacted developmental theory and the research agenda. Main themes of the course are the theoretical and historical context of developmental science; integration of research and practice; university and community contexts of applied developmental research; conceptual issues in the prevention of disorder and promotion of competence; ethical issues in conducting applied research; and the roles that ethnicity, culture, community, and economy play in applying developmental theory and research to social problems.

[**PSYC 515b,Structural Equation Modeling.**]

PSYC 518a,Data Analysis: Quantitative Variables. Leonid Rozenblit.
TTh 2.30–3.45
Introduction to the analysis of quantitative data from experiments — primarily the analysis of variance and contrast analyses. Some coverage of correlation and regression. Required of first-year students except with instructor's permission.

PSYC 520b[u], Multivariate Data Analysis with Latent Variables. Leonid Rozenblit.
MW 2.30–3.45
A survey of multivariate techniques for discovering latent structure in psychological data; unidimensional and multidimensional scaling, clustering, factor analysis.

[**PSYC 521b[u], Multivariate Data Analysis withObservable Variables.**]

[**PSYC 525a,The Minds of Infants.**]

PSYC 527a,Psychotherapy: Historical and Scientific Foundations. Jerome Singer.
TH 1.30–3.20
This course places modern psychotherapeutic practice in a historical and current psychological scientific context. Traces the evolution of modern practice from hypnosis through interpersonal psychoanalysis and various cognitive-behavioral approaches.

[**PSYC 530b,Advanced Quantitative Methods.**]

[**PSYC 533,The Nature of Cognition.**]

[**PSYC 534a,Theories of Development.**]

[**PSYC 535, Foundations of Behavioral Neuroscience.**]

[**PSYC 539a,Psychopathology and Its Treatment.**]

[**PSYC 540b,Changing Behavior in Applied Settings.**]

[**PSYC 541b,Research Methods in Psychology.**]

[**PSYC 554b,Human Intelligence and Its Development.**]

[**PSYC 556,Developmental Psychopathology.**]

PSYC 570b,Nonverbal Communication. Marianne LaFrance.
TTH 3.30–5
Exploration of the psychological and social functions of nonverbal behavior (e.g., facial expression, gesture, posture, paralanguage, proxemics). Several levels of analysis are considered, including individual, interactional, group, intergroup, and cultural.

PSYC 572a,Neurobiology of Learning and Memory. Thomas Brown.
M 11.30–2
The goal is to comprehend the field and memory across several levels of analysis — including synapses, neurons, circuits, systems, behavior, and cognition. The emphasis is on mammalian memory systems that are sufficiently well understood to begin unifying facts and principles across these levels using suitable combinations of theoretical approaches to computational neuroscience. *Also NSCI 614a.*

PSYC 601a[u], Serious Mental Illnesses. Larry Davidson.
W 1.30–3.20
This course provides a brief overview of the history of the understanding and treatment of serious mental illness in Western society as a prelude to current approaches. The majority of the course focuses on contemporary approaches to psychosis, ranging from psychopharmacology and cognitive-behavioral psychotherapy, to psychiatric rehabilitation and self-help/mutual support, to political and personal empowerment.

[**PSYC 605b[u], The Relation of Speech to Language.**]

[**PSYC 607a[u], Human Thinking and Reasoning.**]

[**PSYC 608b,Behavior Genetics.**]

PSYC 610a,Genocide and Terrorism: Probing the Mind of the Perpetrator. Dori Laub.
TH 1.30–3.20
The course begins by establishing a historical framework, which examines on the one hand Russian intellectuals' fascination with violence at the end of the nineteeth and into the twen-

tieth century, and on the other hand Nazi state-sponsored terror and its similarities with and differences from contemporary global terrorism. We then address the questions of the psychology of individual terrorists and suicide bombers, in lectures conducted by psychologists and psychoanalysts who attempt to develop theoretical models on the basis of their clinical experience and field work. A sociological perspective examines individuals in the context of their social environment, focusing especially on the link between modernity and the rise of religious violence. Case studies of the Islamic Jihad, Christian fundamentalism in the United States, and atrocities committed by Japan during WWII add breadth to this exploration. *Also INRL 556a.*

PSYC 612a[u], Neuroimaging Analyses Techniques. Kent Kiehl.
TH 2.30–5.20
This course covers basic through advanced techniques for the analyses of brain imaging data. Analyses techniques for Electroencephalography (EEG), Event-related Potentials (ERPs), Positron Emission Tomography (PET and SPECT), functional magnetic resonance imaging (fMRI), and Magnet Resonance Spectroscopy (MRS) are examined. Special emphasis is placed on fMRI analyses using Statistical Parametric Mapping (SPM). Students are given example brain imaging data sets and are expected to analyze the data within the SPM framework. The course is designed for social scientists with emphasis on understanding the principles of brain imaging analyses, and successful completion of the course relies heavily on the mathematical implementation of image analyses.

[**PSYC 614b[u], Neurobiology of Learning and Memory.**]

[**PSYC 616a[u], Psychopathology and Cognitive Processing.**]

[**PSYC 617b[u], Evolutionary Psychology.**]

[**PSYC 618b, Visual Cognition and Attention.**]

[**PSYC 620, Topics in Cognitive Development.**]

[**PSYC 622a[u], Social Intervention.**]

[**PSYC 626b,Modularity and Cognition.**]

[**PSYC 627a[u], Topics in Infant Cognition.**]

[**PSYC 628a[u], Working Memory, Attention,and Executive Processing.**]

[**PSYC 632b,Comparative Psychology.**]

PSYC 640b, Transdisciplinarity: A New Research Approach to Address Complex Scientific Problems. Suchitra Krishnan-Sarin.
W 9.30–11.20
The traditional method of addressing scientific and health problems has been to study the question within a single discipline in depth. However, the complexity of most disorders requires a more integrated approach. A new approach, transdisciplinarity, has arisen in an effort to address these complex issues from the standpoint of many disciplines at the same time. The course faculty uses a case-based approach, with examples from their own work, to illustrate and define how transdisciplinary approaches might be used to come up with a more meaningful understanding of complex problems.

PSYC 642a,Social Psychology and Social Change. Geoffrey Cohen.
TH 3.30–5.20
An examination of the major ideas and theories of social psychology and their relevance to social problems and social change.

PSYC 648b, Cellular Analysis of Learning and Memory: Model Systems. Glenn Schafe.
HTBA
Focus on the brain circuitries and cellular/molecular mechanisms involved in learning and memory, with particular emphasis on vertebrate model systems. Review of work on habituation, sensitization, Pavlovian and instrumental conditioning, and declarative memory formation.

PSYC 649a[u], Topics in Syntax: Bilingualism. Maria Babyonyshev.
Th 9.30–11.20
An investigation of the interactions between the two grammars of a bilingual speaker. Topics include transfer, first language attrition, and code-switching. Focus on the implications of these processes for syntactic theory. Prerequisite: one course in syntax or permission of instructor. *Also LING 662a[u].*

PSYC 650b[u], Topics in Syntax: The Mental Lexicon. Maria Piñango.
Th 1.30–3.20
A discussion of theories of real-time language comprehension and how they interact with theories of linguistic representation. It focuses on computational and representational models of the mental lexicon which are evaluated in the context of online processing evidence, as well as lesion and imaging studies. *Also LING 660b[u].*

[**PSYC 651b[u], Object Cognition.**]

[**PSYC 652a[u], Topics in Cognitive Neuroscience.**]

[**PSYC 654b[u], Sensory Processes.**]

[**PSYC 657a,Social and Behavioral Influences on Health.**]

[**PSYC 658b,Behavioral Decision Making.**]

PSYC 659a[u], Addictive Behaviors. William Corbin.
W 1.30–3.20
This seminar course introduces students to important issues in the field of addictive behaviors. Three areas of focus include: defining, assessing, and diagnosing addictive behaviors and reviewing epidemiological research on alcohol and drug abuse and negative consequences of normative alcohol and drug use; examining factors that contribute to alcohol and drug related problems, including genetic, physiological, neurochemical, cognitive, and social factors; and evaluating current prevention and treatment approaches for addictive behaviors.

[**PSYC 660b[u], Child Development and Social Policy.**]

[**PSYC 661a, Clinical Diagnostic Evaluation of Children.**]

PSYC 662a,Abilities,Competencies,and Expertise I. Robert Sternberg.
T 4.30–6
This seminar is a forum for students to discuss contemporary issues related to intelligence and thinking. In some classes, we discuss the work of researchers outside Yale. Occasionally there are presentations from researchers outside our community. Most of the classes consist of informal presentations by seminar members aimed at helping them clarify their ideas for theory and research.

PSYC 663b,Abilities,Competencies,and Expertise II. Robert Sternberg.
T 4.30–6
For description, see PSYC 662a.

[**PSYC 669b,Neurochemical and Hormonal Modulation of Learning and Memory.**]

[**PSYC 672,Concepts, Categories,and Word Meanings.**]

[**PSYC 673b[u], Clinical Cognitive Neuroscience.**]

[**PSYC 677b[u], Introduction to Computational Neuroscience.**]

[**PSYC 678a,Psychology's Contribution to Gender and Vice Versa.**]

[**PSYC 682a,Child and Adolescent Peer Relations.**]

PSYC 684a,Psychotherapy Technique: Process and Outcome. Michelle Patterson.
HTBA
Introduction to basic clinical skills and clinical issues. Topics for discussion include: developing a therapeutic relationship, barriers to effective communication, strategies for managing resistance, and developing a professional identity. Class format includes informal discussion, assigned readings, and student case presentations.

PSYC 684b,Case Conceptualization and Diversity. Michelle Patterson.
HTBA
The focus of this seminar is on formulating and conceptualizing psychological problems from a cognitive-behavioral perspective. Special consideration is paid to individual and cultural diversity in conceptualizing cases and planning treatment. Also discussed are ways in which cognitive-behavioral perspectives can be integrated with other theoretical orientations (e.g., interpersonal theory, experiential therapy).

[**PSYC 688b,Psychotherapeutic Process: Clinical and Research Perspectives.**]

PSYC 689a,Psychopathology and Diagnostic Assessment. Douglas Mennin.
Didactic practicum for first-year clinical students. Main emphasis is initial assessment. Treatment planning and evaluation of progress also covered. Students first observe and then perform initial interviews. Applicable ethics and local laws reviewed.

PSYC 690b,Clinical Ethics and Practice. Michelle Patterson.
HTBA
Introduction to ethical and legal guidelines for clinical practice. In addition, supervision on diagnostic interview using the Structured Clinical Interview for DSM-IV is provided.

PSYC 702,Current Work in Cognition. Woo-kyoung Ahn.
T 12–1.30
A weekly seminar in which students, staff, and guests report on their research in cognition and information processing.

PSYC 704,Current Work in Behavioral Neuroscience. Allan Wagner.
F 4–5.30
An informal student/faculty seminar in which each participant chooses, lays groundworkfor, and presents some current work in behavioral neuroscience. Currently emphasizes the psychobiology of learning, but involves a variety of research approaches, designs, and methods.

PSYC 705,Current Work in Abilities and Expertise. Robert Sternberg.
M 1.30–2.30
This seminar discusses current work in abilities and expertise viewed from a multidisciplinary approach. It consists of both presentations and discussions of recent readings.

PSYC 708,Current Work in Developmental Psychology. Frank Keil.
W 12–1.30
A luncheon meeting of the faculty and graduate students in developmental psychology for reports of current research and discussion on topics of general interest.

PSYC 710,Current Work in Social Psychology and Personality. Richard Eibach.
M 12–1.30
Faculty and students in personality/social psychology meet during lunchtime to hear about and discuss the work of a local or visiting speaker.

PSYC 711,Current Work in Child Development and Social Policy. Edward Zigler.
F 11.30–12.30
Guest lectures and discussion on recent topics in child development and social policy, and its influence on public policy in the United States.

PSYC 717a,Ethical Issues in Psychology, Current Work in Clinical Psychology. William Corbin.
Th 12–1.30

PSYC 718b,Ethnic and Cultural Diversity: Current Work in Clinical Psychology. Kelly Brownell.
Th 12–1.30

[**PSYC 719a,History and Systems of Psychology: Current Work in Clinical Psychology.**]

[**PSYC 720b,Current Work in Clinical Psychology.**]

PSYC 721,Research Topics in Infant Cognition. Karen Wynn.
HTBA
Investigation of various topics in infant cognition: early mechanisms for representing and reasoning about number; infants' ability to represent time; early object knowledge; foundations of intentional understanding. Permission of instructor required.

PSYC 722,Research Topics in Eating and Weight Disorders. Kelly Brownell.
T 12.30–1.30
In-depth discussion and analysis of current research topics on bulimia, anorexia nervosa, and obesity. Topics include, but are not limited to, physiology, cultural influences, treatment studies, body image, binge eating, and epidemiology.

PSYC 723,Research Topics in Child and Adolescent Therapy. Alan Kazdin.
This course focuses on the development and execution of research related to child and adolescent treatment, and the factors with which clinical dysfunction and therapeutic change are associated.

PSYC 724,Research Topics in Child Development and Social Policy. Edward Zigler.
M 5–6
The course focuses on major policy issues pertaining to children and families (particular issues are determined by course participants). The goal of the course is to fully investigate the policy issues under study, discovering what is occurring at several different levels (federal policy, state policy, international policy, best practices, and research) on the issues. The knowledge gained is used to develop a written product by the end of the semester or academic year (e.g., journal article, book chapter, monograph). In addition to the substantive knowledge gained on the issues examined, participants also learn how to do research in the policy arena, a skill which can then be used to study other issues.

[**PSYC 727,Professional and Conceptual Issues in Psychology.**]

PSYC 728,Research Topics in Prevention Research. Joseph Mahoney.
F 9.30–11
The course discusses current theory and research on social intervention research and social policy. Format involves student presentation and discussion of original research, student- and faculty-led discussions of current topics in prevention research and social policy, and student development and career training in social intervention research and policy.

PSYC 729,Research Topics in Language and Cognition. Paul Bloom.
Th 10–11.45
Seminar focusing on ongoing research projects in language, cognition, and development. Permission of instructor required.

PSYC 731,Research Topics in Cognition and Development. Frank Keil.
W 2.30–4.20
A weekly seminar discussing research topics concerning cognition and development. Primary focus on high-level cognition, including such issues as: the nature of intuitive or folk theories, conceptual change, relations between word meaning and conceptual structure, understandings of divisions of cognitive labor, and reasoning about causal patterns.

PSYC 749,Research Topics in Memory. Marcia Johnson.
Th 1–2.30
Examines current research on cognition and memory, including discussion of proposed and ongoing research projects. Topics include issues in design, analysis, and interpretation of empirical studies exploring human memory.

PSYC 750,Research Topics in the Neurobiology of Learning and Memory. Thomas Brown.
Discussion and analysis of current work on the neurobiological foundations of learning and memory systems in mammals. Informal weekly discussions span several levels of analysis, including molecular and biophysical studies, cellular and systems neurophysiology and neuroanatomy, and contemporary behavioral neuroscience.

PSYC 751,Research Topics in Memory, Aging,and Neurobiology. Karyn Frick.

PSYC 766,Research Topics in Perception and Cognition. Brian Scholl.
F 2–4
A seminar-style discussion of recent research in perception and cognition, covering both recent studies from the literature and the ongoing research in the Yale Perception and Cognition Laboratory.

PSYC 767,Research Topics in Emotion,Health,and Social Behavior. Peter Salovey.
W 3.30–5.20
A forum for graduate students conducting research in the Health, Emotion, and Behavior Laboratory.

PSYC 768,Research Topics in Psychopathology and Cognitive Processing. Teresa Treat.
Th 10–12
Weekly discussion and analysis of theoretical and measurement models relevant to examination of the role of cognitive processing in psychopathology. Permission of instructor required.

PSYC 769,Research Topics in Intelligence and Thinking. Robert Sternberg.
A forum for students to discuss contemporary issues related to intelligence and thinking. Discussion of works of researchers within and outside the Yale community. Primarily consists of informal presentations by seminar members seeking to help them clarify their ideas for theory and research.

PSYC 772,Research Topics in Self and Social Judgment. David Armor.
T 4–5.30
Weekly lab focusing on current research projects in self-evaluation, social judgment, and decision making.

PSYC 773,Research Topics in Working Memory. Christy Marshuetz.
Students have a chance to discover what it is like to be involved in academic research. The course consists of weekly discussion and analysis of theoretical developments in cognitive neuroscience, especially the cognitive neuroscience of memory. Students in the course have a

chance to help design experiments and discuss data, and read research papers. Students may also become involved in ongoing research. Permission of instructor required.

PSYC 775,Research Topics in Animal Cognition. Laurie Santos.
Investigation of various topics in animal cognition, including: what nonhuman primates know about tools and foods; how nonhuman primates represent objects and number; whether nonhuman primates possess a theory of mind. Permission of instructor required.

PSYC 777,Research Topics in Gender and Psychology. Marianne LaFrance.
This "gender lab" meets weekly to consider research being done in the department that bears on some gender-related issue.

PSYC 779,Research Topics in Child and Adolescent Peer Relations. Mitchell Prinstein.
Lab meeting for ongoing studies of child and adolescent peer relationships and adjustments.

PSYC 801,Clinical Internship (Child). Faculty.
Advanced training in clinical psychology with children. Adapted to meet individual needs with location at a suitable APA-approved internship setting.

PSYC 802,Clinical Internship (Adult). Faculty.
Advanced training in clinical psychology with adults. Adapted to meet individual needs with location at a suitable APA-approved internship setting.

PSYC 806a,Practicum in Childhood Intervention. Faculty.
Advanced supervised work in settings where child and family policies are developed and/or implemented. Adapted to meet individual needs with location at suitable sites.

PSYC 808,Practicum in Child Psychology. Faculty.
The Yale Child Study Center offers a yearlong practicum, which includes assessment of children, psychotherapy, team meetings, supervision, and didactic experiences.

PSYC 809,Practicum in Assessment of School-Aged Children. Faculty.
An optional extension of PSYC 661. Students gain practical experience in testing with children.

PSYC 810,Practicum in Developmental Assessment. Linda Mayes.
Practicum in early childhood screening and assessment of infants and toddlers at high risk for social adaptive and emotional developmental problems.

PSYC 811,Anxiety Disorders Practicum. Douglas Mennin.
Discussion of current topics in psychopathology and treatment of anxiety disorders. Group supervision of therapy cases involving OCD, panic, social phobia.

PSYC 812b, Conduct Problem Practicum. Alan Kazdin.
Provides training in the diagnosis, assessment, and treatment of aggressive and antisocial children and their families. Permission of the instructor required.

PSYC 813,Eating and Weight Disorders Practicum. Kelly Brownell, Marlene Schwartz.
Practical work for graduate students in clinical psychology on therapeutic interventions for eating and weight disorders. Assessment, diagnosis, and treatment are covered.

PSYC 817,Other Clinical Practica. Faculty.
For credit under this course number, clinical students register for practicum experiences other than those listed elsewhere in clinical psychology, so that transcripts reflect accurately the various practicum experiences completed.

[**PSYC 821,Practicum in Clinical Child and Adolescent Treatment.**]

PSYC 883b, Practicum in Clinical Assessment. Donald Quinlan.
Supervised psychological assessment using measures of intellectual functioning, projective testing, and neuropsychological testing with patients.

PSYC 920,Individual Study: Dissertation Area Paper.
By arrangement with faculty.

PSYC 923,Individual Study: Theme Essay.
By arrangement with faculty.

PSYC 925,Individual Tutorial.
By arrangement with faculty and approval of director of graduate studies.

PSYC 930,Predissertation Research.
By arrangement with faculty.

RELIGIOUS STUDIES

451 College, 432.0828
M.A., M.Phil., Ph.D.

Chair
Dale Martin

Director of Graduate Studies
Harry Stout (432.0828, harry.stout@yale.edu)

Professors
Marilyn McCord Adams, Robert Adams (*Philosophy*), Harold Attridge (*Divinity School*), Gerhard Böwering, Jon Butler, Adela Collins (*Divinity School*), John J. Collins (*Divinity School*), Carlos Eire, Margaret Farley (*Divinity School*), Steven Fraade, Christine Hayes, Paula Hyman, Serene Jones (*Divinity School*), David Kelsey (*Divinity School*), Bentley Layton, Ivan Marcus, Dale Martin, Thomas Ogletree (*Divinity School*), Gene Outka, Deepak Sarma (*Visiting*), David Smith (*Visiting*), Harry Stout, Miroslav Volf (*Divinity School*), Robert Wilson

Assistant Professors
Shannon Craigo-Snell, Stephen Davis, Frank Griffel, Ludger Viefhues

Lecturer
Hugh Flick, Jr.

Fields of Study

Students must enroll in one of the following fields of study: American Religious History, Hebrew Bible/Old Testament, History of Ancient Christianity, Islamic Studies, Judaic Studies, New Testament, Philosophy of Religion, Religious Ethics, and Theology. (Buddhist Studies, normally included, is admitting no graduate students at this time.)

Special Admissions Requirement

The department requires the scores of the GRE General Test and previous study in areas relevant to the chosen field of study, including ancient languages where applicable.

Special Requirements for the Ph.D. Degree

Twelve term courses must be completed, in which the Graduate School Honors requirement must be met. Proficiency in two modern scholarly languages, normally French and German, must be shown, one before the end of the first year, the other before the beginning of the third; this may be done by passing an examination administered by the department, by accreditation from a Yale Summer School course designed for this purpose, or by a grade of A or B in one of Yale's intermediate language courses. Mastery of the languages needed in one's chosen field (e.g., Chinese, Hebrew, Greek, Japanese) is also required in certain fields of study. A set of four qualifying examinations is designed for each student, following guidelines and criteria set by each field of study; these are normally completed in the third year. The dissertation prospectus must be approved by

a colloquium, and the completed dissertation by a committee of readers and the departmental faculty. Upon completion of all predissertation requirements, including the prospectus, students are admitted to candidacy for the Ph.D. This is expected before the seventh term in American Religious History, Philosophy of Religion, Religious Ethics, and Theology; before the eighth term in other fields. Students begin writing their dissertation in the fourth year and normally will have finished by the end of the sixth. There is no oral examination on the dissertation.

In the Department of Religious Studies, the faculty considers learning to teach to be an important and integral component of the professional training of its graduate students. Students are therefore required to teach as teaching fellows for at least two years during their graduate programs. Such teaching normally takes place during their third and fourth years, unless other arrangements are approved by the director of graduate studies.

A combined Ph.D. degree is available with African American Studies. Consult departments for details.

Master's Degrees

M.Phil. and *M.A. (both en route to the Ph.D.).* See Graduate School requirements, pages 397–98. Alternatively, the Department of Religious Studies offers, in conjunction with the Medieval Studies program, a joint M.Phil. degree. For further details, see Medieval Studies.

Prospective students must apply in one of the nine fields of study, and when requesting information they should specify their particular field of interest. Program materials are available upon request to the Director of Graduate Studies, Department of Religious Studies, Yale University, PO Box 208287, New Haven CT 06520-8287.

Courses

RLST 510a, Theories in the Study of Religions: Major Thinkers. Ludger Viefhues.
TH 4–5.50
This seminar explores critically the category formation of "religion" in the history of the field of religious studies. We read founding texts of our discipline together with contemporary reflections on the colonial and postcolonial construction of "religion." We discuss psychological, anthropological, sociological, and philosophical approaches to "religion." Authors include, among others, Weber, Freud, Durkheim, Douglas, McCarthy-Brown, Geetz, Bell, Lopez, Chidester.

RLST 511a[u], Religious Diversity and Philosophy. Ludger Viefhues.
MW 11.30–12.20, 1 HTBA
Critical survey of philosophical models addressing religious diversity in the twentieth century. How theories from religious studies, feminist philosophy, anthropology, and non-Western writings on religious life and practice change the understanding of religious diversity.

RLST 534b, The Life and Thought of Jonathan Edwards. Harry Stout.
W 1.30–3.20
This reading course is designed to offer students an opportunity for intensive reading in and reflections upon some of the writings of early America's premier philosophical theologian and his Puritan setting. The course is also meant to familiarize students with the life and times of Edwards, encouraging extensive reading and discussion about Edwards' background, historical and intellectual context, and legacy.

RLST 601a, The Required New Testament/Ancient Christianity Seminar: Rhetoric and Early Christianity. Dale Martin.
W 4–5.50
The topic and instructor of this seminar change yearly. For 2003–2004, the seminar provides an introduction to Graeco-Roman rhetoric, including a reading of various speeches and handbooks. We consider the social placement of rhetoric in the ancient world, theories of rhetoric, letter-writing as part of rhetorical education, and the significance of ancient rhetoric and modern rhetorical analysis for the study of the New Testament and early Christianity.

RLST 603b[u], Women and Gender in Early Christianity. Stephen Davis.
MW 2.30–3.45
An examination of the tensions found in early Christian discourses about women through the study of various primary sources, including the New Testament, Gnostic texts, monastic treatises, saints' lives, and early Christian art. Ways that the representation of women in ancient Christian literature and art help shape social understandings of gender identity.

RLST 604a[u], The Making of the Christian Bible. Stephen Davis.
MW 10.30–11.20, 1 HTBA
Study of historical factors in the formation of the Christian Bible, especially the exclusion of so-called heretical or apocryphal writings, and the way that early Christianity interpreted and thereby shaped its scripture.

RLST 607b[u], Creation and Fall: Genesis 1–3. Stephen Davis.
Th 3.30–5.20
Study of ancient Jewish, Christian, and Muslim interpretations of Genesis 1–3, and their implications for views of God, society, and human body.

RLST 608a, Problems in the Study of Christianity in Late Antiquity. Stephen Davis.
T 2.30–4.20
This course, a required seminar for Ph.D. students in the field of Ancient Christianity, addresses key methodological and historiographical issues in the study of Christianity from the rise of Constantine (313) to the Council of Chalcedon (451), focusing especially on the fourth and fifth centuries. Among the topics to be covered: the relation of church and state after Constantine, theological controversies and the function of church councils, the formation of Christian identity in relation to other religious communities (including pagans and Jews), variety of pieties and practices (including monasticism, pilgrimage, and the cult of the saints), and the study of material culture in late antiquity.

RLST 619a, Gift and Grace. Miroslav Volf.
T 1.30–3.30
Examination of some recent anthropological, philosophical, sociological literature on gift with the purpose of relating it to the theological reflection on the nature of grace. Limited enrollment. *Also REL 767a.*

RLST 622b, History and Methods of the Discipline of New Testament Studies. Adela Collins.
HTBA
The objectives of this course are to become familiar with the history of scholarship on the New Testament; to grasp the theory and practice of the classic methods of historical criticism; and to become acquainted with newer methods being applied to the interpretation of the New Testament. The course is designed primarily for students in the Ph.D. program in New Testament. Doctoral students in Ancient Christianity and Ancient Judaism are also welcome. Other students with knowledge of Greek and experience in advanced exegetical courses, with the permission of the instructor. Graded on a pass/fail basis. *Also REL 691b.*

RLST 625b,Advanced Greek Exegesis. Harold Attridge.
HTBA

RLST 655b,Christianity in the Second Century. Bentley Layton.
W 4–5.50
Principal research areas in ancient Christian literature, controversy, and thought from Ignatius to Clement of Alexandria. A proseminar, required of all graduate students in New Testament Studies and Ancient Christianity.

RLST 659b[u], Seminar: The Making of Monasticism. Bentley Layton.
T 2.30–4.20
The history of Christian monasteries, hermits, ascetics, and monastic institutions and values in late antiquity, with special attention to the eastern Mediterranean world.

RLST 680a, Popular Religion in Europe,1300–1700. Carlos Eire.
T 1.30–3.20
Readings in primary texts from the period 1300–1700 which focus on definitions of the relationship between the natural and supernatural realms, both Catholic and Protestant. Among the topics to be covered: mystical ecstasy, visions, apparitions, miracles, and demonic possession. All assigned readings in English translation. *Also HIST 556a.*

RLST 701a[u], The Growth of Islam: Conquest,Culture,and Conversion. Gerhard Böwering.
TTh 2.30–3.45, 1 HTBA
The development of Islamic civilization in the Middle East, North Africa, Spain, Iran, and India from Muhammad through the Mongol Invasions to the rise of the Ottoman, Safavid, and Timurid empires (600–1500). Emphasis on the intellectual and religious history of the Arabs and Iranians.

RLST 720b,Seminar on the Qur'an. Gerhard Böwering.
Th 2.30–4.20
Intensive study of the Qur'an. Readings in the literature of Qur'anic commentary. Special emphasis on the pre-Islamic background of the Qur'an. Prerequisite: reading knowledge of Arabic. Permission of the instrucor required.

RLST 751a[u], Midrash Seminar: Sifre Va'ethannan. Steven Fraade.
Th 9.30–11.20
Close study of the earliest commentary to the book of Deuteronomy with focus on the commentary to Moses' petition for divine permission to enter the promised land, and its denial (Deut. 3:23–29), and the "Shema" proclamation of monotheistic faith and wholehearted attachment to the divine teachings (Deut. 6:4–9). Introduction to the language and methods of rabbinic scriptural interpretation with particular attention to the interplay of exegesis, narrative, and religious ideology. Prerequisite: reading knowledge of Hebrew.

RLST 756b,The Required Second Temple Judaism Seminar: Scriptual Translation in Antiquity. Steven Fraade.
W 1.30–3.20
The topic of this seminar changes yearly. This year we study the history and varieties of scriptural translation methods and purposes in relation to ancient and modern understandings of translation practice. In particular, we consider scriptural translations into Greek (Septuagint), Aramaic (Targum), and Syriac (Peshitta), by Jewish, Samaritan, and Christian communities. Required for all graduate students in ancient Judaism.

RLST 757a^{u}, The Dead Sea Scrolls and the History of Ancient Judaism. Steven Fraade.

T 9.30–11.20

Examination of the place of the Dead Sea Scrolls and their community of "readers" within the history of ancient Judaism. Focus on the major genres of the sectarian scrolls, with an eye to understanding the community's history, religious ideology, social structures, and place within the broader varieties of Graeco-Roman Judaism. Readings in translation. No prerequisites.

RLST 761a^{u}, Introduction to the Talmud in Translation. Christine Hayes.

MW 1–2.15

An introduction to the Babylonian Talmud in English translation. Examination of legal (halakhic) and non-legal (aggadic) texts that address a wide range of theological and cultural issues central to rabbinic Judaism, including the relationship of written and oral Torah, the interaction of divine revelation and human interpretation, the nature of God, the nature of humankind, sin and virtue, marriage and sexuality, and the problem of human suffering.

RLST 768a^{u}, Historical Perspectives in the Study of the Holocaust. Paula Hyman.

MW 10.30 –11.20, 1 HTBA

A survey of the major historical issues raised by the Holocaust, including the roots of Nazism; different theoretical perspectives and ways of accounting for genocide; the behavior of perpetrators, victims, and bystanders; and problems of representation. *Also HIST 979a^{u}.*

RLST 769b,Critical Methods in the Study of the Talmud. Christine Hayes.

Th 10.30–12.20

An introduction to the modern critical study of the Talmud with special emphasis on the work and methodology of Shamma Friedman (on Yevamot 10 and Bava Metsia 6). The course includes a review of fundamental skills required for the analysis of talmudic texts (Talmudic Aramaic, terminology, and halakhic concepts). Hebrew required; knowledge of Aramaic preferred. Undergraduates admitted with instructor's permission.

RLST 776a, Jews in Christian and Muslim Lands from the Fourth to the Sixteenth Century. Ivan Marcus.

T 1.30–3.20

Research seminar that focuses on a comparison of the two medieval Jewish sub/cultures of Ashkenaz (northern Christian Europe) and Sefarad (mainly Muslim and Christian Spain). Issues in historiography and comparative methodology complement discussions about the symbols and reality of literary, political, and economic features of each society. *Also HIST 541a.*

RLST 777a^{u}, Jews in Muslim Lands from the Seventh to the Sixteenth Century. Ivan Marcus.

Th 11.30–12.45

Introduction to Jewish culture and society in Muslim lands from the Prophet Muhammad to Suleiman the Magnificent. Topics to be discussed include Islam and Judaism; Jerusalem as a holy site; rabbinic leadership and literature in Baghdad; Jewish courtiers, poets, and philosophers in Muslim Spain; the Jews in the Ottoman Empire. *Also HIST 532a^{u}.*

RLST 801a,Hebrew Bible/Old Testament Bible Seminar: Genesis and the Formation of the Pentateuch. Robert Wilson.

M 1.30–3.20

A close reading of selective chapters of the Book of Genesis against the background of classical and current theories of Pentateuchal composition. Prerequisite: two years of Biblical Hebrew or the equivalent; previous work in the interpretation of the Hebrew Bible; reading knowledge of German helpful but not required.

RLST 805a, The History and Methods of the Interpretation of the Old Testament/ Hebrew Bible. John Collins, Robert Wilson.

T 1.30–3.20

Reading and critical evaluation of major classical works in the history of Old Testament studies from Wellhausen to the present. Prerequisite: working knowledge of Biblical Hebrew and reading knowledge of German.

RLST 816a, Hellenistic Judaism. John Collins.

W 3.30–5.20

Review of the history and literature of Greek-speaking Judaism. Segments of the course focus on the Hellenistic Reform in Judea, the settlement of Jews in Egypt under the Ptolemies, and the Jewish experience in Egypt in the Roman period. *Also REL 694a.*

RLST 818b, Judaism in the Persian Period. John Collins.

T 1.30–3.20

Graduate seminar focusing on the books of Ezra and Nehemiah, with some consideration of Haggai, Zechariah, and the Elephantine papyri. (Hebrew and Aramaic required.) *Also REL 693b.*

RLST 852b, *Agape* and Special Relations. Gene Outka.

W 1.30–3.20

The aim overall is to explore possible links between the love commandments and different sorts of special relations. We consider depictions of *agape* as neighbor-love that is universal in scope (the "neighbor" is anyone who "bears the human countenance") and the claims of particular bonds between persons, and examine four different special relations: among co-religionists (especially ties among those in the church); among members of the same political community (including the relations between the Christian community and the civil community); among family members (between spouses, and parents and children); among friends (and the place generally of preferential relations).

RLST 856a, Covenant, Federalism, and Public Ethics. Thomas Ogletree.

M 1.30–3.20

This course is an advanced seminar in religious social ethics. It examines biblical, Jewish, Reformed Protestant, and Puritan notions of covenant in their bearing on the development of federal conceptions of government, as exemplified in the U.S. Constitution and elaborated in *The Federalist* papers of James Madison. The aim of the seminar is to stimulate fresh critical reflection on the contributions that Jewish and Reformed Protestant thought might make toward enhancing the quality of public life in contemporary American society. More broadly, it is about the proper role of faith-based communities within the public life of liberal democratic societies. *Also REL 887a.*

RLST 858b, Critical Social Theory and Constructive Inquiry in Religious Social Ethics. Thomas Ogletree.

W 1.30–3.20

The seminar is devoted to a critical assessment of modern ventures in constructive social theory in their bearing upon normative teachings in religious social ethics. The underlying premise of the seminar is that religiously grounded social teaching can gain practical pertinence for human will being in complex societal systems only by critically engaging the organizational principles and the normative values that already configure those systems of social order. Thus, principles of justice or of basic human rights, no matter how well grounded they may be in cogent rational arguments or in core religious convictions, simply cannot be imposed upon any and all forms of social organizations. To become effective, norms and values of this kind must themselves be realistically and prudently adapted to the standard operations of specific societies, especially the prevailing economic and political arrangements.

Selections from the writings of Max Weber, Talcott Parsons, Alfred Schutz, and Jürgen Habermas are foundational to the work of the seminar, with other writings added in response to the interests of seminar members. The critical method that informs the seminar builds upon the work of Ernst Troeltsch as outlined in his Social Teaching of the Christian Churches.

RLST 863a, Freedom and Action. Margaret Farley.

W 1.30–3.20

This course aims to explore the experience of free choice. Some brief time is spent on questions of determinism and freedom, but primary attention is paid to historical and contemporary analyses of choice and its components (reasons, emotions, objects, judgments, goals). Related issues of the possibilities of human selfhood, moral luck, obligation, love, character, etc., are considered. Readings are selected from classical sources (Aristotle, Thomas Aquinas, Kant); contemporary phenomenologists and action theorists (e.g., Sartre, Ricoeur, Frankfurt, C. Taylor, B. Williams, Meyers); and theologians (e.g., J. Edwards, K. Rahner). This is an advanced course, designed primarily for doctoral students in religious ethics. *Also REL 777a.*

RLST 865a^{u}, Playing God? Biomedical Ethics and the Limits of Power. David Smith.

TTh 9–10.15

This course focuses on a series of issues or problems created by the increasing power of biomedicine. These are problems of ethics — of right and wrong, good and bad. They are also religious problems about identity, destiny, and the human response to the power of nature or fate. The course ultimately revolves around one complex question: How — if at all — should religious and moral traditions help us separate right from wrong as we face difficult, sometimes unprecedented, issues of morality? How do the resources of a religious tradition or standpoint compare with other perspectives? We are interested in the best resolution of problems, and in the role of religion in their resolution.

RLST 867b^{u}, Bioethics,Religion, and the Limits of Freedom. David Smith.

Th 3.30–5.20

This seminar covers a crucial set of methodological issues related to biomedical ethics. Religious and secular perspectives compete for attention. The great majority of our population claims to believe in God, but this belief comes in a variety of traditional and idiosyncratic forms. As bioethics relates closely to the beginning and end of life, this pluralism is hard to avoid. And it may be our greatest strength. We study a group of writers whose attention to method is explicit. They are diverse in religious allegiance (if any), and on the complicated "liberal-conservative" axis. We read what they have to say on issues at the beginning and end of life and on questions of social justice in medicine. Our central concerns are with the values of liberty and health, professional integrity and compassion, tradition and the common good.

RLST 901a,The Philosophical Theology of John Duns Scotus. Marilyn McCord Adams.

T 3.30–5.20

This seminar examines the principal metaphysical, epistemological, ethical, and theological theories of B. John Duns Scotus by a careful study of some of his major works (*De Primo Principio, Sentence-Commentary* selections, *Quodlibet Questions*). An analytical and critical understanding of the text is emphasized. Students may read the works in translation or in Latin. Students are expected to make seminar presentations and write a long final paper on some aspect of Scotus's philosophy of theology. *Also PHIL 612a^{u}.*

RLST 905a,The Required Theology Seminar. Shannon Craigo-Snell.

W 7.30–9.30

RLST 911a,The Metaphysics of Christology. Marilyn McCord Adams.
M 3.30–5.20
The Council of Chalcedon declares that in Christ there are two (unconfused) natures and one person. This seminar examines attempts to give this formula a metaphysical interpretation. Readings come from medieval Latin authors (Anselm, Aquinas, Scotus, Ockham), from late nineteenth-century kenotic theologians, and from contemporary philosophy of religion (e.g., Thomas Morris, Richard Swinburne). Students are expected to read, take part in discussion, and write a twenty-five-page term paper. (Significant preparation in philosophy or theology is required.) *Also PHIL 700a.*

RLST 918b,Contemporary Trinitarian Thought. Miroslav Volf.
T 1.30–3.20
Examination of recent developments in the doctrine of the Trinity against the backdrop of the classical formulations of this doctrine. Limited enrollment. *Also REL 756b.*

RLST 920a[U], Reason, Faith,and Feeling : Early Modern Christian Thought. Shannon Craigo-Snell.
TTh 10.30–11.20, 1 HTBA
A survey of major developments in religious thought in the West from Descartes to Schleiermacher, focusing on the struggles to defend, discredit, or distance religious belief in relation to reason. Exploration of connections between theology, philosophy, and social history.

RLST 921b[U], History, Hope,and the Self: Modern Christian Thought. Shannon Craigo-Snell.
TTh 10.30–11.20, 1 HTBA
An overview of important developments in Western religious thought during the nineteenth and twentieth centuries. Topics include changing understanding of the significance and movement of history, challenges posed to religious traditions by growing historical knowledge, shifting conceptions of the human person, and contrasting estimation of the role of religious persons in secular and political life. Connections between philosophy, theology, and social history are addressed. Authors include Hegel, Marx, Barth, and Gutierrez. No background assumed.

RLST 935a, Jesus' Death as Saving Event. Adela Collins,Serene Jones.
T 1.30–3.20
The course is an exploration of biblical and theological materials related to the interpretation of Jesus' death as a saving event, asking the question "What happened on the cross?" Critical attention is given to themes such as sacrifice, the scapegoat, vicarious suffering, atonement, reconciliation, redemptive violence, and the redemption of violence. We explore literature ranging from biblical texts and classical theologies to modernist, post-modernist, and feminist critiques and reconstructions of these. We also view together at least one film and read at least one novel that attend to one or more of these topics. Students are encouraged to formulate their own constructive proposals concerning the salvific character of the cross. Limited enrollment. *Also REL 671a.*

RLST 955b,Divine Will and Goodness. Marilyn McCord Adams.
M 3.30–5.20
This seminar explores a family of issues in Divine and human action theory: whether it is possible to will anything except under the aspect of goodness, the relation between the agent's intellectual judgments and its choices, the structure and source of putative normative relations between Divine and human wills. Readings are taken from medieval Latin and modern classical philosophers and theologians (e.g., Anselm, Aquinas, Henry of Ghent, Giles of Rome, Godfrey of Fontaines, Peter Olivi, Scotus, Ockham, Peter of Ailly, Luther, Calvin, Descartes, and Leibniz).

RENAISSANCE STUDIES

53 Wall, Rm 310, 432.0672
M.A., M.Phil., Ph.D.

Chair and Director of Graduate Studies
Keith Wrightson

Executive Committee
Edwin Duval, Carlos Eire, Roberto González Echevarría, Lawrence Manley, John Matthews, Giuseppe Mazzotta, Annabel Patterson, John Rogers, Ellen Rosand, Paolo Valesio, Christopher Wood

Faculty Associated with the Program
Rolena Adorno, Christy Anderson, Leslie Brisman, Judith Colton, Anne Dunlop, Paul Freedman, Karsten Harries, John Hollander, Olivia Holmes, Blair Hoxby, K. David Jackson, Maija Jansson, Lee Patterson, Keith Wrightson

Lecturer
Robert Babcock

Fields of Study

Renaissance Studies offers a combined Ph.D. degree that integrates concentration in a departmental field with interdisciplinary study of the broader range of culture in the Renaissance and early modern periods. The program is designed to train Renaissance specialists who are firmly based in a traditional discipline but who can also work across disciplinary boundaries. Departmental areas of concentration available are Classics, Comparative Literature, English, History, History of Art, History of Music, Italian, and Spanish and Portuguese.

Special Admissions Requirements

Only candidates wishing to proceed to a doctorate should apply. *Application should be made to the department of concentration, with an indication that the candidate seeks nomination to the combined degree in Renaissance Studies.* Applications should be accompanied by scores from the GREs and one research or critical paper.

Special Requirements for the Ph.D. Degree

Students are subject to the combined Ph.D. supervision of the Renaissance Studies program and the relevant participating department. The student's program will be decided in consultation with an adviser, the director of graduate studies in Renaissance Studies, and the director of graduate studies in the participating department. Requirements for the combined degree will vary slightly to accommodate the requirements of the participating departments, but all candidates for the combined degree are expected to meet, at a minimum, the following requirements. Students must demonstrate a reading knowledge of Latin, Italian, and a third language, which will vary according to departmental

requirements. At the minimum, an examination in Latin or Italian should normally be passed upon entrance; a second language should be passed before the third term; and a third language by the end of the second year. Each student is required to take sixteen term courses (in History of Art, fifteen). The normal pattern is to have completed fifteen courses during the first two years of study, no more than two of which may be individual reading and research. A two-term core seminar, designed to present a wide range of topics concerned with Renaissance and early modern culture, is required of all combined degree candidates. This course, offered every other year, is open to students from other departments.

Students concentrating in modern language and literature departments (including Comparative Literature, English, Italian, and Spanish and Portuguese) are required to complete three courses in at least two disciplines outside of literature, three courses in the Renaissance literature of the primary department, and two courses in Renaissance literatures outside of the primary department. The remaining courses will be taken in other periods and topics as required by the department of concentration. Students concentrating in History or Music are required to complete four courses dealing with Renaissance culture in disciplines outside of the primary department and four courses in the Renaissance period within the department; the remaining courses are to be taken in other periods and topics as required by the department of concentration. Students concentrating in History of Art are required to take four courses within the department and three courses outside the department dealing with the Renaissance period. Students concentrating in Classics are required to take six courses outside the department in the Renaissance period. Training in teaching, through teaching fellowships, is considered an important part of every student's program. Most students teach in their third and fourth years.

The scheduling of the oral examination and the dissertation prospectus follows the practice of the primary department, but in every case the two requirements must be completed not later than September of the fourth year. The oral examination, varying in length from two hours to two hours and fifteen minutes, will include a standard fifteen-minute question on the bibliographical resources for Renaissance Studies across the disciplines and three fifteen-minute questions (in the case of English two fifteen-minute questions) in Renaissance topics outside the primary discipline. The remainder of the examination will be devoted to the primary discipline, including (except in the case of Classics) some further coverage of the Renaissance period. Students take additional written examinations as required by the primary departments.

Upon completion of all predissertation requirements, including the prospectus, students are admitted to candidacy for the combined Ph.D. degree. Admission to candidacy must be completed by the beginning of the fourth year. The dissertation will be advised and completed according to departmental guidelines, but one of the readers will normally be a member of the Renaissance Studies Executive Committee.

Master's Degrees

M.Phil. The combined M.Phil. degree may be requested after all requirements but the dissertation are met.

M.A. (*en route to the Ph.D.*). The M.A. degree is awarded upon completion of eight term courses, taken in at least three disciplines, and with at least three grades of Honors. The examination in Latin or Italian must have been passed.

Program materials are available upon request to the Chair, Renaissance Studies Program, Yale University, PO Box 208298, New Haven CT 06520-8298.

Courses

RNST 500a,b,Introduction to Renaissance Studies. David Quint [F], Lawrence Manley [Sp].
TH 1.30–3.20 [F], W 3.30–5.20 [Sp]
An introduction to major texts, issues, bibliography, and methods in the interdisciplinary study of the Renaissance. Emphasis in the first term on Italy and in the second on northern Europe. *Also CPLT 501, ENGL 565a/b.*

RUSSIAN AND EAST EUROPEAN STUDIES

Luce Hall, 34 Hillhouse, 432.3423
M.A.

Chair
Laura Engelstein (*History*)

Director of Graduate Studies
Paul Bushkovitch (*History*)

Professors
Vladimir Alexandrov (*Slavic Languages & Literatures*), Paul Bushkovitch (*History*), Katerina Clark (*Slavic Languages & Literatures*), Mirjan Damaška (*Law*), Laura Engelstein (*History*), Robert Evenson (*Economics*), Ute Frevert (*History*), John Gaddis (*History*), Harvey Goldblatt (*Slavic Languages & Literatures*), Benjamin Harshav (*Comparative Literature*), Michael Holquist (*Comparative Literature*), Tatjana Lorković (*Library*), Jaroslav Pelikan (*Emeritus, History*), Susan Rose-Ackerman (*Law*), Ivan Szelenyi (*Sociology*), Tomas Venclova (*Slavic Languages & Literatures*), Miroslav Volf (*Divinity*)

Associate Professor
Hilary Fink (*Slavic Languages & Literatures*), Lawrence King (*Sociology; on leave*)

Assistant Professors
Keith Darden (*Political Science*), Anna Grzymala-Busse (*Political Science*), Pauline Jones Luong (*Political Science*), John MacKay (*Slavic Languages & Literatures*), Timothy Snyder (*History*)

Lecturer
Slobodan Novak (*Slavic Languages & Literatures*)

Senior Lectors
Irina Dolgova (*Slavic Languages & Literatures*), Rita Lipson (*Slavic Languages & Literatures*)

On July 1, 1999, the Council on Russian and East European Studies merged with the Council on West European Studies to create a new interdisciplinary body, the Council on European Studies (CES). The RSEE M.A. program will continue to operate as before while the Council on European Studies moves to formulate and implement new curricular and research programs reflective of current developments in Europe, broadly defined to encompass all states and peoples from Ireland to the Urals.

Fields of Study

See departments of Slavic Languages and Literatures, History, Political Science, Economics, Sociology; the Law School; the School of Forestry & Environmental Studies; the School of Management.

Special Admissions Requirements

Study of Russian through third-year college level or equivalent or another East European language.

Special Requirements for the M.A. Degree

All students must complete sixteen term courses (or their equivalent) in the various fields related to Russian and East European studies. Students are expected to take courses in at least three of the major disciplines relevant to the program (history, literature, social sciences, and law). One of the sixteen term courses may be taken for audit. Students may substitute a yearlong course in Russian or an East European language for two terms of graduate course work. Under this option the language course may not be taken for audit. Students with previous preparation in Russian language and civilization may in certain cases receive credit for this work. Students are required to pass the language examinations in Russian and a second language by the end of the third term at Yale. Students must receive the grade of 1+ or higher in Russian on the ACTFL/ETS Rating Scale as administered by the Slavic Languages and Literatures department at Yale, including reading, oral, and grammar portions. Students specializing in an East European language (such as Polish, Czech, Ukrainian, Hungarian, and others by special arrangement) may take Yale department-administered examinations in the language of the area of concentration. In case of a concentration on a language other than Russian, a student must demonstrate a reading knowledge of Russian by examination as administered by the Slavic Languages and Literatures department.

Joint degrees are available with the School of Management. Interested students must apply separately to the School of Management, as well as to Russian and East European Studies for a joint degree. The Council is currently proposing joint degrees with the Law School, and with the Department of Epidemiology and Public Health. Interested applicants should contact the DGS.

The Master's Thesis

The master's thesis is based on research in a topic approved by the director of graduate studies and advised by a faculty member with specialized competence in the chosen topic. The thesis is normally written in conjunction with RSEE 950.

Program materials are available upon request to the Director of Graduate Studies, Russian and East European Studies, Yale University, Box 208206, New Haven CT 06520-8206.

Courses

RSEE 940a or b,Independent Study.
By arrangement with faculty.

RSEE 950a or b,Master's Thesis.
By arrangement with faculty.

SLAVIC LANGUAGES AND LITERATURES

2704 Hall of Graduate Studies, 432.1300, slavic.department@yale.edu
M.A., M.Phil., Ph.D.

Chair
Harvey Goldblatt

Director of Graduate Studies
Katerina Clark (451 College, Rm 203, 432.0712, katerina.clark@yale.edu)

Professors
Vladimir Alexandrov, Katerina Clark, Laura Engelstein (*History*), Harvey Goldblatt, Benjamin Harshav (*Comparative Literature*), Michael Holquist (*Comparative Literature*), Tomas Venclova

Associate Professors
Hilary Fink, Robert Greenberg (*Adjunct*)

Assistant Professor
John MacKay

Senior Lectors
Irina Dolgova, Rita Lipson

Fields of Study

Fields include Russian literature, medieval Slavic literature and philology (by special arrangement), Polish literature (by special arrangement).

Special Admissions Requirement

An advanced-level command of the Russian language is required.

Special Requirements for the Ph.D. Degree

All entering graduate students must pass departmental proficiency examinations in Russian. During their residence, students specializing in Russian literature take a minimum of sixteen term courses (including three courses in linguistics) and are expected to acquire a comprehensive knowledge in all periods of Russian literature, a familiarity with medieval Slavic literature, a thorough command of the Russian language, and a mastery of a field of concentration within Russian literature. The student's course work, with the approval of the director of graduate studies, may be selected from the offerings of the department and any other department of the University. In addition, the student will be responsible for developing a minor field of specialization in one of the following: (1) a Western literature; (2) another Slavic literature; (3) Slavic linguistics; (4) a topic in intellectual history. (A special curriculum may be arranged for students wishing to specialize in either medieval Slavic literature and philology or Polish literature; a minimum of sixteen term courses will be required for each.) A reading examination in either French or

German, administered and evaluated by the department, must be passed by all graduate students by the beginning of the fifth term of study. The qualifying examinations, based on specific fields of concentration and on topics designed by the student in consultation with the faculty, should be passed by the end of the sixth term of study. A dissertation prospectus must be submitted no later than September 15 of the seventh term of study, and the prospectus defense must take place no later than December 1 of the same term. Upon completion of all predissertation requirements, including the prospectus and its defense, students are admitted to candidacy for the Ph.D.

The faculty considers teaching to be an important part of the professional preparation of graduate students. Students in Slavic normally teach in their third and fourth years.

Joint Ph.D. Program

The Department of Slavic Languages and Literatures also offers, in conjunction with the Program in Film Studies, a joint Ph.D. in Slavic Languages and Literatures and Film Studies. For further details, see Film Studies on page 177. Applicants to the joint program must indicate on their application that they are applying both to Film Studies and to Slavic Languages and Literatures. All documentation within the application should include this information.

Master's Degrees

M.Phil. See Graduate School requirements, pages 397–98. Alternatively, the Department of Slavic Languages and Literatures offers, in conjunction with the Medieval Studies program, a joint M.Phil. degree. For further details, see Medieval Studies.

Master's Degree Program. The Department of Slavic Languages and Literatures does not admit students for the terminal M.A. degree, nor does it award an M.A. en route to the Ph.D. degree. If, however, a student admitted for the Ph.D. leaves the program prior to completion of the doctoral degree, he or she may be eligible to receive a terminal master's degree. He or she must have completed at least fifteen term courses in Russian literature and linguistics, chosen in consultation with the director of graduate studies. A grade of Honors in at least two term courses and an average of High Pass in the remaining courses must be attained. A reading knowledge of French or German is required, and candidates must pass departmental proficiency examinations in Russian.

Program materials are available upon request to the Chair, Slavic Languages and Literatures, Yale University, PO Box 208236, New Haven CT 06520-8236.

Courses

RUSS 652a, Nineteenth-Century Russian Lyric Poetry. Tomas Venclova.
T 3.30–5.20
Textual analysis of selected poems from major nineteenth-century Russian lyric poets Zhukovskij, Batjushkov, Baratynskij, Tjutchev, Lermontov, Fet, and Nekrasov. As well as acquainting students with nineteenth-century Russian lyric poetry, the course aims at evolving a meaningful approach to poetry in general. Open to qualified undergraduates.

RUSS 653b, Tolstoy. Vladimir Alexandrov.

Th 3.30–5.20

A seminar surveying the early, middle, and late periods of Leo Tolstoy's legacy, including selected short stories, novels, and discursive writings. Primary attention to the development of his artistic themes, formal characteristics, and ideology. All readings in Russian.

RUSS 675a,Promised Lands: Slavery, Literature,and Modernity in Russia and the United States. John MacKay.

T 1.30–3.20

Close, comparative, contextualized examination of literary and other forms of cultural production associated with U.S. slavery and Russian serfdom. Special attention is paid to the relation between bondage and national, cultural, and personal identity; the role of bondage in definitions of "aesthetic experience" in the pre- and post-emancipation periods; the relation between literacy and the literary; literature of protest in the two countries; and connections between geographical and subjective space within cultures of enslavement. We examine works by Pushkin, Aksakov, Gogol, Simms, Cooper, Crèvecoeur, Radishchev, Karamzin, Goncharov, Tolstoy, Kennedy, and the "plantation novelists," Stowe, Melville, Turgenev, slave and serf autobiographers, freedman's textbooks, Fet, Lanier, Page, Chesnutt, and Bunin; historical treatments by Kolchin, Genovese, and others; theoretical works by Said, Jameson, Saidiya Hartman, Bakhtin, and others. Requirements: in-class presentations; research paper. No knowledge of Russian required. *Also AMST 926a, CPLT 571a.*

RUSS 678b,Brodsky. Tomas Venclova.

W 10.30–12.20

An investigation of Joseph Brodsky's poetic work against the background of contemporary Russian poetry. Close readings of approximately twenty selected poems.

RUSS 695a,Soviet Literature of the 1920s and 1930s. Katerina Clark.

W 1.30–3.20

The 1920s were both the most fertile and the most fateful period in Soviet literature. The period ended in 1932 with the imposition of Socialist Realism, but that resolution represented only a small fraction of the possibilities that had emerged during the decade. This course presents an historical overview, incorporating some of the main landmarks of the 1920s and 1930s including works by Pilnyak, Bakhtin, the Formalists, Eisenstein, Platonov, Mayakovsky, Bulgakov, and Zoshchenko.

RUSS 699b, Performing Arts in the Twentieth Century: The Russian Stage. Katerina Clark.

W 1.30–3.20

Covers most of the performing arts: ballet, opera, theater, mass spectacle, and film. Theory of the performing arts, including selections from the writings of some of the most famous Russian directors such as Stanislavsky, Meierhold, Eisenstein, and Balanchine. Their major productions and some of the major Russian plays of the twentieth century (e.g., by Chekhov, Mayakovsky, Bulgakov, and contemporary dramatists). No knowledge of Russian required. Students taking the course for credit in Comparative Literature can write their papers on texts in other languages. *Also CPLT 677b.*

RUSS 833,Advanced Russian Conversation and Composition: Topics in Contemporary Russian Press and Media. Rita Lipson.

MW 12.30–1.20

A course designed to equip students with advanced language skills necessary to comprehend complexities of contemporary Russian press and media. Accompanied by a grammar review. Fall and spring.

RUSS 834b,Aspects of Russian Grammar and Teaching Methodologies. Irina Dolgova.
T 12.30–2.20
The course examines various aspects of Russian grammar and the use of different teaching methodologies. Special emphasis is placed on the connection between linguistic knowledge and its application for teaching Russian in an English-speaking classroom. Different types of language learners, diverse teaching strategies, and existing resources for teaching Russian are discussed.

RUSS 851a,Proseminar in Russian Literature. Vladimir Alexandrov.
Th 3.30–5.20
Introduction to the graduate study of Russian literature. Topics include literary theory, methodology, introduction to the profession.

SLAV 754a[u], Old Church Slavic. Harvey Goldblatt.
TTh 11.30–12.45
The study of OCS and its place in the history of Church Slavic. The main features and the grammar of OCS. The Glagolitic and Cyrillic writing systems. Close readings from the "canon" of OCS literary monuments. OCS in relation to modern Slavic languages (especially Russian).

SLAV 785b[u], Language,Nationalism,and Ethnic Conflict in the Balkans. Robert Greenberg.
MW 4–5.15
This course explores the role of linguistic controversies in the polarization of ethnic relations within the former Yugoslavia. Topics include language and nationalism, the integration and disintegration of Yugoslavia, and the Balkans in the context of other charged ethno-linguistic controversies from the United States to India.

SOCIOLOGY

140 Prospect, 432.3323
M.A., M.Phil., Ph.D.

Chair
Jeffrey Alexander

Director of Graduate Studies
Karl Ulrich Mayer

Professors
Jeffrey Alexander, Scott Boorman, Deborah Davis, Ron Eyerman, Paul Gilroy, Karl Ulrich Mayer, Ivan Szelenyi

Assistant Professors
Jennifer Bair, Hannah Brueckner, Averil Clarke, Lawrence King, Sharon Kinsella, Alondra Nelson (*African American Studies*), Christopher Rhomberg, Andrew Schrank, Rachel Sherman, Philip Smith

Lecturer
Vron Ware

Fields of Study

Fields include Comparative Sociology/Macrosociology, Cultural and Historical Sociology, Life Course/Social Stratification, Mathematical Sociology, Methodology (Qualitative and Quantitative Approaches), Networks, Political Sociology, Race/Gender/Ethnic/ Minority Relations, Social Change, Social Movements, Theory (General, Critical, Hermeneutic), Urban Sociology.

Special Requirements for the Ph.D. Degree

Qualification for admission to candidacy for the Ph.D. will take place during the student's first three years of study at Yale. A student who has not been admitted to candidacy will not be permitted to register for the seventh term of study. To qualify for candidacy the student must complete fourteen term courses and demonstrate competence in sociological theory, statistics, and research methods, competence in which may be demonstrated by passing two term courses in each area. After completion of courses, students prepare written and oral comprehensive examinations in two selected fields and defend a dissertation prospectus.

Teaching is an important part of the professional preparation of graduate students in Sociology. Students teach therefore in the third and fourth years of study.

Combined Ph.D. Degree in Sociology and African American Studies

The Department of Sociology offers, in conjunction with the program in African American Studies, a combined Ph.D. degree in Sociology and African American Studies.

Students accepted to the joint Ph.D. program must meet all of the requirements of the Ph.D. in Sociology with the exception that, excluding the courses required to demonstrate competence in sociological theory, statistics, research methods, and comprehensive examination in two substantive fields, joint-degree students may substitute African American Studies courses for six of the fourteen term courses required to qualify for the Ph.D. in Sociology. For further details see African American Studies.

Master's Degrees

M.Phil. See Graduate School requirements, pages 397–98.

M.A. (en route to the Ph.D.). Eight term courses are required for the M.A. degree. Two of these courses must include statistics and theory. A grade of High Pass or Honors must be achieved in five of the eight required courses. A student may petition for the M.A. degree in the term *following* the one in which he/she completes the course requirements.

Program materials are available at www.yale.edu/socdept/.

Courses

SOCY 501a, Foundations of Sociological Theory. Ivan Szelenyi.
TH 9–11
An intensive reading seminar on the key works of a few select classical social theorists. During the fall 2003 the course focuses on the works of Max Weber. Students who need a broad survey of classical social theory should audit the undergraduate course on classical theory, SOCY 151a.

[**SOCY 502b, Contemporary Sociological Theory.**]

[**SOCY 504b, Research Design and Research Practice.**]

[**SOCY 506a, Survey Methods.**]

SOCY 509a, Advanced Methods of Ethnographic Field Research. Rachel Sherman.
TH 1–3
This seminar is a practicum in participant observation. We begin with readings on ethical and methodological issues pertaining to ethnographic fieldwork, but the bulk of the course focuses on workshop-style discussions of students' experience in their field sites. Participants are required to spend four hours per week in a field site and to write and share field notes, as well as hand in a final paper. Participants should initiate a field placement before the semester begins, as this process can be time-consuming and it is essential that students have access to a site by the second week of the semester.

[**SOCY 510b[u], Setting the Scholarly Agenda.**]

SOCY 522a[u], The Sociology of Development. Andrew Schrank.
TH 2.30–4.20
The seminar asks how and why states, firms, and popular organizations in the developing world use their natural and human resource endowments to generate different social, political, and economic outcomes.

[**SOCY 524b, Sociology of Culture.**]

SOCY 525b, Cultural Sociology. Philip Smith.
TH 10–12
The course looks in depth at the tie between culture and society. It reviews the major approaches to this topic within cultural theory over the past one hundred years. We explore

diverse understanding of the content and social impact of culture such as functionalism, structuralism, and postmodernism. Emphasis is given to ways we can theorize the autonomy of culture as a determining force in the organization of social life.

[**SOCY 526a,Recent Trends in Social Stratification Processes.**]

SOCY 526b,Social Stratification in Advanced Societies. Karl Ulrich Mayer.
M 4–6
Social and economic inequalities based on social class and status are a major dimension of individual life chances and life aspirations as well as of the structure and dynamics of societies and the world system. The course is intended to cover the current state of the field in regard to academic and policy debates, theories, methods, crucial research findings, as well as comparative analyses.

[**SOCY 528a^{u}, Reading Race and Gender.**]

[**SOCY 529b,Legislation.**]

[**SOCY 534a,Writing Sociology.**]

[**SOCY 541b,New Theories of Civil Society.**]

SOCY 543b^{u}, Sociology of Education. Heike Solga.
TH 1.30–3.20
Modern educational systems are situated at the intersection of social stratification, culture, and politics. In the seminar we discuss economic and sociological theories developed to understand the causes and mechanisms of educational stratification and its consequences in other life domains, especially with regard to intergenerational mobility and labor markets. We discuss a multiplicity of theoretical, methodological, and empirical considerations that concern the microeconomic and sociological perspective on education. Thereby, we compare the United States to Western European countries. The course work covers readings and discussions of theoretical as well as empirical work. Students are also asked to develop empirical research designs and to carry out some statistical analyses on selected issues of educational stratification and its consequences in labor markets. Authors read include G. Becker, Bell, Boudon, Bourdieu/Passeron, Bowles/Gintis, Collins, Halsey, Jencks, Kerckhoff, Meyer, Mueller/Shavit, Rosenbaum, Spence.

[**SOCY 545a,Reading Karl Marx.**]

SOCY 548a,The Sociology of the Arts: Classical and Contemporary Perspectives. Ronald Eyerman.
W 10–12
This seminar covers the classical and contemporary sociological perspectives on the arts; the "arts" being understood in the broad sense to include fine art and popular culture. Framing these perspectives is the dominant sociological narrative, periodized as a movement from traditional to modern and late or postmodern society. The central theoretical focus is on the Frankfurt School and the notion of a culture industry.

[**SOCY 550a,The Future of Work.**]

[**SOCY 552b^{u}, Corruption and Development.**]

SOCY 557a,Current Debates in Political Sociology. Christopher Rhomberg.
T 3.30–5.20
Examination of current topics in the sociology of the state and politics. Initial consideration of issues in political philosophy; primary focus then turns to recent debates, including globalization and neoliberalism, restructuring of the welfare state, relations between state and civil society, racial and gendered character of politics, collective actors and social movements, and war and violence, among other topics.

SOCY 560a,b,Comparative Research Workshop. Ivan Szelenyi,Andrew Schrank.
W 6–8
This weekly interdisciplinary seminar is devoted to discussions of work-in-progress (forthcoming articles, M.A. thesis drafts, dissertation proposals, dissertation chapter drafts) by distinguished visiting scholars, Yale graduate students, and faculty from various social science disciplines. Papers are distributed a week ahead of time and are also posted at the Web site of the Center for Comparative Research. Students who take the course for a letter grade have to present a paper the semester they are enrolled for credit. *Also PLSC 734a,b.*

SOCY 561a[u], Topics in Contemporary Chinese Society. Deborah Davis.
T 1.30–3.20
In the past two decades, the leaders of the Chinese Communist Party have completely jettisoned the socialist blueprint and "warmly embraced" global markets and private entrepreneurship. At the same time they continue to reject all challenges to their monopoly of political power and outlaw unofficial unions, popular religious associations, and Web sites that carry stories unfriendly to the Party. In this seminar students first review the competing elements of post-Mao reforms and then evaluate the consequences of these tensions on rural and urban society. Knowledge of modern Chinese is desirable but not necessary. Prerequisite: at least one course focused on China after 1911.

[**SOCY 567b,The Performative Turn in Cultural Sociology.**]

[**SOCY 577a, Topics in Multivariate Data Analysis.**]

SOCY 578a,Logic of Social Inquiry. Karl Ulrich Mayer.
M 4–6
The seminar is an intensive introduction into the methodology of the social sciences. It covers such topics as concepts and indicators, propositions and theory, explanation and understanding, observation and measurement, types of data, units of analysis and levels of variables, experiments and quasi-experiments, description and causal modeling, verification and falsification, testing and inference, longitudinal analysis. Besides the discussion of selected texts we re-analyze classical studies as well as recent research papers.

[**SOCY 580a[u], Introduction to Statistics in Sociology.**]

[**SOCY 581b,Multivariate Methods for the Social Sciences.**]

[**SOCY 585b,Life Course Research: Theoretical Foundations and Empirical Approaches.**]

SOCY 597a,b,Special Topics in Sociology. Faculty.
Students enroll in Special Topics if they wish to retake a course for credit when there is a new instructor and a substantially different syllabus from the first time they took the course. Only with the permission of the DGS.

SOCY 598a,599b,Independent Study.
By arrangement with faculty.

[**SOCY 607b,Seminar on Field Methods.**]

SOCY 611b[u], Advanced Methods in Historical Inquiry. Christopher Rhomberg.
T 2–4
This advanced seminar focuses on analytical and methodological problems of doing research in historical sociology. Topics include the uses of theory, research design, archival investigation, types of evidence, narrative genres, and strategies of historical argument, drawing on several exemplary published works of sociology and on the students' own practice of historical research.

[**SOCY 615b[u], Black Communities in the Twentieth Century.**]

SOCY 625a, Analysis of Social Structure. Scott Boorman.
M 10–12
Develops and integrates a variety of the most promising contemporary approaches to the study of social structure and social organization.

[**SOCY 627a, Sociology of the Welfare State.**]

[**SOCY 627b, Gender and Society.**]

SOCY 628a, Workshop in Cultural Sociology. Jeffrey Alexander, Philip Smith, Rachel Sherman.
F 12–2
This workshop is designed to be a permanent, ongoing part of the graduate curriculum. Meeting weekly throughout both the fall and spring terms, it constitutes an ongoing, informal seminar to explore areas of mutual interest among students and faculty, both visiting and permanent. The core concern of the workshop is social meaning and its forms and processes of institutionalization, with special reference to the problem of civil society, democracy, and inclusion. Meaning is approached both as structure and performance, drawing not only upon the burgeoning area of cultural sociology but on the humanities, philosophy, and other social sciences. Our references are codes, narratives, and metaphors, otherwise known as "values and ideologies," and the elements of their performance. Institutionalization refers to the social processes that provide the context for culture creation and that stratify its effects. Our references here are the normal stuff of sociology – class, race, gender, sexuality, religion, status hierarchies and marginality, centers and peripheries, globality.

SOCY 628b, Workshop in Cultural Sociology and Civil Society. Jeffrey Alexander, Philip Smith, Rachel Sherman.
F 12–2
Continuation of SOCY 628a; see 628a for course description.

[**SOCY 637b, The Transition to Democracy and Capitalism in Eastern Europe.**]

SOCY 643b[u], Topics in Comparative Political Economy. Jennifer Bair.
W 2.30–4.20
This class focuses on the political economy of reform and restructuring in Eastern Europe and Latin America. We address this topic in a comparative framework, as we seek to identify similarities and differences across as well as within these regions. Processes of institutional and social transformation in each region are examined, with particular attention paid to how these are shaped by, and in turn shape, the dynamics of regional integration in North America (NAFTA/FTAA) and Europe (EU). Among the questions we address are how these processes of transformation are understood; what are these economies transitioning to? How are their experiences of reform shaped by the institutional legacies of past political-economic strategies and development models? How do we theorize and understand political and economic change in the context of "globalization"?

SOCY 644a, Theorizing the Racial Formation of the United States in the Late Twentieth Century. Paul Gilroy.
T 9.30–11.20
A designated core course for students in the joint Ph.D. program; also open to students in American Studies and Sociology. The interdisciplinary seminar includes readings from the fields of anthropology, critical legal studies, cultural studies, literary history, history, politics, and sociology. *Also AFAM 505a, AMST 643a.*

SOCY 647b,Social Processes. Scott Boorman.

M 10–12

Focus is on identifying and exploring robust alternatives/complements to the rational choice models that have come to dominate so much of the analysis of social (including organizational) processes in recent years. Specifically, emphasis is placed on a range of mathematical models and related analytic approaches originating outside the rational choice literature — in fields such as social network analysis, evolutionary biology, organization theory, and the law. Possible starting points include: the Boorman-Levitt network matching model (see, e.g., Scott A. Boorman and Paul R. Levitt, "The network matching principle: A model of efficient resource allocation by informal social networks in nonprofit and other non-market social structures," *Economics Letters*, 1982, 10, 1–7) and its applications to nonprofits and complex statutes; weak ties model of job information transmission and other information transfer in elite social networks; "garbage can" models of the internal problem-solving dynamics of complex organizations.

SOCY 650b,Modernity and Its Others: Self,Subject,and Cultural Differences. Paul Gilroy.

T 9.30–11.20

This social theory course explores aspects of the political, philosophical, and sociological debates that have emerged around the concept of modernity. It looks particularly at articulations of modernity and "race" following four interlinked lines of inquiry: how has the subject of modernity been imagined and articulated; what attributes and experiences have qualified that subject as properly human and rational; where has identity been recognized as coming from, culturally and materially; and where has cosmopolitan loyalty emerged as a demand to see and act beyond the boundaries of immediate particularity? *Also AFAM712b.*

[**SOCY 651a,Roots and Routes: Identity and Travel in African American Political Culture.**]

COUNCIL ON SOUTHEAST ASIA STUDIES

Luce Hall, 34 Hillhouse, 432.3431, seas@yale.edu

Chair
J. Joseph Errington (*Anthropology*)

Professors
William Burch (*Forestry & Environmental Studies*), Michael Dove (*Forestry & Environmental Studies*), J. Joseph Errington (*Anthropology*), Robert Evenson (*Economics*), William Kelly (*Anthropology*), Benedict Kiernan (*History*), James Scott (*Political Science*), Mimi Yiengpruksawan (*History of Art*)

Associate Professor
Lisa Curran (*Forestry & Environmental Studies*)

Lecturers and Lectors
Carol Carpenter (*Forestry & Environmental Studies*), Quang Phu Van (*Southeast Asian Languages*), Indriyo Sukmono (*Southeast Asian Languages*)

Yale does not offer higher degrees in Southeast Asia Studies. Instead, students apply for admission to one of the regular degree-granting departments and turn to Southeast Asia Studies for guidance regarding the development of their special area interest, courses outside their department, and instruction in Southeast Asian languages related to their research interest. The Council aims to bring together faculty and students sharing an interest in Southeast Asia and supplements the graduate curriculum with an annual seminar series, periodic conferences, and special lectures.

Yale offers extensive library and research collections on Southeast Asia in Sterling Memorial Library, the Economic Growth Center, the Peabody Museum of Natural History, and the Human Relations Area Files. Further information on library resources is available from Rich Richie, Curator, Southeast Asia Collection, Sterling Memorial Library (432.1858, rich.richie@yale.edu).

Language instruction is offered in two Southeast Asian languages, Indonesian and Vietnamese. The Council supports language tables and tutoring in the other Southeast Asian languages by special arrangement. Students planning to undertake field research or language study in Southeast Asia may apply to the Council for summer fellowship support.

For information and program materials, contact the Council on Southeast Asia Studies, Yale University, PO Box 208206, New Haven CT 06520-8206; or see our Web site, http://www.yale.edu/seas/.

Courses

INDN 520[u], Elementary Indonesian. Indriyo Sukmono.
5 HTBA
An introductory course in Standard Indonesian with emphasis on developing communicative skills through systematic survey of grammar and graded exercises. Introduction to reading in the second term, leading to mastery of language patterns, essential vocabulary, and basic cultural competence.

INDN 527[u], Intermediate Indonesian. Indriyo Sukmono.
3 HTBA
Continues practice in colloquial Indonesianconversation and reading and discussion of texts.

INDN 560,Readings in Indonesian. Indriyo Sukmono.
For students with advanced Indonesian language skills working on modern Indonesian literature.

VIET 515[u], Elementary Vietnamese. Quang Phu Van.
MTWThF 9.30–10.20
Students acquire basic working ability in Vietnamese including sociocultural knowledge. Attention paid to integrated skills such as speaking, listening, writing (Roman script), and reading. No previous knowledge of or experience with Vietnamese language required.

VIET 530[u], Intermediate Vietnamese. Quang Phu Van.
MTWThF 10.30–11.20
An integrated approach to language learning aimed at strengthening students' listening, speaking, reading, and writing skills in Vietnamese. Students are thoroughly grounded in communicative activities such as conversations, performance simulation, drills, role playing, and games. Discussion of aspects of Vietnamese society and culture. Prior knowledge of Vietnamese required.

VIET 560,Readings in Vietnamese. Quang Phu Van.
For students with advanced Vietnamese language skills who wish to engage in concentrated reading and research.

SPANISH AND PORTUGUESE

82 – 90 Wall Street, 432.1150, 432.5439
M.A., M.Phil., Ph.D.

Chair
Roberto González Echevarría

Director of Graduate Studies
Rolena Adorno (432.1154, rolena.adorno@yale.edu)

Director of the Language Program
María Martino Crocetti

Professors
Rolena Adorno, Roberto González Echevarría, K. David Jackson, Josefina Ludmer, María Rosa Menocal, Noël Valis

Associate Professor
Lidia Santos

Assistant Professors
Elizabeth Amann, Guillermo Irizarry, Oscar Martín, Fernando Rosenberg

Senior Lector
María Martino Crocetti

Fields of Study

Fields include Spanish Peninsular literature, Latin American literature, Portuguese and Brazilian literatures.

The doctoral program offers: (1) a Spanish major concentrating in a single field of study (medieval, Renaissance/Golden Age, modern Spanish Peninsular, colonial Spanish American, contemporary Spanish American); (2) a combined major in Spanish and Portuguese offering the student the opportunity to work in both the Luso Brazilian and Spanish/Spanish American fields. In addition, the department participates in: (1) a combined Ph.D. program in Spanish and Portuguese and African American Studies offered in conjunction with the African American Studies program and (2) a combined Ph.D. program in Spanish and Portuguese and Renaissance Studies offered in conjunction with the Renaissance Studies program.

Special Admissions Requirements

Thorough command of the language in which the student plans to specialize and a background in its literature, as well as command of at least one of the three additional languages in which the student will need to fulfill requirements.

Application must include GRE scores, a personal statement, and an academic writing sample in the language of the proposed specialization not to exceed twenty-five pages in length. Students whose native language is not English must submit scores of the Test of English as a Foreign Language (TOEFL).

Special Requirements for the Ph.D. Degree

The department requires two years of course work, sixteen term courses with a grade of Honors in at least two courses. Course work includes two required courses, SPAN 500, History of the Spanish Language, and SPAN 790, Methodologies of Modern Foreign Language Teaching, and two courses taken outside the department. Also required are a reading knowledge of Latin and a second language, as well as a third language-literature minor. In the third year, the student is expected to pass the qualifying examination (oral and written components) and submit and receive approval of the dissertation prospectus. Upon completion of all predissertation requirements, including the prospectus, students are admitted to candidacy for the Ph.D. The entire program, including the dissertation, can be completed in five years.

Participation in the department's teaching and pedagogy program is a degree requirement. It consists of taking the required course SPAN 790 in the second year and teaching one section per term of a course in the beginning language sequence during the third and fourth years of study. Viewed as an integral part of the course of study for the doctorate, this program includes supervision by the director of the language program and course directors.

Combined Ph.D. Programs

SPANISH AND PORTUGUESE AND AFRICAN AMERICAN STUDIES

The Department of Spanish and Portuguese also offers, in conjunction with the African American Studies program, a combined Ph.D. in Spanish and Portuguese and African American Studies. For further details, see African American Studies.

SPANISH AND PORTUGUESE AND RENAISSANCE STUDIES

The Department of Spanish and Portuguese also offers, in conjunction with the Renaissance Studies program, a combined Ph.D. in Spanish and Portuguese and Renaissance Studies. For further details, see Renaissance Studies.

Master's Degrees

M.Phil. See Graduate School requirements, pages 397–98. Alternatively, the Department of Spanish and Portuguese offers, in conjunction with the Medieval Studies program, a joint M.Phil. degree. For further details, see Medieval Studies.

M.A. (en route to the Ph.D.). The M.A. en route is awarded upon the satisfactory completion of eight term courses and two of the three language requirements (Latin and one other language).

Courses

PORT 921b[u], Camões and *The Lusiads*. K.David Jackson.
TH 9.30–11.20
A study of Portugal's most renowned poet Luis de Camões (1524?–1580) and his Renaissance epic, *The Lusiads* (1572), from the perspective of history and mythology. Students read from and analyze the first edition in CD-ROM. Camões's treatment of Vasco da Gama's voyage to India is emphasized. In English.

PORT 962a[u], Brazilian Short Story. K.David Jackson.
MW 1–2.20
This course provides a general critical and historical perspective on the Brazilian short story, guided by studies of the aesthetics of the genre. Major authors form the core of the readings, along with the trends they represent, accompanied by essays in criticism and theory. In English.

PORT 991a and b, Tutorial.
By arrangement with faculty.

SPAN 500a, History of the Spanish Language. Oscar Martín.
W 4–6
This course explores the origin and development of philology as the foundational discipline of literary studies, the history of the Spanish language in the context of intellectual developments in the twentieth century, the rise of linguistics as a positivist field, the separation of linguistic from literary studies, and the fracturing of Romance studies into separate language and culture fields. In Spanish.

SPAN 520a[u], Toledo: The Three Faiths and the Foundations of Medieval Europe. María Rosa Menocal.
MW 10.30–11.20, 1 HTBA
Toledo as a city of philosophical and scientific translations, of legendary religious tolerance, and of startling admixtures in the arts and letters. A broadly interdisciplinary approach explores the dramatic transformations of European culture in multiple art forms and in intellectual life triggered by this crossroads city between "East" and "West." In English.

SPAN 660a[u], Cervantes: *Don Quixote*. Roberto González Echevarría.
TTh 2.30–3.45
Closely reads *Don Quixote* in the context of theories of the novel of the Renaissance and later periods, with particular attention to the history of ideas and developments in science. In Spanish.

SPAN 714b, Eroticism and Narrative. Noël Valis.
M 1.30–3.20
An exploration of the relationship between eroticism, gender, class, and aesthetics in the *novela galante* and other narrative forms of 1880–1930 (Rachilde, Picón, Valle-Inclán, Trigo, Salinas, Insúa, etc.), with reference to the theories of Bataille, Paz, Barthes, and others. In Spanish.

SPAN 790b, Methodologies of Modern Foreign Language Teaching. María Martino Crocetti.
M 3.30–5.20
Preparation for a teaching career through readings, lectures, classroom discussions, and presentations on current issues in foreign/second language acquisition theory and teaching methodology. Classroom techniques at all levels. An additional ninety-minute practicum meets immediately afterward. In Spanish.

SPAN 816a, Geographies and Genealogies of Spanish American Literature (Sixteenth to Twentieth Century). Rolena Adorno.
M 4–6
This seminar examines parallel and overlapping genealogies of Spanish American literature organized geographically and spanning the sixteenth to the twentieth century. Including a variety of literary genres, the course consists of four reading sequences, as follows: *Mexico:* Bartolomé de las Casas, Fray Servando Teresa de Mier, José María Heredia, Reinaldo Arenas; *Peru:* Felipe Guaman Poma de Ayala, El Inca Garcilaso de la Vega, José Carlos Mariátegui,

José María Arguedas; *Nueva Granada/Gran Colombia:* Juan Rodríguez Freyle, Simón Rodríguez, Simón Bolívar, Gabriel García Márquez; *Río de la Plata:* Martín del Barco Centenera, Mariano Moreno, José María Ramos Mejía, and Andrés Rivera. In Spanish.

SPAN 939b, The Latin American Essay (Nineteenth and Twentieth Centuries). Josefina Ludmer.
TH 2.30–4.20
A theory and analysis of the Latin American essay, works by Bolívar, Simón Rodríguez, Sarmiento, Rodó, Vasconcelos, Martínez Estrada, and others. In Spanish.

SPAN 949b, The Jungle Books. Roberto González Echevarría.
W 4–6
Journeys to the jungle in poetry, fiction, autobiography, anthropology, travel narrative, and popular culture, and their relation to imperialism. Particular attention is given to the origins and evolution of the social sciences and their reflection in fiction, as well as to popular culture versions of the journey to the jungle in literature and films, such as those about Tarzan and Indiana Jones. Texts: Charles Baudelaire, "Le voyage"; Alvar Núñez Cabeza de Vaca, *Narrative;* Alejo Carpentier, *The Lost Steps;* André Malraux, *La voie royale;* Sir Arthur Conan Doyle, *The Lost World;* Joseph Conrad, *Heart of Darkness;* Claude Lévi-Strauss, *Tristes tropiques;* Rómulo Gallegos, *Canaima;* Mario Vargas Llosa, *The Storyteller;* Rudyard Kipling, *The Jungle Books;* William Henry Hudson, *Green Mansions;* Jules Verne, *Superbe Orénoque* and *La jangada,* and others. In English (knowledge of Spanish and French desirable). *Also CPLT 772b.*

SPAN 991a and b, Tutorial.
By arrangement with faculty.

STATISTICS

24 Hillhouse, 432.0666
M.A., Ph.D.

Chair
Andrew Barron

Director of Graduate Studies
John Hartigan (Rm 207, 24 Hillhouse, john.hartigan@yale.edu)

Professors
Donald Andrews (*Economics*), Andrew Barron, Joseph Chang, John Hartigan, Theodore Holford (*Epidemiology & Public Health; Biostatistics*), Peter Phillips (*Economics*), David Pollard, Edward Tufte (*Political Science; Computer Science*)

Associate Professor
Heping Zhang (*Epidemiology & Public Health; Biostatistics*)

Assistant Professors
Hani Doss (*Visiting*), John Emerson, Hannes Leeb

Lecturer
Jonathan Reuning-Scherer

Fields of Study

Fields comprise the main areas of statistical theory (with emphasis on foundations, Bayes theory, decision theory, nonparametric statistics), probability theory (stochastic processes, asymptotics, weak convergence), information theory, econometrics, classification, statistical computing, and graphical methods.

Special Admissions Requirements

GRE scores for the General Test and for the Subject Test in the area of the undergraduate major should accompany an application. All applicants should have a strong mathematical background, including advanced calculus, linear algebra, elementary probability theory, and at least one course providing an introduction to mathematical statistics. An undergraduate major may be in statistics, mathematics, computer science, or in a subject in which significant statistical problems may arise. For those whose native language is not English, the Test of English as a Foreign Language (TOEFL) scores are required.

Special Requirements for the Ph.D. Degree

There is no foreign language requirement. Normally during the first two years, fourteen term courses in this and other departments are taken to prepare students for research and practice of statistics. These include courses devoted to case studies and practical work, for which students prepare a written report and give an oral presentation. The qualifying examination consists of three parts: a written report on an analysis of a data set, a

written examination on theoretical statistics, and an oral examination. The examination is taken not later than when scheduled by the department in the middle of the second year, with provision for one subsequent reexamination of one or more parts in the event that a student does not pass the first time. All parts of the qualifying examination must be completed before the beginning of the third year. A prospectus for the dissertation should be submitted no later than the first week of March in the third year. The prospectus must be accepted by the department before the end of the third year if the student is to register for a fourth year. Upon successful completion of the qualifying examination and the prospectus (and meeting of Graduate School Requirements), the student is admitted to candidacy.

Master's Degree

M.A. (en route to the Ph.D.). This degree may be awarded upon completion of eight term courses and two terms of residence.

Master's Degree Program. Students are also admitted directly to a terminal master's degree program. To qualify for the M.A., the student must successfully complete eight term courses, chosen in consultation with the director of graduate studies. Full-time students must take a minimum of three courses per term. Part-time students are also accepted into the master's degree program. See pages 398–99.

Program materials are available upon request to the Director of Graduate Studies, Department of Statistics, Yale University, PO Box 208290, New Haven CT 06520-8290; e-mail, susan.jackson-mack@yale.edu.

Courses

STAT 501–506,Introduction to Statistics.
A basic introduction to statistics, including numerical and graphical summaries of data, probability, hypothesis testing, confidence intervals, and regression. Each course focuses on applications to a particular field of study and is taught jointly by two instructors, one specializing in statistics and the other in the relevant area of application.The Tuesday lecture, which introduces general concepts and methods of statistics, is attended by all students in STAT 501–506 together. The course separates for Thursday lectures (sections), which develop the concepts with examples and applications. Computers are used for data analysis.These courses are alternatives; they do not form a sequence and only one may be taken for credit.

STAT 501a[u], Introduction to Statistics: Life Sciences. John Hartigan, Günter Wagner.
TTh 1–2.15
Statistical and probabilistic analysis of biological problems presented with a unified foundation in basic statistical theory. Problems are drawn from genetics, ecology, epidemiology, and bioinformatics. *Also E&EB 510a[u].*

STAT 502a[u], Introduction to Statistics: Political Science. John Hartigan, Rose Razaghian.
TTh 1–2.15
Statistical analysis of politics and quantitative assessments of public policies. Problems presented with reference to a wide array of examples: public opinion, campaign finance, racially motivated crime, and health policy.

STAT 503a[u], Introduction to Statistics: Social Sciences. John Hartigan, Jonathan Reuning-Scherer.
TTh 1–2.15
Introduction to probability and statistics with emphasis on experimental design and data analysis. Survey of many of the great experiments in social science. Topics include obedience to authority, conformity to social pressure, and susceptibility to perceptual distortions.

STAT 504a[u], Introduction to Statistics in Psychology. Jonna Kwiatkowski, John Hartigan.
TTh 1–2.15
Statistical and probabilistic analysis of psychological problems presented with a unified foundation in basic statistical theory. The problems are drawn from studies of sensory processing and perceptions, development, learning, and psychopathology.

STAT 505a[u], Introduction to Statistics: Medicine. John Hartigan,Marek Chawarski.
TTh 1–2.15
Statistical methods relied upon in medicine and medical research. Practice in reading medical literature competently and critically, as well as practical experience performing statistical analysis of medical data.

STAT 506a[u], Introduction to Statistics: Data Analysis. John Hartigan and staff.
TTh 1–2.15
An introduction to probability and statistics, with emphasis on data analysis.

STAT 530b[u], Introductory Data Analysis. David Pollard.
MW 2.30–3.45
Survey of statistical methods: plots, transformations, regression, analysis of variance, clustering, principal components, contingency tables, and time series analysis. S-PLUS and Web data sources are used. After or concurrent with STAT 501a.

STAT 538a[u], Probability and Statistics for Scientists. Joseph Chang.
MWF 2.30–3.20
Fundamental principles and techniques that help scientists think probabilistically, develop statistical models, and analyze data. Essentials of probability: conditional probability, random variables, distributions, law of large numbers, central limit theorem, Markov chains. Statistical inference with emphasis on the Bayesian approach: parameter estimation, likelihood, prior and posterior distributions, Bayesian inference using Markov chain Monte Carlo. Introduction to regression and linear models. Computers are used throughout for calculations, simulations, and analysis of data. After MATH 118a or b or 120a or b. Some acquaintance with matrix algebra and computing assumed.

STAT 541a[u], Probability Theory. Hannes Leeb.
MWF 9.30–10.20
A first course in probability theory: probability spaces, random variables, expectations and probabilities, conditional probability, independence, some discrete and continuous distributions, central limit theorem, Markov chains, probabilistic modeling. After or concurrent with MATH 120a or b or the equivalent.

STAT 542b[u], Theory of Statistics. Hannes Leeb.
MWF 9.30–10.20
Principles of statistical analysis: maximum likelihood, sampling distributions, estimation; confidence intervals; tests of significance; regression; analysis of variance; and the method of least squares. Some statistical computing. After STAT 541a and concurrently with or after MATH 222a or b or 225a or b or the equivalent.

STAT 551b[u], Stochastic Processes. David Pollard.
MW 1–2.15
Introduction to the study of random processes, including Markov chains, Markov random fields, martingales, random walks, Brownian motion, and diffusions. Techniques in probability such as coupling and large deviations. Applications to image reconstruction, Bayesian statistics, finance, probabilistic analysis of algorithms, genetics, and evolution. After STAT 541a or the equivalent.

STAT 600b[u], Advanced Probability. David Pollard.
TTh 2.30–3.45
Measure theoretic probability, conditioning, laws of large numbers, convergence in distribution, characteristic functions, central limit theorems, martingales. Some knowledge of real analysis is assumed.

STAT 603a,Stochastic Calculus. Joseph Chang.
HTBA
Martingales in discrete and continuous time, Brownian motion, sample path properties, predictable processes, stochastic integrals with respect to Brownian motion and semimartingales, stochastic differential equations. Applications mostly to counting processes and finance. Knowledge of measure-theoretic probability at the level of STAT 600b is a prerequisite for the course, although some key concepts, such as conditioning, are reviewed. After STAT 600b.

STAT 606a,Markov Chain Monte Carlo. Hani Doss.
HTBA
Markov chain Monte Carlo is a simulation method for estimating distributions and expectations that are analytically intractable. This course discusses theory and applications of the method. Topics include the Metropolis-Hastings algorithm and the Gibbs sampler; applications in survival analysis, hierarchical models, and nonparametric Bayes problems; convergence theorems; convergence diagnostics.

STAT 610a,Statistical Inference. Andrew Barron.
HTBA
A systematic development of the mathematical theory of statistical inference covering methods of estimation, hypothesis testing, and confidence intervals. An introduction to statistical decision theory. Undergraduate probability at the level of STAT 541a assumed.

STAT 612a[u], Linear Models. Hani Doss.
TTh 9–10.15
The geometry of least squares; distribution theory for normal errors; regression, analysis of variance, and designed experiments; numerical algorithms (with particular reference to S-plus); alternatives to least squares. Generalized linear models. Linear algebra and some acquaintance with statistics assumed.

STAT 625a,Case Studies. John Emerson.
Thorough study of some large data sets on such topics as second-hand smoking, crashes in small cars, reticulate evolution, bloc voting, and Connecticut educational standards.

STAT 626b,Practical Work. John Emerson.
Individual one-term projects, with students working on studies outside the department, under the guidance of a statistician.

STAT 627b,Statistical Consulting. John Emerson.
Statistical consulting and collaborative research projects usually require statisticians to explore new topics outside their area of expertise. This course exposes students to real problems, requiring them to draw on their expertise in probability, statistics, and data analysis. Students complete the course with individual projects outside the department, under the guidance of a statistician.

STAT 645b,Statistical Methods in Genetics and Bioinformatics. Hongyu Zhao.
HTBA
Stochastic modeling and statistical methods applied to problems such as mapping quantitative trait loci, analyzing gene expression data, sequence alignment, and reconstructing evolutionary trees. Statistical methods include maximum likelihood, Bayesian inference, Monte Carlo Markov chains, and some methods of classification and clustering. Models introduced include variance components, hidden Markov models, Bayesian networks, and coalescent. Recommended background: STAT 541a, STAT 542b. Prior knowledge of biology is not required. Times to be arranged at organizational meeting.

STAT 660b,Multivariate Statistical Methods for the Social Sciences. Jonathan Reuning-Scherer.
HTBA
An introduction to the analysis of multivariate data. Topics include principal components analysis, factor analysis, cluster analysis (hierarchical clustering, k-means), discriminant analysis, multidimensional scaling, and structural equations modeling. Emphasis is placed on practical application of multivariate techniques to a variety of examples in the social sciences. Students complete extensive computer work using either SAS or SPSS. Prerequisites: knowledge of basic inferential procedures, experience with linear models (regression and ANOVA). Experience with some statistical package and/or familiarity with matrix notation is helpful but not required. Requirements: regular assignments and a final project. *Also F&ES 844b.*

STAT 661b[u], Data Analysis. John Hartigan.
MW 2.30–3.45
By analyzing data sets using the S-plus statistical computing language, a selection of statistical topics are studied: linear and nonlinear models, maximum likelihood, resampling methods, curve estimation, model selection, classification, and clustering. Weekly sessions are held in the Social Sciences Statistical Laboratory. After STAT 542a and MATH 222a or b or 225a or b or the equivalents.

STAT 664b[u], Information Theory. Andrew Barron.
TTh 9–10.15
Foundations of information theory in communications, statistical inference, statistical mechanics, probability, and algorithm complexity. Quantities of information and their properties: entropy, conditional entropy, divergence, mutual information, channel capacity. Basic theorems of data compression and coding for noisy channels. Applications in statistics, communication networks, and finance. After STAT 541a.

STAT 665b[u], Data Mining and Machine Learning. Hannes Leeb.
MW 11.30–12.45
Techniques for data mining and machine learning are covered from both a statistical and a computational perspective, including support vector machines, bagging, boosting, neural networks, and other nonlinear and nonparametric regression methods. The course gives the basic ideas and intuition behind these methods, a more formal understanding of how and why they work, and opportunities to experiment with machine learning algorithms and apply them to data. After STAT 542b.

STAT 674a[u], Analysis of Spatial and Time Series Data. Staff.
TTh 1–2.15
Study of statistical models that are useful for describing data collected over space or time. Models include frequency domain and time domain analysis of time series; state space models and Kalman filters; point processes; Gibbs processes and random fields.

STAT 676a, Portfolio Estimation for Compounding Wealth. Andrew Barron.
HTBA
A study of distributional properties of compounded wealth in repeated gambling and in stock market investment. Wealth concentration inequalities. Strategies of highest concentrated wealth. Normal theory for log-wealth. Relationship to maximum likelihood theory in statistics and to the asymptotic equipartition property in physics and information theory. Greedy strategies. Universal portfolios and their relationship to Bayes methodology. The ratio of idealized wealth (best with hindsight) to actual wealth and the properties of this ratio, both for stochastic stock price sequences and its minimax behavior for arbitrary price sequences. Fast algorithms for universal portfolios. Times to be arranged at organizational meeting.

STAT 683a,Asymptotics. John Hartigan.
HTBA
Consistency, normality, martingales, cumulants, Edgeworth expansions. M-estimates. Matching Bayes and frequentist procedures. Resampling. Asymptotic admissibility using elliptical partial differential equations. After STAT 600a and 610b.

STAT 695a,Internship in Statistical Research. John Hartigan.
The internship is designed to give students an opportunity to gain practical exposure to problems in the analysis of statistical data, as part of a research group within industries such as: medical and pharmaceutical research, finance, information technologies, telecommunications, public policy, and others. The internship experience often serves as a basis for the Ph.D. dissertation. Students work with the director of graduate studies and other faculty advisers to select suitable placements. Students submit a one-page description of their internship plans to the DGS by May 1, which will be evaluated by the DGS and other faculty advisers by May 15. Upon completion of the internship, students submit a written report of their work to the DGS, no later than October 1. The Internship is graded on a Satisfactory/Unsatisfactory basis, and is based on the student's written report and an oral presentation. This course is an elective requirement for the Ph.D. degree. Prerequisites: completion of one semester of the Ph.D. program.

STAT 700,Departmental Seminar.
Important activity for all members of the department. See weekly seminar announcements.

THE WHITNEY SEMINARS

Coordinator
Jay Winter (*History*) (300E HGS, 432.1395)

The Whitney Seminars, a yearlong graduate course inaugurated in 2002–2003, are sponsored by the Whitney Humanities Center in association with the Department of History. Designed to speak across disciplinary lines and to broad public and intellectual issues, the format of the program includes both the weekly seminar and a series of coordinated public lectures on history, memory, and European identities. The lectures, open to the Yale and local community, follow the seminar meetings.

Seminars

WHIT 970a,When Was Europe? The Whitney Seminar on European Identities. Paul Freedman, Paula Hyman, Jay Winter.
w 4–6,Lect. w 7
This seminar examines the idea of Europe from the Middle Ages until now. Topics include European identity in relation to Christian and Roman foundations, the mythology of nationalism and the misuse of history (romantic and nationalist theories of historical origins), the rhetoric of Enlightenment and Progress, the impact of Marxism and liberalism on notions of Europe, and unification and Balkanization in the late twentieth century. This seminar examines the notion that "Europe" was as much a shifting discursive field as it was a shifting territorial one. The boundaries of both discourse and territory remain contested and fluid to this day. *Also HIST 970a.*

WHIT 971b,History and Memory: The Whitney Seminar on European Identities. Jay Winter.
w 4–6,Lect. w 7
The seminar explores facets of the historical literature surrounding issues of individual memory, collective memory, and commemoration. The focus is on modern Europe, though the literature surveyed addresses issues beyond the confines of Europe. After a survey of interdisciplinary approaches to the field, focusing on social agency, representations, trauma studies, and cognitive psychological research, two different kinds of evidence are examined. The first relates to historical sites (monuments, ruins, battlefields, landscapes) as well as social spaces (families, trials, museums); the second, to representations and languages of remembrance, through the narratives of trauma, fiction, memoir, testimonial literature, photography, and film. The focus is on civil society rather than primarily on the manipulation of commemorative forms. *Also HIST 971b.*

WOMEN'S AND GENDER STUDIES

315 WLH, 100 Wall, 432.0845
Qualification

Chair
Laura Wexler

Professors
Linda Bartoshuk (*Psychology*), Seyla Benhabib (*Political Science*), Kelly Brownell (*Psychology*), Jill Campbell (*English*), Hazel Carby (*African American Studies; American Studies*), Kang-i Sun Chang (*East Asian Languages & Literatures*), Kathryn Dudley (*American Studies; Anthropology*), Glenda Gilmore (*History; American Studies; African American Studies*), Ingeborg Glier (*German*), Dolores Hayden (*Architecture; American Studies*), Margaret Homans (*English; Women's & Gender Studies*), Paula Hyman (*History; Religious Studies*), Marianne LaFrance (*Psychology; Women's & Gender Studies*), Charles Musser (*Film Studies; American Studies*), Judith Resnik (*Law*), Frances Rosenbluth (*Political Science*), Cynthia Russett (*History*), Harold Scheffler (*Anthropology*), Reva Siegel (*Law*), William Summers (*Molecular Biophysics & Biochemistry*), Laura Wexler (*American Studies; Women's & Gender Studies*), Robert Wyman (*Molecular, Cellular & Developmental Biology*)

Associate Professors
Elizabeth Dillon (*English; American Studies*), Laura Frost (*English*), Nora Groce (*Epidemiology & Public Health*), Janet Henrich (*School of Medicine*), Serene Jones (*Divinity; Women's & Gender Studies*), Jonathan D. Katz (*Adjunct, History of Art; Women's & Gender Studies*), Linda-Anne Rebhun (*Anthropology*), Michael Trask (*English*), Eric Worby (*Anthropology*)

Assistant Professors
Jennifer Bair (*Sociology; Women's & Gender Studies*), Bernard Bate (*Anthropology*), Jessica Brantley (*English*), Hannah Brueckner (*Sociology*), Alicia Schmidt Camacho (*American Studies; Ethnicity, Race & Migration*), Kamari Clarke (*Anthropology*), Shannon Craigo-Snell (*Religious Studies*), Stephen Davis (*Religious Studies*), Laura Frost (*English*), Casiano Hacker-Cordon (*Political Science*), Mary Lui (*History*), Sanda Lwin (*English; American Studies*), Naomi Rogers (*History of Medicine & Science; Women's & Gender Studies*), Lidia Santos (*Spanish & Portuguese*)

Lecturers
Sarah Bilston (*Women's & Gender Studies*), Geetanjali Singh Chanda (*Women's & Gender Studies*), Seth Silberman (*Women's & Gender Studies; African American Studies*), Vron Ware (*Sociology; Women's & Gender Studies*)

Fields of Study

The program in Women's and Gender Studies establishes gender and sexuality as fundamental categories of social and cultural analysis and offers critical perspectives upon them as a basis from which to study the diversity of human experience. Gender (the social and historical meanings of the distinction between the sexes) and sexuality (sexual practices, identities, discourses, and institutions) are studied as they intersect with class, race, ethnicity, and nationality. The introduction of these perspectives into all fields of knowledge necessitates new research, criticism of existing research, and the formulation of new paradigms and organizing concepts.

Graduate students who wish to receive the Qualification in Women's and Gender Studies must complete the specified course work at the graduate level, assist in teaching in appropriate courses, and demonstrate capacity to pursue independent research in Women's and Gender Studies. Students who fulfill these expectations will receive a letter from the chair, indicating that they have completed the work for the Qualification. The Qualification in Women's and Gender Studies is open by application to students enrolled in selected Ph.D. programs at Yale.

Applications and program information are available on request from the Chair, Women's and Gender Studies Program.

Courses

WGST 590a[u], History of Feminist Thought. Margaret Homans.
TTh 1–2.15
This course explores a range of key works from the intellectual history of feminism in Britain, France, and the United States from the Enlightenment onward. We also examine influential writings on gender and sexuality with which these works are in dialogue. The aim is to trace the foundations and development of various strands of feminist thought: liberal feminism with its emphasis on sameness and equality, cultural and separatist feminisms with their focus on difference, and postmodern and third-wave feminisms and queer theory with their questioning of such identity categories as "woman." *Also ENGL 982a[u]*.

WGST 710a,Anthropological Perspectives on Emotion. Linda-Anne Rebhun.
W 1.30–3.20
This seminar focuses on cross-cultural meanings of emotional experiences. Topics include the relations among emotion, cognition, and other psychological experiences in various cultural settings, vocabularies of emotion in different languages, gender issues in emotion, and the interconnections among emotion, sickness, religion, and healing. *Also ANTH 502a[u]*.

WGST 720b,Modernism and Sexuality: A Literary Approach. Laura Frost.
T 10.30–12.20
This course examines the representation of sexuality in modern fiction through a formal and historical approach. We consider how literary constructions of sexuality reflect modernist aesthetics and formal innovation as well as historical preoccupations such as pseudo-scientific discourses of sexuality from the turn of the century to mid-twentieth century. Topics include sexology and psychoanalysis, Victorianism and the "repressive hypothesis," theories of "perversion," female sexuality and feminism, modernism and mass culture, eroticism and pornography, and the politics of pleasure. Primary authors include T.S. Eliot, Djuna Barnes, Radclyffe Hall, Henry James, James Joyce, D.H. Lawrence, Mina Loy, Thomas Mann, Marcel

Proust, Oscar Wilde, and Virginia Woolf. Critical readings include Bersani, Boone, Butler, Carpenter, Ellis, Foucault, Laqueur, Rubin, and Sedgwick. *Also CPLT 956b, ENGL 956b.*

WGST 730b,Art,Sex, and the Sixties. Jonathan D. Katz.

M 3.30–5.20

Using the work of Andy Warhol as our ur-text, this graduate seminar maps the development of increasingly cool and ironic modes of art making against the heated and ideologically loaded social and political developments of the 1960s. Its central query concerns why a set of aesthetic practices that seemingly celebrated normative values (i.e., Pop art) were nonetheless elevated to dominance ahead of a range of more confrontational and oppositional strategies in line with the tenor of the times. Sexuality, its liberation and its suppression figure prominently in this inquiry into the paradoxical engendering of opposition through the citation of normative forms. In asking this question, this course hopes to make sense of such wildly divergent artistic genres of the period as Pop, minimalism, photo-realism, opart, Fluxus, protest art, performance, hard-edge abstraction, happenings, assemblage, new media, conceptual art, text-based art, etc. Painters became dancers, filmmakers, authors, and designers in record numbers, And at a moment when Formalist theory grew both increasingly rigid and prominent, an unheard-of range of distinctly non-Formalist artistic practices flourished amidst new audiences, new galleries and art spaces and, perhaps most notable of all, new prestige. As American cultural influence finally matched, and perhaps even exceeded, American military and economic influence, the once esoteric art world became genuinely popular and certain artists, most notably Warhol, came to be seen as defining of their social-historical moment despite — and indeed in some sense through — their sexuality. Among the readings for this class are Herbert Marcuse's *One Dimensional Man* and *Eros and Civilization,* Marshall McLuhan's *The Medium Is the Massage* and other works, as well as period art criticism and social critique like Daniel Bell's *The End of Ideology* — in addition to a range of primary and secondary art historical/critical texts. *Also AMST 733b, HSAR 703b.*

WGST 740a,Reading Black Queer Literatures of the United States and the Caribbean. Seth Silberman.

HTBA

Close study of both the racial underpinnings of psychoanalytic method and psychoanalytic discourse in fiction by black Americans Zora Neale Hurston, James Weldon Johnson, LeRoi Jones, Nella Larsen, Charles Perry; Jamaican Andrew Salkey; Martiniquan Joseph Zobel; Guyanan Edgar Mittelholzer. Exploration of race and sexuality in psychoanalytic criticism by W. E. B. Du Bois, Daniel Boyarin, Frantz Fanon, Sigmund Freud, Jacques Lacan, Hortense Spillers, Claudia Tate. Our aim is twofold: first, to examine psychoanalytic discourse in literary metaphors of black liberation; and second, to ameliorate psychoanalysis anxiety in African American Studies scholarship. *Also AFAM 751a.*

WGST 750b[u], Visuality and Violence. Laura Wexler.

W 7–8.50

(Formerly Photography and Images of the Social Body.) Examination of different sets of photographic images — documentary, medical, and digital images; family snapshots; stereotypes and anti-stereotypes of race and gender; portraiture; advertising; industrial images; and art — in light of major writings on photographic representation. Study of how different ways of making and displaying images of the body invest it with culturally specific and historically informative meanings. *Also AMST 870b[u].*

[**WGST 850b,Queer Theory: Normativity and Its Deviations.**]

[**WGST 890a, Feminist and Gender Theory.**]

WGST 901b,Interdisciplinary Colloquium on Gender and Sexuality. Margaret Homans and staff.
F 12.30–2.20
An interdisciplinary research seminar investigating contemporary methods of research in women's and gender studies. Requirements include a research paper, a works-in-progress presentation, peer reviews, and reviews of critical literature in a variety of humanities and social science fields.

Related Courses

AMST 673b,Theorizing "Black"and "Asian"Intersectionalities in the United States. Diana Paulin.

AMST 923a,Cities,Suburbs,and the Culture of Sprawl. Dolores Hayden.

ANTH 548b[u], Gender and Media in India. Bernard Bate.

ENGL 812b, Jane Austen and the British Empire. Katie Trumpener.

HIST 934b,Medicine,Public Health,and Colonialism,1750–1950. Naomi Rogers.

HIST 941a,Making the Modern Body. Susan Lederer.

LAW 21291,Gender—Locally, Globally. Judith Resnik, Vicki Jackson.

PLSC 586a[u], Feminism,Imperialism,and Global Justice. Casiano Hacker-Cordon.

PSYC 570b,Nonverbal Communication. Marianne LaFrance.

REL 758b, Trauma and Grace. Serene Jones.

RLST 603b[u], Women and Gender in Early Christianity. Stephen Davis.

Research Institutes

THE COWLES FOUNDATION

30 Hillhouse, 432.3702

Director
John Geanakoplos

The Cowles Foundation for Research in Economics at Yale University seeks to foster the development of theoretical, mathematical, and statistical methods of analysis for use in economics and related social sciences. All members of the professional research staff have faculty appointments in the Department of Economics or another social science department at Yale. The foundation sponsors a working paper series and a seminar series. It also maintains a library of materials related to its special areas of research activity.

THE ECONOMIC GROWTH CENTER

27 Hillhouse, 432.3610

Director
Christopher Udry

The Economic Growth Center is a research organization within the Yale Department of Economics that was created in 1961 to analyze, both theoretically and empirically, the process of economic growth and the economic relations between low and high income countries. The research program emphasizes the search for regularities in the process of growth and changes in economic structure by means of cross-sectional and intertemporal studies and the analysis of policies that affect that process. An increasing share of the research involves statistical study of the behavior of households and firms as revealed in sample surveys by the application of microeconomic theory. Current projects include research on technology development, choice and transfer, household consumption, investment and demographic behavior, agricultural research and productivity growth, labor markets and the returns to education of women and men, labor markets and migration, income distribution, and international economic relations, including monetary and trade policies. The Center's research faculty hold appointments in the Department of Economics and other departments at Yale, and accordingly have teaching as well as research responsibilities.

The Center administers, jointly with the Department of Economics, the Yale master's degree training program in International and Development Economics, in which most students have experience as economists in foreign central banks, finance ministries, and public and private development agencies. It presents a regular series of workshops on trade and development, on the microeconomics of labor and population, and on economic

history and includes among its publications book-length studies, reprints by staff members,and discussion papers.

The Economic Growth Center Collection, housed in a separate facility at the Social Science Library, is a special collection focused on the statistical, economic, and planning documents of developing countries, including government documents.

THE CENTER FOR RELIGION AND AMERICAN LIFE

250 Church, 432.4040, iasry@yale.edu, www.yale.edu/iasry/

Administrative Director
Kenneth P. Minkema

The Center for Religion and American Life is a nonsectarian, nondenominational initiative that encourages inquiry into the role that religion has played in the history of the United States. The Center provides nonresidential fellowships for scholars working on any aspect of American religion from before European settlement to the present. Annually, the Center supports non-Yale scholars from a variety of disciplines with dissertation, research, postdoctoral, and advanced fellowships. The Center also awards two Yale dissertation fellowships to students who are in the writing stage of their dissertation, as well as five Yale summer fellowships to help students make significant progress in researching their doctoral topic.

Besides encouraging the creation of a new and significant body of literature on American religion, the Center sponsors opportunities for constructive dialogue. The Center holds two conferences each year. First is the Northeast Regional Faculty Conference in Religion and American Life, which meets the weekend after Thanksgiving and features scholars of American religion who meet to discuss teaching issues and recent books in the field. Second is the Spring Fellows Conference, held each May, which features presentations by our fellows along with lively exchanges of ideas. In addition, the Center sponsors a luncheon seminar series that brings in scholars from across the country to present their latest work.

Contingent upon funding, the Center for Religion and American Life will be awarding nonresidential fellowships to dissertation, postdoctoral, and established scholars of all ranks. Candidates from varied disciplines are encouraged to apply, so long as their research interests include religion in American society, past and present, as a key component or variable.

INSTITUTION FOR SOCIAL AND POLICY STUDIES

77 Prospect, 432.3234

Director
Donald P. Green

Executive Committee
Stephanie Spangler (*ex officio*), Jeffrey Alexander, Andrew Barron, Alvin Klevorick, David G. Pearce, Peter Salovey, Ian Shapiro

The Institution for Social and Policy Studies (ISPS) facilitates interdisciplinary inquiry in the social sciences and research on important public policy subjects. Recognizing that important social problems cannot be studied adequately by a single discipline, the Yale Corporation established the Institution for Social and Policy Studies in 1968 in order to stimulate interdisciplinary collaboration within the University. Faculty and students from many departments in the Faculty of Arts and Sciences and from Yale's graduate and professional schools are involved in a variety of activities. These include numerous interdisciplinary faculty seminars, research publications, postdoctoral programs, and the undergraduate major in Ethics, Politics, and Economics. Through these activities, ISPS seeks to shape public policies of local, national, and international significance.

Among the major programs at ISPS are: the *Agrarian Studies Program*, James Scott, director; the *Program in Ethics, Politics, and Economics,* Seyla Benhabib, director; and the *Yale University Interdisciplinary Bioethics Project,* Robert Levine and Margaret Farley, directors.

For more information, refer to the *ISPS Bulletin*.

INTERNATIONAL SECURITY STUDIES

31 Hillhouse, 432.6242

Director
Paul Kennedy

International Security Studies (ISS) supports interdisciplinary research and teaching in grand strategy, international history, and security studies, with particular reference to diplomatic and military history. Its goals are to fill the critical national need for trained leaders; to discover flexible and fruitful ways to recognize, define, and analyze security issues; and to provide independent critiques of policy-thinking and policy-making on these issues. United Nations Studies at Yale (UNSY), directed by Bruce Russett, exists under the umbrella of ISS. UNSY is a policy-relevant think-tank on key issues concerning the future of the United Nations. Neither ISS nor UNSY are degree-granting programs: they facilitate the work and welcome the participation of students from all academic departments and the professional schools.

ISS offers research grants and internship support for Yale graduate and undergraduate students. Like UNSY, it sponsors conferences, lectures, seminars, and workshops. Current projects at UNSY include a collaborative study with the World Bank on *The Political Economy of Civil Wars;* the *Yale-United Nations Oral History Project,* which has collected over ninety interviews with United Nations personnel; and *The Public Papers of Secretary-General Boutros Boutros-Ghali,* which is producing a three-volume edition of Dr. Boutros-Ghali's public papers.

The focus of ISS for the next five years will be on its Grand Strategy Project. This project seeks to revive the study and practice of grand strategy by devising methods to teach grand strategy at the graduate and undergraduate levels and by fostering a network of individuals and institutions trained to think about and implement grand strategies in imaginative and effective ways. The project, launched in January 2000, combines histor-

ical depth and analytical range with the belief that the preparation of future leaders is the best long-term investment ISS can make in the future.

ISS and UNSY's *Annual Report* is available on request, as is ISS's *Grand Strategy Project Review*. Inquiries should be directed to International Security Studies, Yale University, PO Box 208353, New Haven, CT 06520-8353. Further information on ISS can also be found at http://www.yale.edu/iss; on UNSY at http://www.yale.edu/unsy.

YALE CENTER FOR INTERNATIONAL AND AREA STUDIES

Luce Hall, 34 Hillhouse, 432.3410

Director
Gustav Ranis

The Yale Center for International and Area Studies (YCIAS) is Yale University's principal agency for encouraging and coordinating teaching and research on international affairs, societies, and cultures around the world. YCIAS seeks to make understanding the world outside the borders of the United States, and America's role in the world, an integral part of the liberal education and professional training at Yale University.

YCIAS includes twenty research and educational affiliates, specializing in interdisciplinary and problem-oriented, comparative studies of different world regions. They include: African Studies Council; Canadian Studies Committee; East Asian Studies Council; European Studies Council; International Affairs Council; Latin American and Iberian Studies Council; Middle East Studies Council; South Asian Studies Council; Southeast Asia Studies Council; Center for Cities and Globalization; Center for the Study of Globalization; European Union Studies Program; Fox International Fellowships Program; Genocide Studies Program; Gilder Lehrman Center for the Study of Slavery, Resistance, and Abolition; Genocide Studies Program; Georg Walter Leitner Program in International Political Economy; Global Migration Program; Hellenic Studies Program; and Program in Agrarian Studies.

It also administers six undergraduate majors (African Studies; East Asian Studies; Ethnicity, Race, and Migration; International Studies; Latin American Studies; and Russian and East European Studies), four graduate degree programs (African Studies; East Asian Studies; International Relations; and Russian and East European Studies), and several joint-degree programs with the schools of Law, Management, Forestry & Environmental Studies, and the Department of Epidemiology and Public Health.

The Center also provides opportunities for scholarly research and intellectual innovation; awards more than two hundred fellowships and grants each year; encourages faculty/student interchange; sponsors more than five hundred lectures, conferences, workshops, seminars, and films each year (most of which are free and open to the public); produces a range of working papers and other academic publications; and contributes to library collections (exclusive of Europe) comprising 1.4 million volumes in the languages of various areas. Through Programs in International Educational Resources (PIER), it brings international education and training to educators, students K-12, the media, businesses, and the community at large.

YALE CENTER FOR THE STUDY OF GLOBALIZATION

Betts House, 393 Prospect Street, 432.1900, globalization@yale.edu,
www.yaleglobal.yale.edu

Director
Ernesto Zedillo

The Yale Center for the Study of Globalization (YCSG) is devoted to examining the impact of our increasingly integrated world on individuals, communities, and nations. The Center's purpose is to support the creation and dissemination of ideas for seizing the opportunities and overcoming the challenges presented by globalization. It is focused on producing practical policies to enable the world's poorest and weakest citizens to share in the benefits brought by globalization. YCSG also explores solutions to problems that, even if they do not result directly from integration, are global in nature and can therefore be effectively addressed only through international cooperation. The Center draws on the rich intellectual resources of the Yale community, scholars from other universities, and experts from around the world.

On campus, the Center supports teaching and research on the many facets of globalization, while helping to enrich debate through workshops, conferences, and public programs. Faculty as well as graduate and undergraduate students receive support for research projects and activities that enhance the study of globalization, have policy implications, or further the following goals: (1) to produce and disseminate ideas that will help nations take advantage of globalization's opportunities and overcome its challenges, or (2) to explore solutions to problems that, even if they do not result directly from international integration, are global in nature and can therefore be effectively addressed only through international cooperation.

The Center also furthers its mission through collaboration with a variety of institutions across the globe. Projects resulting from these collaborations provide the means by which YCSG can contribute toward influencing the attitudes and actions of policy makers, academics, and institutions. Natural opportunities exist to present the results of this work at Yale through seminars, colloquia, and public lectures. These collaborations include the following projects:

International Task Force on Trade and Finance for the Millennium Development Project

International Task Force on Global Public Goods

Commission on the Private Sector and Development

International Migration

In order to multiply the effects of the internal and external dimensions of the Center's strategy, YCSG has developed a global media instrument. *YaleGlobal Online* magazine (www.yaleglobal.yale.edu) explores the growing interconnectedness of the world and aims to analyze and promote debate on all aspects of globalization. The magazine posts three original articles per week, re-publishes and archives articles from around the globe, and offers video recordings of special events at Yale.

Policies and Regulations

ADMISSIONS

www.yale.edu/graduateschool/admissions/

Application for admission to any of the Graduate School's programs should begin in the summer or fall of the academic year before the one in which students propose to register. Application materials for all programs in the Graduate School and other information may be viewed at the Graduate School's Web site, www.yale.edu/graduateschool/admissions.

Application for admission to the Graduate School may be made to only one department or program. The online application is the preferred method of applying to programs of the Graduate School. The individual program descriptions listed in this book, in the information and application brochure, and on the Graduate School Web site explain the prerequisites for each department and program. Applicants must state their intended department specialization when requesting application materials. Completed applications, including three letters of recommendation, transcripts, standardized test scores, and the non-refundable application fee, are due by January 2, 2004 for most programs. Please check the Graduate School Web site for those programs with earlier deadline dates.

Students who seek a professional degree should write to one of the University's professional schools, listed on pages 436–37. Holders of American Ph.D. or Sc.D. degrees, or their foreign equivalents, are not eligible for admission to the Graduate School in the field in which they have already earned a degree. They may apply in other fields and are also eligible to apply for admission to the Division of Special Registration as special students, for nondegree study (please see Nondegree Study on pages 388–89 for more information).

All applicants are required to submit official results of the Graduate Record Examinations (GRE) General Test, which is administered in the United States and abroad by the Educational Testing Service (ETS). This examination should be taken no later than the November testing date. Some departments and programs also require scores from a GRE Subject Test; consult the individual program of study listings for those requirements.

Applicants whose native language is not English must present evidence of proficiency in English by satisfactorily completing the Test of English as a Foreign Language (TOEFL), which is administered by ETS. This examination should be taken no later than the November testing date. The TOEFL requirement is waived only for applicants who have successfully attended for at least two years a university where English is the language of instruction.

Students who do not demonstrate sufficient proficiency in English may be retested and/or asked to take courses in English for speakers of other languages. A higher level of proficiency will be required in order for students to serve as teaching fellows.

All students who accept offers of admission to Ph.D. programs and whose native language is not English must present acceptable scores on the Test of Spoken English (TSE) or SPEAK test before being appointed as teaching fellows with instructional responsibilities. The TOEFL and TSE are administered in the United States and abroad by ETS. The SPEAK test is administered by Yale's English Language Institute on campus only.

International students who accept offers of admission will be required to give appropriate evidence of necessary financial support for one or two academic years, depending upon their program of study, before the University will be able to issue visa documents.

Applicants will usually be notified of action concerning admission during the month of March. Official notification is sent by mail only; no decisions are provided by phone or e-mail. All entering students must have obtained the bachelor's degree or its foreign equivalent. Offers of admission are contingent on students' providing official evidence of having completed the bachelor's degree or foreign equivalent prior to registration. Students who are not able to provide such evidence will not be permitted to register. Those who have been engaged in graduate work at Yale or another university must also present an official transcript giving evidence of degree(s) awarded and/or satisfactory completion of the previous year's work.

Applicants who have been previously denied admission three times will not be allowed to apply again.

PROGRAMS OF STUDY

Full-Time Degree Candidacy

Most students enrolled in the Graduate School are registered for full-time study as they pursue a Ph.D. or master's degree program. These students devote their full effort to course work, preparation for qualifying examinations, gaining teaching experience, and the research and writing leading to the completion of the dissertation.

Part-Time Study

In rare circumstances, qualified individuals who are unable to devote their full time to graduate study may apply and be admitted as part-time students in either doctoral or terminal master's programs. For more complete information about part-time study, please turn to page 393.

Nondegree Study

Qualified individuals who wish to study at the graduate level as nondegree candidates may be admitted to the Division of Special Registration (DSR). Admission to the DSR is for one term or for one year only and carries with it no commitment by the Graduate School for further study. Students admitted for the academic year must demonstrate satisfactory academic performance in the first term in order to register for the second term. Students in the DSR are issued transcripts indicating the appropriate credit for work completed.

Application procedures for the DSR are the same as for students seeking admission to regular degree programs. In addition, applicants to the DSR must provide evidence of health care for the duration of their studies at Yale at the time of application.

DSR students engaged solely in course work are identified as special students. Special students admitted for part-time study are charged tuition on a per-course basis, whether for credit or audit. See page 415 for a schedule of tuition and fee charges. Students admitted to the DSR as special students are not eligible for financial aid, including federal and most nonfederal student loans.

More advanced graduate students who are degree candidates at other universities and who wish to do full-time dissertation-level research or a combination of research and course work at Yale may be admitted to the DSR as Visiting Affiliated Research Graduate Students. Such students are charged full tuition. A limited amount of tuition assistance based on need may be available, but students in this category must always pay at least $1,560 of their tuition per term. Students enrolling for the summer only are charged $780. Applicants for admission as Visiting Affiliated Research Graduate Students should complete the Applicant's Financial Statement and must submit any other documentation that would clearly establish their need for tuition assistance. Support beyond tuition in the form of fellowship stipends, teaching fellowships, or research assistantships is not available.

In certain circumstances, advanced graduate students who are degree candidates at another university and who have made arrangements with a specific Graduate School faculty member for a research project under his or her direct supervision may be admitted to the DSR as Visiting Assistants in Research. Any proposal for the admission of a visiting assistant in research must be discussed by the relevant departmental director of graduate studies and the appropriate associate dean. Such students hold standard graduate student assistantship in research appointments in the faculty member's department. The appointment is funded by the faculty member. The tuition charge for students enrolled as Visiting Assistants in Research is $1,560 per term. Students enrolling for the summer only are charged $780.

Some departments at Yale have formal exchange agreements with universities in other countries that have been approved by the Graduate School. Graduate students who are admitted to Yale under such approved exchange agreements may be registered as Visiting International Exchange Students. Visiting International Exchange Students normally are not charged a tuition fee.

Cumulative enrollment in the DSR is limited to two years. Students enrolled in the DSR who are subsequently admitted to degree programs may receive academic and tuition credit for work done while enrolled in the DSR, provided that the department recommends such credit and the appropriate associate dean approves.

Interdisciplinary Study

All graduate students are formally associated with one department or program but students may be encouraged to take one or more courses in a related department. Students are often advised by faculty members from more than one department during their dissertation research. Students in the Graduate School, with permission of the director of

graduate studies and the relevant school, may take advantage of particular course or research opportunities in Yale College and in Yale's professional schools.

Combined and Joint-Degree Programs

The Graduate School offers students interested in African American Studies, Classics, Film Studies, and Renaissance Studies an opportunity to pursue a combined Ph.D. with departments in related fields. In addition to these academic programs, there are several formal interdisciplinary Ph.D. programs in the Graduate School listed under the appropriate departmental entries of this bulletin. Ad hoc programs may also be approved. A student who is interested in an ad hoc program should prepare a written proposal for review and approval by the relevant departments and associate deans.

Students are encouraged to contact the appropriate directors of graduate studies about specific opportunities for interdisciplinary study throughout the Graduate School and the University.

The Graduate School also participates in the following formal joint-degree programs with the professional schools: the J.D./M.A. and J.D./Ph.D. programs in cooperation with the Law School; the M.D./Ph.D. program in cooperation with the School of Medicine; the M.A./M.B.A. programs in cooperation with the School of Management; and the M.A./M.F.S. and M.A./M.E.S. programs in cooperation with the School of Forestry & Environmental Studies. For all joint-degree programs except the M.D./Ph.D., students are required to submit formal applications to both the professional school and the Graduate School indicating their interest in enrolling in the joint program. Individuals interested in the M.D./Ph.D. program apply directly to the School of Medicine (see pages 400–401).

Exchange Scholar Program

www.yale.edu/graduateschool/academics/special_programs.html

Graduate students in Yale Ph.D. programs may petition to enroll full-time for a term or for an academic year as exchange scholars at a number of other institutions, including the University of California at Berkeley, Brown, Chicago, Columbia, Cornell, Harvard, Princeton, and Stanford Universities, and at MIT and the University of Pennsylvania. The Exchange Scholars Program enables students to take advantage of special educational opportunities not available at their home institutions. For applications, contact Assistant Dean Thomas Burns (thomas.burns@yale.edu), Room 134, Hall of Graduate Studies (HGS). Applications must be received at least three weeks prior to the beginning of the term for which the student is applying.

International Graduate Student Exchange Agreements

All international exchange agreements must be approved in advance by the Graduate School to ensure that they meet University policy and Graduate School guidelines. Departments interested in establishing an exchange program must prepare a statement that demonstrates that there is a clear academic and reciprocal need for such a program, and that the program will conform to the established guidelines for all such exchange agreements.

INTERNATIONAL EXCHANGE PROGRAMS

Center for International and Area Studies
Fox International Fellowship Program (Moscow State University; University of Cambridge; Free University, Berlin; Fudan University, Shanghai; University of Tokyo)

Council on East Asian Studies
Inter-University Center for Japanese Language Studies, Yokohama; Inter-University Board for Chinese Language Studies, Tsinghua University, Beijing; International Chinese Language Program, National Taiwan University, Taipei Tokyo University

Economic Growth Center
Research Institute for Economics and Business Administration (Kobe University, Japan)

Engineering
Ecole Normale Supérieure de Cachan (ENSC), France

Epidemiology and Public Health
Many internship opportunities in numerous countries across the world

Graduate School
Royal Holloway College, University of London, England; The Connecticut Department of Education and the State of Baden-Württemberg Exchange, Germany

French
Ecole Normale Supérieure, Paris; University of Geneva, Switzerland

Linguistics
Tokyo Metropolitan University, Japan

Molecular, Cellular, and Developmental Biology
Peking University, Beijing, China

Political Science
Nuffield College, University of Oxford, England

PROGRAMS IN DEVELOPMENT

Council on East Asian Studies
Kyoto University, Japan

German
Free University, Berlin, Germany

History
Leiden University, Netherlands; Paris-Sorbonne, Paris VI

Agrarian Studies
Amsterdam School for Social Science Research, Netherlands

Summer Study

www.yale.edu/summer

Many graduate students remain in New Haven during the summer for independent study and research (see Summer Registration, page407). Although the Graduate School does not offer courses in the summer, a program of undergraduate courses is available, as well as an intensive program of instruction in languages, and graduate students may wish to take advantage of those programs while in New Haven. For further details on summer offerings at Yale, please contact Yale Summer and Special Programs, PO Box 208282, New Haven CT 06520-8282.

DEGREE REQUIREMENTS

The requirements set forth in the pages that follow are the minimum Graduate School degree requirements and apply to all degree candidates. Students should consult the listings of individual departments and programs on pages 21–381 for additional specific departmental requirements.

Requirements for the Degree of Doctor of Philosophy

LENGTH OF STUDY

In most fields of study, six years should normally be sufficient for the completion of the Ph.D., although it is understood that seven years may be needed by students in fields requiring extensive field work or the mastery of difficult foreign languages. Departments and programs make every effort to design a course of study and to provide advice and guidance to make it possible for students to complete their work within six years. Normally three, or at most three and one-half, years are devoted to the completion of predissertation requirements (courses, examinations, selection of a dissertation topic). The remaining time, typically two to three years, is devoted to conducting research and writing the dissertation. Advanced standing that has been granted for work done in a Yale M.A./M.S. program is counted as part of the six years (for further information, please see Transfer Credit and Advanced Standing on page 394).

Students must register each term until the dissertation is submitted or until six years (twelve terms) of study have been completed. Students who have not completed the dissertation by the end of the sixth year of study may request a period of extended registration, by submitting a one-page petition for extended registration, the standard dissertation progress report that is required annually of all students admitted to candidacy, and a continuous registration form (see page 394). Before a period of extended registration is approved, the student's adviser and director of graduate studies must certify that the student is making good progress on the dissertation, will be working full-time on it during the year, and has a reasonable prospect of completing it by the end of the registration period. The Graduate School will normally approve petitions supported by these certifications for a seventh year of registration provided that the student is not employed more than twenty hours per week and will be at Yale or in another location conducive to writing the dissertation.

Part-Time Study

Students in Ph.D. programs are expected to register for full-time study. In extraordinary circumstances a student may petition the Graduate School for permission to register as a half-time student for a limited period. Students may not register for half-time study for more than three of the first four academic years they are enrolled. Thereafter, they must register full-time until the four-year tuition obligation has been satisfied. Any Ph.D. student who registers half-time at any point in his or her graduate program must fulfill the four-year tuition obligation to receive the Ph.D. (see page 394). Students may not register less than half-time.

Students who wish to study part-time should consult with their director of graduate studies and the appropriate associate dean to develop a proposed plan of study, so that both the student and the Graduate School have a common understanding about the time by which the requirements leading to admission to candidacy must be completed. Such a plan of study may be modified with the consent of the director of graduate studies and the associate dean. Part-time study has a five-year limit for students in terminal master's degree programs. Only candidates for terminal master's degrees may enroll less than half-time.

Noncumulative Registration

In certain areas of study, it may be necessary for a registered student to acquire an academic skill (typically, knowledge of a foreign language) that is essential for a degree requirement or for research in a particular field and for the overall progress of the dissertation but is not an inherent part of the dissertation itself. A student in this situation may request up to one year of "noncumulative registration." It is important to note that general study in a field related to or parallel with the topic of the dissertation is *not* appropriate for noncumulative registration.

A student who wishes to have a specific period of study designated as "noncumulative" should discuss the reasons for such a period of study with and secure prior approval from his or her associate dean. If prior authorization has been given by the Graduate School, the period of time spent in acquiring the necessary academic skill will not be counted as part of the student's six-year period of candidacy. The Continuous Registration Fee (CRF) is charged during the period of noncumulative registration. Noncumulative registration does not change the four-year full-tuition obligation. The tuition charge and any University Fellowship aid will be postponed if a student registers noncumulatively before the four-year full-tuition obligation has been satisfied.

RESIDENCE REQUIREMENT

Students seeking the Ph.D. degree are required to be in residence in the New Haven area during at least three academic years. This is an academic requirement, distinct from and independent of the tuition requirement described below. The residence requirement must normally be met within the first four years of study. Any exception to the residence requirement must be approved by the department and by the appropriate associate dean.

TUITION REQUIREMENT AND THE CONTINUOUS REGISTRATION FEE

All Ph.D. candidates are charged four years (eight terms) of full tuition, or proportionately less if all degree requirements, including submission of the dissertation, are completed in less than four continuous years of full-time study from the date of matriculation in the Ph.D. program.

Once the full-tuition obligation has been completed, students are charged the Continuous Registration Fee (CRF), $256 per term in 2003–2004, until the dissertation is submitted or the terminal date is passed. Students who are permitted to register after the sixth year are also charged the CRF.

TRANSFER CREDIT AND ADVANCED STANDING

The Graduate School does not award transfer credit for graduate work completed before matriculation at Yale. A department may, with the approval of the Graduate School, waive a portion of the Ph.D. course requirement in recognition of previous graduate-level work done at Yale or elsewhere. Such a waiver does not affect the full-tuition requirement. Courses taken previous to matriculation at Yale will not appear in the student's Graduate School transcript.

With the approval of the department, a student who is currently enrolled may petition for advanced standing in the Graduate School of up to one year for work completed in a Yale master's or professional doctoral program that is relevant to the student's Ph.D. program. This petition must be received by the appropriate associate dean in the Graduate School before the end of the student's first year of study in the Ph.D. program. Such students may also be offered admission with advanced standing by the department and the Graduate School. Such advanced standing will reduce the four-year tuition requirement and eligibility for Graduate School fellowship aid accordingly. The normal six-year period of registration will be similarly reduced.

LANGUAGE REQUIREMENT

Language requirements are set by individual departments and programs. Specific language requirements are explained in the individual departmental listings on pages 21–381. All departmental requirements are subject to initial approval by the Executive Committee of the Graduate School and are monitored by the divisional degree committees. A department cannot make exceptions to its own requirements without authorization by the appropriate degree committee.

The required level of proficiency in foreign languages, and the method for demonstrating it, are determined by the individual departments. Most give their own examinations. A few permit the requirement to be satisfied by passing particular courses. Students are urged to be prepared to meet language requirements at the beginning of their first year of study.

COURSE AND HONORS REQUIREMENTS

The course requirements for the Ph.D. degree are set individually by each department or program. Although departments may set more stringent requirements, to meet the

minimum Graduate School quality requirement for the Ph.D., students must achieve the grade of Honors in at least one full-year or two full-term graduate courses, taken after matriculation in the Graduate School and during the nine-month academic year. The Honors requirement must be met in courses other than those concerned exclusively with dissertation research and preparation.

A student who has not met the Honors requirement at the end of the fourth term of full-time study will not be permitted to register for the fifth term. In exceptional circumstances, the director of graduate studies may petition the degree committee, through the appropriate dean, that a student who has not met the Honors requirement be permitted to continue study. Such a petition should be made before the end of the fourth term of study in time to be considered by the degree committee at its meeting that term.

QUALIFYING EXAMINATION

Each Ph.D. student must pass a general examination, separate from course examinations, in the major subject offered and in such subordinate subjects as may be required by the department. Such examinations are described in the individual departmental listings on pages 21–381. Students should consult with the director of graduate studies for further information about this requirement.

PROSPECTUS

The prospectus should be viewed as a preliminary statement of what the student proposes to do in his or her dissertation and not as an unalterable commitment. The appropriate form and typical content of a prospectus inevitably vary from field to field. In most cases, however, a prospectus should contain the following information:

1. A statement of the topic of the dissertation and an explanation of its importance. What in general might one expect to learn from the dissertation that is not now known, understood, or appreciated?
2. A concise review of what has been done on the topic in the past. Specifically, how will the proposed dissertation differ from or expand upon previous work? A basic bibliography should normally be appended to this section.
3. A statement of where most of the work will be carried out — for example, in the Yale library or another library or archive, in the laboratory of a particular faculty member, or as part of a program of field work at specific sites in the United States or abroad.
4. If the subject matter permits, a tentative proposal for the internal organization of the dissertation — for example, major sections, subsections, sequence of chapters.
5. A provisional timetable for completion of the dissertation.

Although it is difficult to prescribe a standard length for the prospectus, it should be long enough to include essential information for all proposed topics but concise enough to focus clearly on the subject. About seven pages, including bibliography, should be sufficient in most cases.

ADMISSION TO CANDIDACY

Admission to candidacy indicates that the department and the Graduate School consider the student prepared to do original and independent research. Students will be admitted to candidacy when they have completed all predissertation requirements, including the dissertation prospectus. Admission to candidacy will normally take place by the end of the third year of study. Any programmatic variations from this pattern that have been approved by the Executive Committee of the Graduate School are described in the individual department statements beginning on page 22. Teaching is required in some departments and is an expectation in all. A student who has not been admitted to candidacy at the expected time will not be permitted to register for the following term.

TRAINING IN TEACHING

The Teaching Fellow Program (TFP) is the principal framework at Yale in which graduate students learn to become effective teachers. Learning to teach and to evaluate student work is fundamental to the education of graduate students. The TFP provides opportunities for graduate students to develop teaching skills, under faculty guidance, through active participation in the teaching of Yale undergraduates. Teaching fellows who encounter problems or difficulties related to their teaching appointments are encouraged to meet with the director of the TFP (Judith Dozier Hackman) or their associate dean (Richard Sleight for the natural sciences and Anthropology, Linguistics, Psychology, and Statistics; Pamela Schirmeister for the humanities and the other social sciences). A student must be registered in the Graduate School to be appointed as a teaching fellow (TF) or as a part-time acting instructor (PTAI). TFs assist faculty in teaching and administering relatively large undergraduate courses. PTAIs are responsible for small undergraduate courses, subject to guidance and advice by department faculty. For a more detailed description of these types of appointments, see "Teaching Fellow Levels" (on pages 420–21).

The Graduate School requires that all students who teach be in good academic standing. In addition, they must be fluent in English, except for those who only grade. Graduate students whose native language is not English are required to meet the oral English proficiency standard before they may begin teaching. The standard may be met by (1) passing the SPEAK test, (2) passing the Test of Spoken English (TSE), or (3) having received a degree from an institution where the principal language of instruction is English. (Degrees awarded en route to the Ph.D. at Yale will not satisfy this requirement.) In some instances, a student's director of graduate studies (DGS) may require that students with degrees from English-speaking institutions also pass the SPEAK test to satisfy the language requirement.

DEFERRAL OF TEACHING YEAR

Students in a teaching year, normally years three and four, may request to defer a teaching year or semester into the fifth year for compelling academic reasons. Such reasons include but are not limited to the receipt of an external fellowship, a need to do research in absentia, or insufficient preparation for teaching.

A student who wishes to defer a teaching year must make arrangements to do so no later than the beginning of the fourth year. At the time the deferral is requested, the student and DGS should agree on the teaching the student will do in the fifth year. The assignment should be at the level normally expected in a regular teaching year, that is, a TF 3.5 or 4, depending on the department.

The deferral must be approved by the DGS and the associate dean. If the deferral is approved, the student will receive a supplemental University fellowship to bring the amount of the fifth-year teaching fellowship up to the standard departmental stipend. Under no circumstances may a student defer a teaching year beyond the fifth year, and all students must still complete the Dissertation Fellowship by the end of the sixth year.

DISSERTATION

The dissertation should demonstrate the student's mastery of relevant resources and methods and should make an original contribution to knowledge in the field.

The originality of a dissertation may consist of the discovery of significant new information or principles of organization, the achievement of a new synthesis, the development of new methods or theories, or the application of established methods to new materials.

Normally, it is expected that a dissertation will have a single topic, however broadly defined, and that all parts of the dissertation will be interrelated. This does not mean that sections of the dissertation cannot constitute essentially discrete units. Dissertations in the physical and biological sciences, for example, often present the results of several independent but related experiments.

Given the diverse nature of the fields in which dissertations are written and the wide variety of topics that are explored, it is impossible to designate an ideal length for the dissertation. Clearly, however, a long dissertation is not necessarily a better one. The value of a dissertation ultimately depends on the quality of its thought and the clarity of its exposition. In consultation with their faculty advisers and directors of graduate studies, students should give serious thought to the scale of proposed dissertation topics. There should be a reasonable expectation that the project can be completed in two to three years.

In accordance with general University policy, classified or restricted research is not acceptable as part of the dissertation. Exceptions must be approved in advance by the Degree Committee.

For information about submission of the dissertation, please see page 401. Students should also consult the booklet entitled *Preparation and Submission of the Doctoral Dissertation*, available at the Student Information Office, Room 140, Hall of Graduate Studies (HGS).

Requirements for the Degree of Master of Philosophy

The Master of Philosophy is awarded en route to the Ph.D. The minimum general requirements for this degree are that a student shall have completed all requirements for the Ph.D. except the prospectus and dissertation. Students will not generally have satisfied the requirements for the Master of Philosophy until after two years of study, except where graduate work done before admission to Yale has reduced the student's

graduate course work at Yale. In no case will the degree be awarded for less than one year of residence in the Yale Graduate School. Not all departments offer the M.Phil. degree. Information regarding special departmental requirements for the degree, if any, are stated in the individual department listings on pages 21–381.

Requirements for the Degree of Master of Arts or Master of Science

Except in the case of programs listed below under terminal M.A./M.S. Degrees, students are not admitted as candidates for the Master of Arts or Master of Science degree. However, students in most doctoral departments may be awarded the M.A. or M.S. en route to the Ph.D. degree.

Although departments may set more stringent requirements, the minimum general requirements that must be met for award of the M.A. or M.S. en route are (1) completion of the first year of the program leading to the Ph.D., with grades that satisfy departmental requirements; (2) completion of one academic year in full-time residence, or the equivalent, at Yale; (3) recommendation by the department for award of the degree, subject to final review and approval by the appropriate degree committee. In no case may courses taken prior to matriculation in the Graduate School, or in Yale College or other summer programs, be applied toward the requirements for the Master of Arts or Master of Science degree.

Some departments do not offer the M.A. or M.S. en route to the Ph.D., or award it only to students who are withdrawing from the Ph.D. program. For information about this or any special departmental requirements additional to the general requirements stated above, see the departmental listings, pages 21–381.

Students enrolled in a Ph.D. program may receive a master's degree from another department provided that it is in a related field of study and the director of graduate studies in both departments and the appropriate associate dean agree on the student's program of study prior to enrollment in courses. Courses taken toward a master's degree in another department must be part of the student's course requirement for the Ph.D., as approved by the director of graduate studies in both departments. However, such course work cannot also be counted toward a master's degree in the department to which the student was admitted. Students who wish to obtain a master's degree in a field that is not directly related to the doctoral degree must apply for a personal leave from the Ph.D. program and submit an application for admission to the master's program. Any financial aid offered to the student for a Ph.D. program may not be transferred to a master's degree course of study.

TERMINAL M.A./M.S. DEGREES

The M.A./M.S. degrees are offered as terminal degrees in twenty-two departments and programs: African Studies, American Studies, Applied Mathematics, Archaeology, Biostatistics (Epidemiology and Public Health), Computer Science, East Asian Studies, Engineering and Applied Science, English, Germanic Languages and Literatures, History, History of Medicine and Science, International and Development Economics (IDE), International Relations, Mathematics, Medieval Studies, Molecular Biophysics

and Biochemistry, Music, Near Eastern Languages and Civilizations, Russian and East European Studies, Slavic Languages and Literatures, and Statistics.

The residence and tuition requirements for a terminal M.A./M.S. degree are: a minimum of one year of full tuition and course work in residence in one-year programs, or a minimum of two years of full tuition and course work in residence in two-year programs. For information about which departments offer one-year programs and which offer two-year programs, see departmental listings on pages 21–381.

With the approval of the department and the appropriate associate dean, a student may be admitted for part-time study toward the master's degree. In that case, tuition will be charged on a per-course basis. Part-time study does not change the one- or two-year full-tuition obligation described above. Part-time students must complete all degree requirements within five years of continuous registration.

Individual departments establish the specific course and language requirements for these degrees. Although departments may set more stringent requirements, the minimum Graduate School requirement for students admitted for M.A./M.S. degrees is an overall grade average of High Pass, including a grade of Honors in at least one full-term graduate course (for students enrolled in one-year programs), or in at least two full-term graduate courses (for students enrolled in two-year programs). No credit will be awarded toward the M.A./M.S. degree for courses taken prior to matriculation in the Graduate School, or taken in Yale or other summer programs. Students in one of Yale's professional schools who matriculate in the Graduate School to complete a joint master's degree may, however, with the permission of their director of graduate studies, count courses already completed in their professional school program toward the joint degree. See the individual program or department listings above, pages 21–381.

The master's degree may also be earned jointly with the B.A./B.S. in certain departments by students enrolled in Yale College. For further information, please see *Yale College Programs of Study*, available from the Office of the Dean of Yale College.

Requirements for Joint-Degree Programs

Students who are candidates for degrees in any of the joint programs sponsored by the Graduate School and Yale's professional schools must meet the requirements established by each school for the degree they are seeking. Degree requirements in the Graduate School include both the Graduate School's general requirements and any special requirements set by the relevant department or program. In all cases, the Honors requirement must be fulfilled in non-research courses offered primarily for Graduate School students, taken after matriculation in the Graduate School.

In addition to the J.D./Ph.D., J.D./M.A., and M.D./Ph.D. programs described below, joint-degree programs with other professional schools have been approved for students in International Relations and International and Development Economics. These programs are described in the departmental statements on pages 233–40.

J.D./PH.D. AND J.D./M.A. PROGRAMS

Admission to the Graduate School joint-degree programs with the Law School, described below, requires separate admission to both schools as well as approval by the appropriate associate dean in each school, and by the director of graduate studies in the student's Graduate School department. Students must apply for admission to a joint program no later than their first year of study in a J.D., Ph.D., or two-year M.A. program, and must matriculate in the joint program no later than the beginning of their second year. Students wishing to pursue a J.D./M.A. in a one-year M.A. program must apply for admission no later than their first year of study in the J.D. program and must matriculate in the M.A. program as a joint-degree candidate.

In the J.D./Ph.D. program, the first year of study is spent principally in the Law School. The second and third years are combined according to the interest of the student. As many as six term courses, designated by the student at the beginning of the term, may be counted toward both degrees. During this time all course work and language requirements for the Ph.D. program are normally completed. The J.D. should be completed by the end of the fourth year. During the fifth year the student is expected to complete all remaining predissertation requirements and be admitted to candidacy. Any exception to this pattern of study must be approved by the appropriate associate dean.

The minimum residence requirement in the J.D./Ph.D. program is four years. The tuition requirement is two and one-half years in the Law School and three and one-half years in the Graduate School. Financial aid is provided by each school according to its own criteria, typically for two and one-half years in the Law School and three and one-half years in the Graduate School, and is awarded by each school during the terms in which the student pays tuition in that school.

In the J.D./M.A. program, the J.D. and M.A. degrees are awarded simultaneously at the end of the fourth year of study in one-year M.A. programs and at the end of four and one-half years of study in two-year M.A. programs. The Graduate School tuition requirement for J.D./M.A. students in one-year M.A. programs is one year of tuition; students in two-year M.A. programs have a one and one-half year tuition requirement in the Graduate School. In all cases students pay three years of tuition in the Law School. Students in J.D./M.A. programs, like other students in M.A. programs, are not ordinarily eligible for University Fellowship aid through the Graduate School. Students usually enroll in the Law School during the first year of study. The pattern of enrollment in subsequent years depends on whether the M.A. program is a one-year or a two-year program. No more than two Law School courses may be counted toward the M.A.

M.D./PH.D. PROGRAM

This program is sponsored jointly by the Graduate School and the School of Medicine. Applications for admission to the joint program are reviewed by a committee composed of faculty members and deans from both schools. Normally, admission to the program includes simultaneous admission to both schools. However, students may apply to the joint program by October 15 of their second year of study in either the M.D. or Ph.D. pro-

gram, and they must matriculate in the joint program no later than the beginning of the following year.

Students request affiliation with a particular department or program in the Graduate School by the middle of their third year of study in the joint program, after their course and research interests have been defined. Although students usually pursue their research in one of the biological sciences, those interested in earning the Ph.D. through work in another department may do so under certain circumstances, with the approval of the M.D./Ph.D. committee.

The residence requirement in this program is seven years. The full-tuition requirement is three and one-half years in the Medical School and two and one-half years in the Graduate School. To qualify for the M.D. and Ph.D. degrees, students must satisfy all degree requirements of both schools. Normally, a student admitted to this joint program must satisfy the Graduate School Honors requirement by the end of the second year of study and must complete all remaining predissertation requirements within four terms of affiliation with the Ph.D. department. This schedule may be adjusted for students who have been enrolled in either the Medical School or the Graduate School before admission to the M.D./Ph.D. program.

Petitioning for Degrees

Graduate School degrees are awarded twice each year, at Commencement in May and in the fall (normally in December, depending on the schedule of the Yale Corporation). Degrees are not granted automatically. Students must file a petition for each degree by the appropriate date (see Schedule of Academic Dates and Deadlines on pages 438–41). Petitions that have received favorable recommendations from the student's department are reviewed by the appropriate degree committee. When the degree committee has given its approval, the petition is forwarded to the Faculty of the Graduate School and then to the Yale Corporation. If the petition is successful, the student will be notified in writing by the dean of the Graduate School.

Students enrolled in Ph.D. programs should not petition for M.A./M.S. and M.Phil. degrees until the end of the term in which requirements for the degree are completed (e.g., students completing degree requirements during the spring term should petition for award of the degree the following fall).

Dissertation Submission

Dissertations must be submitted to the Graduate School by October 1 for degrees to be considered at the fall meetings of the degree committees and by March 15 for consideration at May meetings of the degree committees. These deadlines have been established to allow sufficient time for readers to make careful evaluations and for departments to review those evaluations and make their recommendations to the Graduate School. No extensions of the deadlines will be granted. Dissertations submitted after the deadlines will be considered during the following term.

Students are advised to obtain the booklet entitled *Preparation and Submission of the Doctoral Dissertation* prior to preparing their dissertations. This booklet, available from the Graduate School Student Information Office (140 HGS), describes the formatting requirements for the dissertation and the processes for submission and approval. Candidates should obtain a Dissertation Submission Packet from the Graduate School Student Information Office prior to submitting their dissertations. This packet contains directions for submission and all required forms.

In accord with the traditional scholarly ideal that the candidate for a doctorate must make a contribution to knowledge, all dissertations that have been accepted by the Graduate School are made available in the University library and published on microfilm (UMI Company). The only required fee associated with submission is $20 for binding of the library copy of the dissertation. UMI charges authors $45 if they wish to register a copyright. Publication on microfilm does not prevent the author from publishing the dissertation in another format at any time. Fees are subject to change.

Students must register continuously until either they have been awarded the Ph.D. or six years have elapsed since matriculation, whichever occurs first. During the first six years, students must be registered through the term of dissertation submission. Registration beyond the sixth year is not required. Registered students who submit dissertations will remain registered until the end of the term and will retain all privileges of registration (for example, library privileges, health care coverage, and e-mail accounts). Students who complete all Ph.D. requirements within four continuous years of full-time study in the Ph.D. program will be registered and charged full tuition only through the term in which the dissertation is submitted. Students who have registered part time or taken a leave of absence must complete the four-year, full-tuition obligation, regardless of when they submit the dissertation.

The Graduate School does not require departments to evaluate the dissertations of degree candidates who are no longer registered. In practice, however, departments normally agree to evaluate these dissertations.

Commencement

www.yale.edu/commencement
GScommencement@yale.edu

There is only one University Commencement ceremony each year, on a Monday in late May. All degrees awarded for both December and May of each year are presented at the May ceremony. The Graduate School Diploma Ceremony takes place at noon on Monday in Woolsey Hall, following the University Ceremony in the morning. However, students receiving master's degrees from the Yale Center for International and Area Studies (YCIAS) and the Economic Growth Center receive their diplomas in a separate ceremony held at Luce Hall, 34 Hillhouse Avenue. Included are master's candidates in African Studies, East Asian Studies, International and Development Economics, International Relations, and Russian and East European Studies.

All degree candidates for the M.A., M.S., M.Eng., and M.Phil., whether teminal or en route, or the Ph.D. are encouraged to march at Commencement and receive their diploma from the dean. If the student does not attend the ceremony, the diploma may also be mailed. Tickets are not required, for degree candidates or their guests, but degree candidates who march are responsible for the rental or purchase of their own academic regalia, or cap and gown; details are listed on the Web site above. Degree candidates will receive information on Commencement each year, but they should also see the information on the Commencement Web site. The Office of Graduate Student Life of the McDougal Center coordinates Commencement for the Graduate School.

ACADEMIC REGULATIONS

Registration

Only registered students may attend classes, receive financial aid, or use the facilities of the University. Students must register every term for the duration of their degree program (normally six years or less for Ph.D. programs and one or two years for students in M.A./M.S. programs). This regulation applies to all students, whether engaged in course work, preparation for qualifying examinations, or dissertation research and, in the case of students in Ph.D. programs, whether study is in residence or in absentia. Students who do not register for any term for which they have not been granted a leave of absence (see pages 407–9) will be considered to have withdrawn from the Graduate School. Privileges associated with registered status (i.e., library privileges, health care coverage, and e-mail accounts) will likewise be withdrawn.

No student may register for any term unless he or she is making satisfactory progress toward the degree and has been cleared by the Office of Student Financial Services to register. In compliance with Connecticut state law, no student will be allowed to register unless satisfactory evidence of immunity to measles and rubella has been presented to the Yale University Health Service (see page 429).

Satisfactory progress means that the student has met all Graduate School and departmental requirements normally expected for each stage of the student's program. For Ph.D. students before admission to candidacy and for M.A./M.S. students, this includes satisfactory completion of courses from the preceding term(s). As indicated on pages 394–96 (Course and Honors Requirements and Admission to Candidacy), students in Ph.D. programs must satisfy the Honors requirement before beginning the fifth term of study and must be admitted to candidacy by the appropriate time. In addition to satisfying these general Graduate School requirements, students must meet any additional requirements specified by their departments. Ph.D. students who have been admitted to candidacy must continue to demonstrate satisfactory progress toward the degree in the annual dissertation progress report. Students who fail to meet departmental or Graduate School requirements by the designated deadlines, and students who have been admitted to candidacy who fail to submit the annual dissertation progress report, will be barred from further registration and withdrawn.

Course Enrollment

Any student who wishes to enroll in courses during a term must register through the Online Course Selection (OCS) process. The deadlines for registration each term are listed in the Schedule of Academic Dates and Deadlines on pages 438–41. Students who submit course enrollment forms after the appropriate deadline will be assessed a $25 fee.

No student may attend any class unless officially registered in the course. No credit will be given for work done in any course for which a student is not officially registered, even if the student entered the course with the approval of the instructor and the director of graduate studies. Students enrolling in courses offered by a Yale professional school are subject to all policies and deadlines of both the professional school and the Graduate School.

A student who wishes to audit a course must receive permission from the instructor before enrolling as an auditor, as not all faculty permit auditors in their classes. The minimum general requirement for auditing is attendance in two-thirds of the class sessions; instructors may set additional requirements for auditing their classes.

COURSE CHANGES

Once the course enrollment form has been submitted to the registrar, all changes must be approved by the student's director of graduate studies and then filed with the registrar. If a student is enrolled in a professional school course, all changes in enrollment status must be reported to the registrar of that school as well as to the Graduate School. Forms for reporting changes to the Graduate School are available at the Graduate School Student Information Office, 140 HGS, as well as from the student's department.

The dates for changing enrollment in a course from credit to audit or audit to credit and for withdrawing from a course are listed in the Schedule of Academic Dates and Deadlines on pages 438–41. If a student stops attending a course in which he or she is enrolled for credit but does not file a course change form with the registrar, a permanent "Incomplete" will be recorded on the student's record for that course. Similarly, if a student attends a course, for credit or audit, that was not listed on the student's approved course enrollment form for that term, the course will not be entered in the student's record and credit for the course will not be given. A fee of $25 per course will be charged for changes made after midterm (fall term: October 24; spring term: March 5).

Grades

The grades assigned in the Graduate School are:

H = Honors
HP = High Pass
P = Pass
F = Fail

Marks of Credit/No Credit are assigned for History of Art students enrolled in History of Art courses.

Marks of Satisfactory/Unsatisfactory may be assigned only when the department sponsoring the course has designated such marks. In such cases, all students enrolled in the course must receive these marks; individual students may not receive grades for the course.

The Graduate School does not calculate grade-point averages nor does it assign numerical or letter equivalents to Graduate School grades. Grades assigned according to grading scales other than those described above will be returned to the instructor for conversion.

The Schedule of Academic Dates and Deadlines on pages 438–41 indicates the dates on which grades are due for the current year. Instructors have the responsibility for assigning dates for submission of course work to meet these grade deadlines. If a student and instructor have agreed that an extension is appropriate, the student must submit a request for the Temporary Incomplete (TI) with the intended completion date, signed by the instructor and the director of graduate studies. The instructor will indicate the mark of TI on the grade sheet, which is to be submitted to the Office of the Registrar by the appropriate grade submission deadline. Only one TI for courses taken in a single term is permitted. Temporary Incompletes received in an academic year must be converted to final grades by October 1 of the following academic year. If a grade is not received by the registrar by this date, the TI will be converted to a permanent Incomplete (I) on the student's record.

In certain extraordinary circumstances, such as serious illness or a family emergency, and on the recommendation of the student's department, the associate dean may grant an additional extension. A written request for such an extension must be made by the director of graduate studies on the student's behalf within two weeks of the grade submission deadline. The request should indicate the special circumstances and suggest a date by which the student will complete the work. If the request is approved, the associate dean will inform the student and instructor. If the grade is submitted to the registrar by the new deadline approved by the associate dean, it will replace the Temporary Incomplete. If a grade is not received by the registrar by this date, a Temporary Incomplete (TI) will be converted to a permanent Incomplete (I) on the student's record.

"Provisional" or "temporary" grades (as opposed to Incompletes) are not permitted. Once submitted to the Office of the Registrar, a grade may be changed *only* in cases of arithmetical or clerical error on the part of the instructor and *only* with the approval of the appropriate associate dean.

Students are reminded that the policies stated above are the Graduate School minimum general requirements. Departments or individual instructors may have more stringent policies and students should consult their departmental handbooks or directors of graduate studies about such requirements.

Registration Status and Leaves of Absence

REGISTRATION IN RESIDENCE

Students who are studying on campus, attending classes, and using University facilities are considered to be in residence. All M.A./M.S. and nondegree (DSR) students must register in residence each term, as do most students in Ph.D. programs (see also Registration in Absentia and Continuous Registration Fee, below). Students who will be in residence during any term are required to register through the Online Course Selection process during the normal registration period at the beginning of that term (see the Schedule of Academic Dates and Deadlines on pages 438–41).

A fee of $25 will be charged to students who register in residence after the close of the registration period but within the first ten days of the term. Registration after the tenth day of the term requires the permission of the director of graduate studies, the registrar, and, in some instances, of the appropriate associate dean. Additional fees may be imposed for registration after the tenth day of the term. Late fees may be waived only if the registrar receives written notification from the student or director of graduate studies before the start of the registration period that the student will register late because of participation in an academic program, such as a summer language course or professional meeting, that coincides with the registration period. A student who cannot register during the registration period because of a sudden serious illness or family emergency should contact the deputy registrar (142 HGS) as soon as possible.

REGISTRATION IN ABSENTIA

Ph.D. students who have not yet completed the four-year full-tuition requirement and whose program of study requires full-time dissertation research, full-time field work, or full-time study at another academic institution outside the New Haven area, may request to be registered in absentia. Such registration requires the recommendation of the director of graduate studies and the approval of the appropriate associate dean. Forms for requesting registration in absentia may be obtained at the Graduate School Student Information Office reception desk and should be filed at least one month before the beginning of the term during which the student expects to be studying away from New Haven. A student who has not completed the three-year residence requirement will be permitted to register in absentia for compelling academic reasons only, and normally only if the student has completed all other predissertation requirements.

Students who register in absentia before completing the four-year full-tuition requirement will normally be charged full tuition. Registration in absentia does not reduce the four-year full-tuition or three-year residence requirements, nor will a student who has not met the full tuition requirement be permitted to pay the special fee for more than one year. For additional information, see Eligibility for Fellowships on page 423.

Students who are enrolled in the Yale Health Plan and are registering in absentia should consult the staff of the Member Services department at the University Health Services about the policies governing coverage while they are away from New Haven.

CONTINUOUS REGISTRATION FEE

Ph.D. students who have completed the tuition and residence requirements described on pages 393–94 above must continue to register each term through the sixth year whether in residence or in absentia, or until they submit the dissertation, whichever occurs first. Students are charged a Continuous Registration Fee (CRF), which in 2003–2004 is $256 per term. Students who are granted extensions beyond the sixth year are also charged this fee. Forms for continuing registration are provided to eligible students before the start of each term and must be submitted by the end of the registration period for that term.

SUMMER REGISTRATION

Most Ph.D. students and many M.A./M.S. students continue full- or half-time independent study or research during the summer. Students who were registered during the preceding spring term and are engaged in degree-related activities at least half-time may register for the summer research term, approximately June 1 through August 31.

LEAVES OF ABSENCE

Students who wish or need to interrupt their study temporarily may request a leave of absence. There are two types of leave, personal and medical, both of which are described below. The general policies that apply to both types of leave are:

1. All leaves of absence must be approved by the appropriate associate dean on the recommendation of the department. Medical leaves also require the recommendation of a Yale Health Plan (YHP) physician, as described below; see Medical Leave of Absence.
2. Students in Ph.D. programs may be granted a leave for one term or one academic year. A leave extends the eligibility for fellowship aid by a time equal to the duration of the leave, but not for partial terms. The expected last date of registration will be adjusted by one term for each term of the leave.

   Students in one-year M.A./M.S. programs may be on leave for a maximum of one term. Students in two-year M.A./M.S. programs may be on leave for a maximum total of one year.

   In exceptional circumstances renewal of one term or one year, to a maximum total of two years of leave, may be granted for students in Ph.D. programs. Leaves of absence for students in M.A./M.S. programs are not renewable. Students who fail to register for the term following the end of the approved leave will be considered to have withdrawn from the Graduate School.
3. Students on leave may complete, *by the appropriate deadline for the term in which the course was taken*, outstanding work in courses for which they have been granted approved incompletes. They may *not,* however, fulfill any other degree requirements during the time on leave. (Students who intend to work toward the degree while away from the University must request registration in absentia.) Students who in fact make progress toward the degree while on leave will have their registration changed retroactively to in absentia for the period of the leave.

4. Students on leave are not eligible for financial aid, including loans, or for the use of any University facilities normally available to registered students, with the exception of the Yale Health Plan, in which they may enroll through the Student Affiliate Coverage plan. In order to secure continuous YHP coverage, enrollment in this plan must be requested prior to the beginning of the term in which the student will be on leave or, if the leave commences during the term, within thirty days of the date when the leave is granted. Coverage is not automatic; enrollment forms are available from the Member Services department of the Yale Health Service, 17 Hillhouse Avenue, 203.432.0246. Additional information may be found in the *YHP Student Handbook*.
5. A leave of absence does not exempt the student from meeting the tuition requirement (payment of eight terms of full tuition in Ph.D. programs, or the appropriate established tuition charge in M.A./M.S. programs) or from paying the Continuous Registration Fee (if appropriate), but merely postpones the required charges.
6. Students on leave of absence do not have to file a formal application for readmission. However, they must notify the registrar in writing of their intention to return. Such notification should be given at least six weeks prior to the end of the approved leave.

Personal Leave of Absence

A student who is current with his or her degree requirements and who wishes to interrupt study temporarily for reasons such as pregnancy, maternity or paternity care, or because of financial exigencies, may request a personal leave of absence. The general policies governing leaves of absence are described above. Students are eligible for personal leaves after satisfactory completion of at least one term of study. Normally, students in Ph.D. programs are not eligible for personal leaves after the fourth year of study. In certain exceptional cases, however, personal leaves may be granted to students beyond the fourth year of study for reasons of pregnancy, maternity or paternity care, or for military service. Personal leaves cannot be granted retroactively and normally will not be approved after the tenth day of a term.

To request a personal leave of absence, the student must write to the appropriate associate dean before the beginning of the term for which the leave is requested, explaining the reasons for the proposed leave and stating both the proposed start and end dates of the leave and the address at which the student can be reached during the period of the leave. If the dean finds the student to be eligible and the department approves, the leave will be granted. In any case the student will be informed in writing of the action taken. Students who do not apply for a personal leave of absence, or who apply for a leave but are not granted one, and who do not register for any term, will be considered to have withdrawn from the Graduate School.

Medical Leave of Absence

A student who must interrupt study temporarily because of illness may be granted a medical leave of absence with the approval of the appropriate associate dean, on the written recommendation of a physician on the staff of the University Health Services and of the

student's department. The general policies governing all leaves of absence are described above, including information about health care coverage. A student who is making satisfactory progress toward his or her degree requirements is eligible for a medical leave any time after matriculation. Students who are granted a medical leave during any term will have their tuition adjusted according to the same schedule used for withdrawals (please see Schedule of Academic Dates and Deadlines on pages 438–41). Before re-registering, a student on medical leave must secure written permission to return from a physician at the University Health Services. Advanced Ph.D. students may return at any time, with the permission of the Yale Health Plan.

Forms for requesting a medical leave of absence are available at the Graduate School Student Information Office. Health coverage options during a leave of absence are described on page 428. Eligible Ph.D. students will receive a Health Award from the Graduate School to cover the cost of the Student Affiliate Coverage Plan for the remainder of the term in which the leave is started, if they apply for this coverage through the Yale Health Plan within thirty days of the start of their leave.

WITHDRAWAL AND READMISSION

A student who wishes to terminate his or her program of study should confer with the director of graduate studies and the appropriate associate dean regarding withdrawal; their signatures on an official withdrawal form are required for withdrawal in good standing. The associate dean will determine the effective date of the withdrawal, upon consultation with the department. The University identification card must be submitted with the approved withdrawal form in order for withdrawal in good standing to be recorded. Withdrawal forms are available at the Graduate School Student Information Office.

Students who fail to meet departmental or Graduate School requirements by the designated deadlines will be barred from further registration and withdrawn, unless an extension or exception has been granted by the appropriate dean or degree committee. Students who do not register for any fall or spring term, and for whom a leave of absence has not been approved by the appropriate associate dean, are considered to have withdrawn from the Graduate School.

A student who discontinues his or her program of study during the academic year without submitting an approved withdrawal form and the University identification card will be liable for the tuition charge (or Continuous Registration Fee) for the term in which the withdrawal occurs. Tuition charges for students who withdraw in good standing will be adjusted as described in the Schedule of Academic Dates and Deadlines, pages 438–41. The Continuous Registration Fee for the term is not canceled if a student withdraws after the fourteenth day of the term. Health service policies related to withdrawal and readmission are described on page 428.

A student who has withdrawn from the Graduate School in good standing and who wishes to resume study at a later date must apply for readmission. Neither readmission nor financial aid is guaranteed to students who withdraw. The deadline for making application for readmission is January 2 of the year in which the student wishes to return to

the Graduate School. The student's application will be considered by the department, which will make a recommendation for review by the appropriate associate dean. The student's remaining tuition obligation will be determined at the time of readmission. Ph.D. students who withdraw after completion of the full tuition requirement and who are subsequently readmitted will be charged the accumulated CRF up to a maximum of four terms.

Personal Conduct

Yale University is an academic community dedicated to the advancement of learning. Its members freely associate themselves with the University and in doing so affirm their commitment to a philosophy of tolerance and respect for all members of the community. They pledge to help sustain the intellectual integrity of the University and to uphold its standards of honesty, free expression, and inquiry. They are expected to abide by the regulations of the University. They are also expected to obey local, state, and federal laws, and violations of these may be cause for discipline by the Graduate School.

The Graduate School specifically prohibits the following forms of behavior by graduate students:

1. Cheating on examinations, problem sets, and any other form of test; also, falsification and/or fabrication of data.
2. Plagiarism, that is, the failure in a dissertation, essay, or other written exercise to acknowledge ideas, research, or language taken from others.
3. Misuse of the materials or facilities of the University Library.
4. Unauthorized use of University services, equipment, or facilities, such as telephones and photocopying equipment.
5. Violation of University rules for using information technology services and facilities, including computers, the University network, and electronic mail. (See *Policies for Use of Information Technology Services Facilities.*)
6. Assault on, or coercion, harassment, or intimidation of, any member of the University community, including harassment on the basis of race, religion, gender, ethnicity, or sexual orientation; sexual harassment; or the use of a teaching position to harass or intimidate another student.
7. Disruption of a legitimate function or activity of the University community, including disrupting classes and meetings, blocking entrances and exits to University buildings, unauthorized occupation of any space on the Yale campus, or preventing the free expression or dissemination of ideas. (See Report of the Committee on Freedom of Expression at Yale, pages 412–14.)
8. Refusal to comply with the direction of a University police officer or other University official, including a member of faculty, acting in the performance of her or his duties.
9. Misuse, alteration, or fabrication of University credentials or documents, such as an identification card or a transcript or grade list, including grade lists submitted by teaching fellows.

10. Misrepresentation or lying during a formal inquiry by University officials.
11. Misrepresentation in applying for admission or financial aid.
12. Theft, misuse of funds, or willful damage of University property.
13. Trespassing on University property to which access is prohibited.
14. The possession or use of explosives, incendiary devices, or weapons on or about the campus is absolutely prohibited.
15. Interference with the proper operation of safety or security devices, including fire alarms, electronic gates, and sprinkler systems.
16. Unlawful manufacture, possession, use, or distribution of illicit drugs or alcohol on University property or as part of any University activity.

Violations of any of the above regulations will be referred to the Graduate School Committee on Regulations and Discipline, composed of three graduate students, three faculty members, normally one from each division, and an associate dean. Students found guilty of such violations will be subject to one or more of the following penalties:

Reprimand
Probation
Suspension
Dismissal
Fines
Restriction

In addition to imposing these penalties for offenses subject to disciplinary action, the University may refer students for prosecution, and students found guilty of unlawful possession, use, or distribution of illicit drugs or alcohol on University property or as part of any University activity may be required to complete an appropriate rehabilitation program.

Copies of the procedures of the Committee on Regulations and Discipline are available at registration along with *Programs and Policies* and may also be obtained at other times from the office of each of the associate deans of the Graduate School. The deans may be consulted for further information and advice. A copy of the procedures is sent automatically to any student who is charged with a violation of the Graduate School's regulations.

Grievance Procedures

To address complaints and grievances of various kinds, the following procedures have been adopted.

COMPLAINTS OF SEXUAL HARASSMENT

A standing committee reviews complaints of sexual harassment brought by graduate students against administrators, faculty of the Graduate School of Arts and Sciences, other instructors of graduate students, postdoctoral appointees, or other graduate students.

THE GRADUATE SCHOOL PROCEDURE FOR STUDENT COMPLAINTS

This procedure governs any case in which a student has a complaint, including but not limited to a complaint of discrimination on the basis of race, sex, color, religion, national or ethnic origin, sexual preference, or handicap, against a member of the faculty or administration of the Graduate School. Complaints that involve a misapplication of Graduate School policy are also appropriate for consideration by the Dean's Advisory Committee on Student Grievances. Complaints that require an emendation of policy will be referred to the Graduate School Executive Committee.

PROVOST'S PROCEDURE

The Provost's Procedure governs cases in which a student has a complaint, including but not limited to a complaint of sexual harassment or of discrimination on the basis of race, sex, color, religion, national or ethnic origin, sexual preference, or handicap, against a faculty member who is not a member of the Faculty of Arts and Sciences; or against an employee who is not an administrator in the Graduate School or who is not subject to discipline by the student's dean.

Copies of the grievance procedures of the Graduate School are available at registration along with *Programs and Policies* and may also be obtained at other times from the office of each of the associate deans of the Graduate School, or from the Information Office. The deans may be consulted for further information and advice.

Freedom of Expression

The Yale faculty has formally endorsed as an official policy of Yale University the following statement from the Report of the Committee on Freedom of Expression at Yale, published in January 1975.

> The primary function of a university is to discover and disseminate knowledge by means of research and teaching. To fulfill this function a free interchange of ideas is necessary not only within its walls but with the world beyond as well. It follows that the university must do everything possible to ensure within it the fullest degree of intellectual freedom. The history of intellectual growth and discovery clearly demonstrates the need for unfettered freedom, the right to think the unthinkable, discuss the unmentionable, and challenge the unchallengeable. To curtail free expression strikes twice at intellectual freedom, for whoever deprives another of the right to state unpopular views necessarily also deprives others of the right to listen to those views.
>
> We take a chance, as the First Amendment takes a chance, when we commit ourselves to the idea that the results of free expression are to the general benefit in the long run, however unpleasant they may appear at the time. The validity of such a belief cannot be demonstrated conclusively. It is a belief of recent historical development, even within universities, one embodied in American constitutional doctrine but not widely shared outside the academic world, and denied in theory and in practice by much of the world most of the time.

Because few other institutions in our society have the same central function, few assign such high priority to freedom of expression. Few are expected to. Because no other kind of institution combines the discovery and dissemination of basic knowledge with teaching, none confronts quite the same problems as a university.

For if a university is a place for knowledge, it is also a special kind of small society. Yet it is not primarily a fellowship, a club, a circle of friends, a replica of the civil society outside it. Without sacrificing its central purpose, it cannot make its primary and dominant value the fostering of friendship, solidarity, harmony, civility, or mutual respect. To be sure, these are important values; other institutions may properly assign them the highest, and not merely a subordinate, priority; and a good university will seek and may in some significant measure attain these ends. But it will never let these values, important as they are, override its central purpose. We value freedom of expression precisely because it provides a forum for the new, the provocative, the disturbing, and the unorthodox. Free speech is a barrier to the tyranny of authoritarian or even majority opinion as to the rightness or wrongness of particular doctrines or thoughts.

If the priority assigned to free expression by the nature of a university is to be maintained in practice, clearly the responsibility for maintaining that priority rests with its members. By voluntarily taking up membership in a university and thereby asserting a claim to its rights and privileges, members also acknowledge the existence of certain obligations upon themselves and their fellows. Above all, every member of the university has an obligation to permit free expression in the university. No member has a right to prevent such expression. Every official of the university, moreover, has a special obligation to foster free expression and to ensure that it is not obstructed.

The strength of these obligations, and the willingness to respect and comply with them, probably depend less on the expectation of punishment for violation than they do on the presence of a widely shared belief in the primacy of free expression. Nonetheless, we believe that the positive obligation to protect and respect free expression shared by all members of the university should be enforced by appropriate formal sanctions, because obstruction of such expression threatens the central function of the university. We further believe that such sanctions should be made explicit, so that potential violators will be aware of the consequences of their intended acts.

In addition to the university's primary obligation to protect free expression there are also ethical responsibilities assumed by each member of the university community, along with the right to enjoy free expression. Though these are much more difficult to state clearly, they are of great importance. If freedom of expression is to serve its purpose and thus the purpose of the university, it should seek to enhance understanding. Shock, hurt, and anger are not consequences to be weighed lightly. No member of the community with a decent respect for others should use, or encourage others to use, slurs and epithets intended to discredit another's race, ethnic group, religion, or sex. It may sometimes be necessary in a

university for civility and mutual respect to be superseded by the need to guarantee free expression. The values superseded are nevertheless important, and every member of the university community should consider them in exercising the fundamental right to free expression.

We have considered the opposing argument that behavior which violates these social and ethical considerations should be made subject to formal sanctions, and the argument that such behavior entitles others to prevent speech they might regard as offensive. Our conviction that the central purpose of the university is to foster the free access of knowledge compels us to reject both of these arguments. They assert a right to prevent free expression. They rest upon the assumption that speech can be suppressed by anyone who deems it false or offensive. They deny what Justice Holmes termed "freedom for the thought that we hate." They make the majority, or any willful minority, the arbiters of truth for all. If expression may be prevented, censored or punished, because of its content or because of the motives attributed to those who promote it, then it is no longer free. It will be subordinated to other values that we believe to be of lower priority in a university.

The conclusions we draw, then, are these: even when some members of the university community fail to meet their social and ethical responsibilities, the paramount obligation of the university is to protect their right to free expression. This obligation can and should be enforced by appropriate formal sanctions. If the university's overriding commitment to free expression is to be sustained, secondary social and ethical responsibilities must be left to the informal processes of suasion, example, and argument.

Financing Graduate School

TUITION AND FEES, 2003–2004

*Tuition:**

Full-time study, per term	$12,800
Full-time study in IDE, per term	13,300
Half-time study, per term	6,400
Master's programs, less than half time per term	
One-quarter time study, per term	3,200
Division of Special Registration (DSR, nondegree study)	
Course work, per course, per term (including audited courses)	3,200
Visiting Affiliated Research Graduate Students, per term	12,800
Visiting Assistants in Research, per term	1,560
Visiting Assistants in Research appointed for half-term or the summer only	780

Fees:†

Continuous Registration Fee (CRF), per term (see page 407)	$256
Special in absentia registration, per term (see page 406)	256
YHP Hospitalization/Specialty Coverage, twelve months‡	888
YHP Prescription Plus Coverage, twelve months	324

For fees relating to registration and course enrollment see page 404.

Appointment to a University post does not exempt a student from registration and payment of other fees. Full-time (and certain part-time) Yale managerial and professional employees and their spouses, as well as the spouses of Yale faculty, are eligible for a tuition reduction in the DSR and master's programs. They should consult the Department of Human Resources for details. Full-time faculty members and their spouses, emeritus faculty and their spouses, and University employees may audit courses without charge.

Candidates for degrees in the Graduate School, nondegree students paying full tuition, and spouses of full-time candidates for degrees in the Graduate School may audit courses without charge.

STUDENT ACCOUNTS AND BILLS

Student accounts, billing, and related services are administered through the Office of Student Financial Services, which is located at 246 Church Street. The telephone number is 203.432.2700.

* It is anticipated that tuition will be increased in subsequent years.

† It is anticipated that the Continuous Registration Fee will be increased in subsequent years. Other fees are subject to change without notice.

‡ Hospitalization fees are for single students. Rates are higher for students needing dependent coverage.

Yale Charge Account

Students who sign and return a Yale Charge Card Account Authorization form will be able to charge designated optional items and services to their student accounts. Students who want to charge toll calls made through the University's telephone system to their accounts must sign and return this Charge Card Account Authorization. The University may withdraw this privilege from students who do not pay their monthly bills on a timely basis. For more information, contact the Office of Student Financial Services at 246 Church Street, PO Box 208232, New Haven CT 06520-8232; telephone, 203.432.2700; fax, 203.432.7557; e-mail, sfs@yale.edu.

Yale Payment Plan

The Yale Payment Plan is a payment service that allows students and their families to pay tuition, room, and board in eleven or twelve equal monthly installments throughout the year based on individual family budget requirements. It is administered for the University by Academic Management Services (AMS). To enroll by telephone,call 800.635.0120. The feeto cover administration of theplan is $50.The deadlinefor enrollment is June 21. Application forms will be mailed to all students. For additional information, please contact AMS at the number above or visit their Web site at http://www.tuitionpay.com/.

Bills and Payments

Term bills reflect charges for tuition and health coverage, as well as for room and board, library fines, miscellaneous purchases, and unpaid balances from prior terms.

For Ph.D. students, stipends are paid directly to students by checks issued periodically during the academic year, while tuition fellowships and the Health Award for hospitalization coverage are normally paid as credits against the related charges on students' term bills.

Term bills for the fall term are mailed to students by August 5 and are due and payable by September 1. Bills for the spring term are mailed by November 5 and are due and payable by December 1.

A late fee of $110 will be imposed by the Office of Student Financial Services for every term in which outstanding charges, less Yale-administered loans and scholarships, exceed $250 and are not paid by September 1 for the fall term, and by December 1 for the spring term.

Until all outstanding charges, less Yale-administered loans and scholarships, are paid in full, students are not furnished, directly or indirectly, with transcripts, certificates of attendance, or diplomas.

Charge for Returned Checks

A processing charge of $20 will be assessed for checks returned for any reason by the bank on which they were drawn. In addition, the following penalties may apply if a check is returned:

1. If the check was in payment of a term bill, a $110 late fee will be charged for the period the bill was unpaid.

2. If the check was in payment of a term bill to permit registration, the student's registration may be revoked.
3. If the check was given in payment of an unpaid balance in order to receive a diploma, the University may refer the account to an attorney for collection.

TRANSCRIPTS

Transcripts may be ordered in writing at the Office of the Registrar for the Faculty of Arts and Sciences (246 Church Street, third floor), or faxed, with a signature, to 203.432.2334. For each transcript order, the charge for the first transcript is $5, with a charge of $1 for each additional transcript. Normally a transcript order is processed within forty-eight hours after receipt. In some circumstances it may be possible to provide a transcript within twenty-four hours after receipt of the order; there is an additional charge of $10 for such requests. For overnight delivery, additional mailing charges may be imposed. www.yale.edu/sfas

FINANCIAL AID

Financial assistance is provided in the form of Yale University Fellowships, tuition fellowships, teaching fellowships, traineeships, and research assistantships. The nature of the assistance varies among the divisions and departments. Yale University Fellowships are awarded at the time of admission. Doctoral students are normally provided a level of support comparable to the fellowship awarded at admission, from the first through the fourth year of study. Eligible students in the humanities and social sciences receive University Dissertation Fellowhips in their fifth or sixth year of study.

In addition to grants and fellowships for tuition and living costs, eligible Ph.D. students receive a Health Award, which covers the full cost of single-student Yale Health Plan Hospitalization/Specialty Coverage. For those eligible Ph.D. students who elect two-person or family coverage at the Yale Health Plan, the Graduate School covers half the cost of the coverage plan (which includes both Basic Coverage and Hospitalization/Specialty Coverage for the student and his or her dependents). Students for whom a Medical Leave of Absence is approved (see pages 408-9) will continue to be eligible for the Health Award for the remainder of the term in which the leave was started, if they apply for Student Affiliate coverage through the Yale Health Plan wihitn thirty days of the start of their leave. Information about Yale Health Plan Basic Coverage, provided at no cost to students enrolled at least half-time in M.A., M.S., or Ph.D. programs, may be found on page 427.

Students who do not participate in the Yale Health Plan Hospitalization/Specialty Coverage will not be provided with Health Awards. Yale Health Plan Prescription Plus Coverage is an option that eligible students may choose to purchase for themselves and their dependents. The Prescription Plus plan is not covered by the Health Award.

Application for University Fellowship Support

Applicants for admission to the DSR and to terminal M.A. departments and programs are required to complete the financial statement contained in the application brochure.

Applicants for admission to Ph.D. departments and programs will automatically be considered for all Yale fellowships, traineeships, research assistantships, and teaching fellowships for which they are eligible. These awards of financial aid are announced in letters of admission, which are usually mailed during the month of March. Tuition assistance is not available beyond the fourth year of study. Students are strongly encouraged to seek financial support from external sources (see page 422, External Fellowships and Combined Award Policy).

University Fellowships

The Graduate School awards University Fellowships in most departments. Fellowships are awarded at admission to entering students on the basis of recommendations made by individual departments to the appropriate associate dean. Fellowship awards are based on merit.

The Graduate School provides Ph.D. students with a level of support during the second, third, and fourth years of study comparable to that awarded at admission. In most departments the source of stipend support will change after the first or second year of study to a teaching fellowship or research assistantship. If during the teaching years a student's teaching fellowship is less than the standard departmental stipend, the Graduate School provides a supplemental fellowship to bring the annual stipend/fellowship to the level of the department's standard stipend. Students in the humanities and social sciences may defer a teaching year, and the supplemental fellowship, into the fifth year (see pages 396–97). To assist students in the completion of their studies, the Graduate School offers Summer Study Fellowships to eligible students in their first and second years in the humanities and social sciences, and University Dissertation Fellowships to eligible students in years four, five, or six in the humanities and social sciences.

Students awarded a University Fellowship may not accept any other award without the permission of the appropriate associate dean. The Graduate School is the final authority on University Fellowships. It is important to note that no University Fellowships are awarded during the summer.

In most departments in the humanities and social sciences, the fellowship stipends of students in the third and fourth years of study will be derived from teaching fellowships. When a student teaches in the third or fourth year, the teaching fellowship will comprise the student's fellowship stipend, according to the terms of the offer of admission. For students who teach in their first or second year when such teaching is not a departmental requirement, the Graduate School will use the standard departmental stipend as a ceiling for combined fellowship stipend and teaching award and will reduce the stipend accordingly.

In departments where there are insufficient opportunities for undergraduate teaching, doctoral students may continue to receive fellowship stipends in their third and fourth years of study up to the level of the standard departmental stipend. Stipend support will normally be withheld if a student in the third or fourth years refuses a teaching position or elects not to teach. Exceptions to this policy require the permission of the appropriate associate dean and the director of the Teaching Fellow Program.

Teaching Fellowships

TEACHING AND ADMISSION OFFERS

Letters of admission inform students of their programs' requirement for teaching. In many programs there are specific years when students teach and when a portion of their financial aid is derived in part from teaching. For example, most humanities and social science students will participate in teaching in their third and fourth years. In the natural sciences, the timing of teaching is earlier or is flexible across several years. When students are teaching as specified in their letters of admission, teaching assignments will not be adjusted in response to changes in course enrollments. Appointments for these students will change only if a course is cancelled or if the student, course instructor, and DGS all agree upon a reassignment.

Upon admission, many students receive financial aid packages that include teaching fellowships. The admission letter sets the minimum annual total stipend (including the teaching fellowship), which will be awarded even if appropriate teaching is not available or if the teaching fellowship is less than the standard departmental stipend. Such funding adjustments are made with the participation of a student's associate dean and DGS.

Teaching appointments outside those specified in the letter of admission are contingent on a graduate student's satisfactory academic progress and on sufficient course enrollment. Because the Graduate School considers teaching experience an integral part of graduate education, every effort will be made to assign students to another course at an equivalent level if enrollments are lower than anticipated. Ph.D. students who teach in their first or second year, or when such teaching is not a departmental requirement, will receive the full teaching fellowship, plus a supplemental fellowship, bringing their combined stipend up to the level awarded in the admission letter. M.A. students will receive the full teaching fellowship; any other financial aid will be awarded according to the policies of their programs.

ACCESS TO TEACHING FELLOWSHIPS

When departments are considering applications for teaching fellowships, priority is given to qualified graduate students who are expected to teach as indicated in their letter of admission (usually in years three and four in the humanities and social sciences). Students in their fifth or sixth year of study will be permitted to teach as long as they have been admitted to candidacy and do not currently hold a dissertation fellowship. Students who are permitted to register beyond the sixth year of study may be appointed as TFs or PTAIs, but only if there is no other qualified candidate available in the first six years of study in any department or program of the Graduate School. In cases where an appointing department must choose between two or more graduate students who are each well qualified to teach a particular course, the student or students who have not yet had a chance to teach or who have taught the least should be given preference.

LIMITS ON TEACHING

Except in certain science departments, first-year students may be appointed as teaching fellows only in exceptional cases, and only after prior approval by their DGS, the appropriate associate dean, and the director of the TFP. Normally the maximum amount of teaching a student may do is four TF units or one PTAI per term.

Students with outside fellowships are eligible to serve as TFs according to the policies of their departments and the conditions of their outside awards.

APPOINTMENT LETTERS

The Graduate School expects that each term departments will send letters of appointment to graduate students, signed by both the department and the TFP director, indicating the course in which a graduate student is expected to teach and the level of the assignment.

TEACHING FELLOW LEVELS

There are five levels of TFs at Yale. They are distinguished from one another by several considerations, including the kind or kinds of activity required, the approximate hours per week, and the number of students taught. For example, courses in which TFs are expected to provide frequent and intensive writing criticism, to grade problem sets or vocabulary tests frequently, or to prepare especially complicated visual or laboratory materials, may be accorded a higher-level teaching fellowship than courses that do not carry such an expectation. A graduate student's teaching assignment is measured in terms of teaching fellow units (one unit for a term as TF 1, two units for a term as TF 2, and so on).

Teaching Fellow 1: The duties of a TF 1 are primarily (a) grading or (b) a modest combination of the following: attending class, reading, advising undergraduates, offering an occasional discussion section, helping to set up a lab, or assisting in the administrative details of a course. A TF 1 does not engage in regular classroom teaching. Approximate weekly effort, 5 hours. The 2003–2004 teaching fellowship is $1,790 per term.

Teaching Fellow 2: A TF 2 typically leads and grades one discussion or laboratory section of up to twenty students in courses in the natural sciences and some social sciences or combines responsibilities (a) and (b) as described under TF 1. Approximate weekly effort, 10 hours. The 2003–2004 teaching fellowship is $3,580 per term.

Teaching Fellow 3: Depending on department policy, the duties of a TF 3 may include leading and grading one or two lab or discussion sections, as in Chemistry. Alternatively, a TF 3 may be appropriate for a combination of duties that might include attending lectures, office hours and consultations, and grading, as in Psychology. Approximate weekly effort, 15 hours. The 2003–2004 teaching fellowship is $5,370 per term.

Teaching Fellow 3.5: This appointment is appropriate for TFs who lead and grade one section in English, History of Art, the Literature major, in any literature course in the national language departments that may conform to the same mode of teaching, in courses double titled with these departments and programs, and in a few designated courses. Discussion section leaders are appointed for lecture courses with 30 or more students; a section size is expected not to exceed 18 students, with 20 the absolute maximum. This appointment is also used for Writing Intensive TFs. Approximate weekly effort, 17.5 hours. The 2003–2004 teaching fellowship is $6,265 per term.

Teaching Fellow 4: This appointment is appropriate for TFs in humanities and social science departments where teaching fellows usually lead and grade two sections. Discussion section leaders are appointed for lecture courses with 30 or more students; a section size is expected not to exceed 18 students, with 20 the absolute maximum. Approximate weekly effort, 20 hours. The 2003–2004 teaching fellowship is $7,160 per term.

PART-TIME ACTING INSTRUCTORS

Graduate students appointed as part-time acting instructors (PTAIs) are responsible for the conduct of sections of introductory courses or advanced courses, normally seminars in their special fields. PTAIs are subject to departmental guidance, which, in the case of multisection introductory courses, may entail the use of a common syllabus and examinations. PTAIs who teach advanced courses must have satisfied all predissertation requirements (including the dissertation prospectus) and must be registered full time to be eligible for the appointment. Hours of effort for PTAIs will vary from one individual to another. The 2003–2004 teaching fellowship is $7,260 per term.

Traineeships and Assistantships in Research

Traineeships (National Research Service Awards) from the National Institutes of Health are available in most of the biological sciences and in some other departments. These awards support full-time Ph.D. study by U.S. citizens, noncitizen nationals of the United States, and permanent residents. In combination with University and departmental supplements, they provide payment of tuition, a monthly stipend, and the hospitalization premium. Federal rules require that trainees pursue their research training on a full-time basis. In some instances, there is a federal payback provision, which is ordinarily satisfied by serving in health-related research or teaching at the conclusion of training. Information about this obligation and other matters relating to traineeships is available from the director of graduate studies or the principal investigator of the specific training grant in question.

Research Appointments

Graduate students in departments where the faculty receive research grants or contracts may be eligible for appointments as assistants in research (AR). In most of the science departments, advanced students are normally supported as ARs by individual faculty research grants. An assistantship in research provides a monthly salary at a rate agreed upon by the department and the Graduate School. It is understood that the work performed not only is part of the faculty principal investigator's research project but also is the student's dissertation research and therefore in satisfaction of a degree requirement. For a standard AR appointment, in addition to the salary, the grant pays half of the tuition or all of the CRF. When the appointee is eligible for a University Fellowship, the other half of tuition is covered by a fellowship.

An appointment as a project assistant (PA) is intended for a student who performs services for a research project that are not a part of the student's degree program. A

project assistant may normally work no more than ten hours per week. The rate of compensation is based on the department-approved rate paid to assistants in research. With the permission of the director of graduate studies and the appropriate associate dean, a student may receive a combination of project assistant and assistant in research appointments.

Questions about AR or PA appointments should be directed to the director of graduate studies or the appropriate associate dean in the Graduate School.

SUPPLEMENTARY FELLOWSHIP AID

The Graduate School is currently able to offer a small amount of supplementary fellowship assistance to students who experience significant financial hardship at some point during their first four years of study. Students who wish to request supplemental fellowship awards should send to their associate dean a letter explaining the reasons for their request. Students requesting supplemental assistance may be asked to submit additional information about their financial status at any time thereafter until their request is considered. Requests for supplemental fellowship assistance are usually made during the spring term, and students are typically notified of decisions during the summer.

Students should note that the budget for supplementary aid is extremely modest and only requests from students in serious financial difficulty are likely to be met. Awards of supplementary aid are made for one year only.

EXTERNAL FELLOWSHIPS AND COMBINED AWARD POLICY

All current students and applicants for admission are strongly encouraged to compete for outside fellowships. These fellowships, sponsored by both public and private agencies, confer distinction on a student who wins an award in a national competition. They are often more generous than the fellowships the University is able to provide. Students must report to their associate dean any scholarship/fellowship received from an outside agency or organization.

Students are allowed to hold outside awards in conjunction with University stipends up to combined levels that are significantly higher than the normal stipend. During the nine-month academic year, the sum of the Graduate School's initial stipend award and all outside awards may total the standard department/program nine-month stipend plus $4,000. If the sum of the Graduate School's initial stipend award and all outside awards exceeds this limit, the Graduate School stipend award will be reduced accordingly.

In humanities and social science departments, up to 3/12 of the external award may be reserved for the summer (when this is permitted by the awarding agency), prior to calculating the nine-month combined award. When outside awards include restricted funds (e.g., for tuition and/or research support), the restricted funds will not be used in calculating the combined stipend.

University Fellowship stipends awarded as a result of this formula are subject to all applicable policies, including replacement of stipends by teaching fellowships, and are awarded for the nine-month academic year.

DISSERTATION FELLOWSHIPS

In addition to the substantial regular fellowships awarded to students, the Graduate School offers special University Dissertation Fellowships to eligible advanced graduate students in the humanities and social sciences during their fourth, fifth, or sixth year of study. These awards are made when a student's adviser and director of graduate studies certify that the student will be engaged full-time in research and writing, is making satisfactory progress toward the degree, and has a reasonable schedule for the timely completion of the dissertation. The University Dissertation Fellowship is an academic-year fellowship and is offered exclusively during the fall and spring terms. It may never be held concurrently with a teaching fellowship of any kind. Students who accept a teaching position in the fall or spring of the year of final eligibility will forfeit that term's dissertation fellowship amount. In 2003–2004, University Dissertation Fellowships will carry a stipend of $16,000. A student may be awarded a dissertation fellowship for one year only. Application materials and additional information can be found in the Graduate School Web site: www.yale.edu/graduateschool/financial/UDF_Form.pdf or from the appropriate associate dean.

ELIGIBILITY FOR FELLOWSHIPS

Students who hold Yale-administered fellowships are required to be in residence and engaged in full-time study. Permission to hold a fellowship in absentia must be obtained from the appropriate associate dean. A student who leaves New Haven, except for short vacation periods, without having such permission may have the fellowship canceled. No fellowships will be paid for any period when a student is not registered.

Students are not eligible for stipend support from the Graduate School after six years of study, but they remain eligible for student loans as long as they are enrolled at least half-time.

A fellowship will be withdrawn and a stipend withheld if the recipient's activities become prejudicial to the purpose for which the fellowship was granted or if a student becomes ineligible to register for any reason.

OTHER MEANS OF FINANCING GRADUATE EDUCATION

Part-Time Employment

Study toward the Ph.D. degree is expected to be a full-time activity. Accordingly, part-time employment for compensation, at the University or elsewhere, should not conflict with the obligations of the Ph.D. program or interfere with academic progress.

Part-time employment beyond an average of ten hours per week requires permission of the director of graduate studies, who will inform the appropriate associate dean.

Students who hold student loans must report *all* part-time employment earnings to the Office of Financial Aid. Failure to do so may result in cancellation of the loan(s).

Loans and Work-Study

U.S. citizens may be eligible to borrow through federally subsidized loan programs. Eligibility is based on federal regulations and University policies. Information is available from the Financial Aid Office, 129 HGS.

During 2003–2004, eligible students in the Graduate School may be able to borrow from the following federal student loan programs: Federal Stafford Loans and Federal Perkins Loans. The Graduate School also offers special "bridge loans" in the fall term to students whose financial aid is concentrated in the spring term. For full details, consult the director or associate director of finance.

The College Work-Study (CWS) program, which is federally funded, enables eligible graduate students to meet a portion of their academic year financial need through part-time employment.

All students applying for any of these federal programs must fill out a Free Application for Federal Student Aid (FAFSA). Information on loan and work-study programs is contained in the 2003–2004 *Financial Information for Entering Graduate Students.* These documents are available from the financial aid office. Information and FAFSA applications are also available at the Web site of the United States Department of Education (www.fafsa.ed.gov/).

International students are eligible to borrow from Graduate School loan funds, but normally only in the third and fourth years of study. These loans are limited in number and may not exceed $5,000 per academic year. Because Graduate School loan funds are limited, this policy may change from year to year. Interest-bearing loans are available to international students from private lenders, but require a U.S. citizen as cosigner.

TWO FEDERAL REGULATIONS GOVERNING TITLE IV FINANCIAL AID PROGRAMS

Satisfactory Academic Progress

Federal regulations require that students be making satisfactory academic progress each year in order to be eligible for Title IV funding (i.e., federal loans, Javits Fellowships, and College Work-Study). The standards by which satisfactory academic progress is measured are determined by the Graduate School and by individual departments. Verification of satisfactory progress is based on annual student evaluations from the directors of graduate studies and, for students in the dissertation stage, on a statement of progress from the student, the dissertation adviser, and the director of graduate studies.

Department of Education Refund Policy

Students receiving Title IV financial assistance who withdraw during a term and are entitled to a refund of any University charges will have their Title IV assistance adjusted according to a formula specified by the Department of Education. Please consult the Financial Aid Office in 129 HGS.

University Services and Facilities

LIVING ACCOMMODATIONS

Graduate Housing — On Campus

www.yale.edu/graduatehousing/

The Graduate Housing Office has dormitory and apartment units for a small number of graduate and professional students. Approximate rates for 2003–2004 are: dormitory (single) housing, $4,228–5,026 per academic year; apartments (single and family housing), $620–890 per month. Students who have accepted an offer of admission may download the graduate housing application form from the Web site above, and send it in to apply for housing. The assignment process generally starts in mid- to late April after current returning residents are offered renewals.

The Graduate Housing Office consists of two separate offices: the Graduate Dormitory Office and the Graduate Apartment Office, both located within Helen Hadley Hall, a graduate dormitory, at 420 Temple Street. Office hours are from 9 A.M. to 4 P.M., Monday through Friday. For facility descriptions, floor plans, and rates, visit the Graduate Housing Web site. For further information on graduate dormitories, contact Beverly Whitney at 203.432.2167, fax 203.432.4578, or beverly.whitney@yale.edu.For graduate apartment information,contactBetsy Rosenthal at 203.432.8270, fax 203.432.0177, or betsy.rosenthal@yale.edu.

Off-Campus Listing Service

www.yale.edu/offcampuslisting

The University's Off-Campus Listing Service is an online database of rental apartments, houses, room shares, and sublets listed by private landlords and current students and staff. It is a service for current and incoming members of the Yale community, with an office at 155 Whitney Avenue, third floor, open from 8.30 A.M. to 3.30 P.M., Monday through Friday. Its listings may also be accessed from any computer at Yale through the Intranet or from anywhere in the world through the Internet at www.yale.edu/offcampuslisting. Use the user I.D. "housevis99" and the password "rix99" to access the site. No phone or e-mail assistance is available, as this is a self-service resource.

University Properties

www.yale.edu/universityproperties

University Properties owns and operates Yale University's nonacademic, off-campus properties in New Haven. We are committed to enhancing the quality of life at Yale and in downtown New Haven through the development of unique retail and office environments and the revitalization of surrounding neighborhoods.

University Properties offers a variety of quality market-rate housing options to the Yale community and provides high-quality commercial space to businesses. Properties

are managed by contracted management companies chosen for their professionalism and ability to work effectively with the Yale community. Several properties are leased exclusively to graduate students.

HEALTH SERVICES

www.yale.edu/uhs/

Yale University Health Services (YUHS) is located on campus at 17 Hillhouse Avenue. YUHS offers a wide variety of health care services for students and other members of the Yale community. Services include student medicine, internal medicine, gynecology, mental health, pediatrics, pharmacy, laboratory, radiology, a twenty-three-bed inpatient care facility (ICF), a round-the-clock urgent care clinic, and such specialty services as allergy, dermatology, orthopedics, and a travel clinic. YUHS also includes the Yale Health Plan (YHP), a health coverage option that coordinates and provides payment for the services outlined above, as well as for emergency treatment, off-site specialty services, inpatient hospital care, and other ancillary services. YUHS's services are detailed in the *YHP Student Handbook,* available through the YHP Member Services Department, 203.432.0246.

Eligibility for Services

All full-time Yale degree-candidate students who are paying at least half tuition are enrolled automatically for YHP Basic Coverage. YHP Basic Coverage is offered at no charge and includes preventive health and medical services in the departments of Student Medicine,Internal Medicine, Gynecology, Health Education, and Mental Hygiene. In addition, treatment for urgent medical problems can be obtained twenty-four hours a day through Urgent Care.

Students on leave of absence or on extended study and paying less than half tuition are not eligible for YHP Basic Coverage but may enroll in YHP Student Affiliate Coverage. Students enrolled in the Division of Special Registration as nondegree special students or visiting scholars are not eligible for YHP Basic Coverage but may enroll in the YHP Billed Associates Plan and pay a monthly premium. Associates must enroll for a minimum of one term within the first thirty days of affiliation with the University.

Students not eligible for YHP Basic Coverage may also use the services on a fee-for-service basis. Students who wish to be seen fee-for-service must enroll with the YHP Member Services Department. Enrollment applications for the YHP Student Affiliate Coverage, Billed Associates Plan, or Fee-for-Service Program are available from the YHP Member Services Department.

All students are welcome to use specialty and ancillary services at YUHS. Upon referral, YHP will cover the cost of these services if the student is a member of YHP Hospitalization/Specialty Care Coverage (see below). If the student has an alternate insurance plan, YHP will assist in submitting the claims for specialty and ancillary services to the other plan and will bill through the Office of Student Financial Services for noncovered charges and services.

Health Coverage Enrollment

The University also requires all students eligible for YHP Basic Coverage to have adequate hospital insurance coverage. Students may choose YHP Hospitalization/Specialty Coverage or elect to waive the plan if they have other hospitalization coverage, such as coverage through a spouse or parent. The waiver must be renewed annually, and it is the student's responsibility to confirm receipt of the waiver form by the University's deadlines noted below.

YHP HOSPITALIZATION/SPECIALTY COVERAGE

Students are automatically enrolled and charged a fee each term on their Student Financial Services bill for YHP Hospitalization/Specialty Coverage. Students with no break in coverage who are enrolled during both the fall and spring terms are billed each term and are covered from September 1 through August 31. For students entering Yale for the first time, readmitted students, and students returning from a leave of absence who have not been covered during their leave, YHP Hospitalization/Specialty Coverage begins on the day the dormitories officially open. A student who is enrolled for the fall term only is covered for services through January 31; a student enrolled for the spring term only is covered for services through August 31.

For a detailed explanation of this plan, see the *YHP Student Handbook*.

Waiving the YHP Hospitalization/Specialty Coverage: Students are permitted to waive YHP Hospitalization/Specialty Coverage by completing a waiver form that demonstrates proof of alternate coverage. Waiver forms are available from the YHP Member Services Department. It is the student's responsibility to report any changes in alternate insurance coverage to the YHP Member Services Department. Students are encouraged to review their present coverage and compare its benefits to those available under the YHP. The waiver form must be filed annually and must be received by September 15 for the full year or fall term or by January 31 for the spring term only.

Revoking the Waiver: Students who waive YHP Hospitalization/Specialty Coverage but later wish to be covered must complete and send a form voiding their waiver to the YHP Member Services Department by September 15 for the full year or fall term, or by January 31 for the spring term only. Students who wish to revoke their waiver during the term may do so, provided they show proof of loss of the alternate insurance plan and enroll within thirty days of the loss of this coverage. YHP premiums will not be prorated.

YHP STUDENT TWO-PERSON AND FAMILY PLANS

A student may enroll his or her lawfully married spouse or same-sex domestic partner and/or legally dependent child(ren) under the age of nineteen in one of two student dependent plans: the Two-Person Plan or the Student Family Plan. These plans include coverage for YHP Basic Coverage and for coverage under YHP Hospitalization/Specialty Coverage. YHP Prescription Plus Coverage may be added at an additional cost. Coverage is not automatic and enrollment is by application. Applications are available from the YHP Member Services Department or can be downloaded from the YUHS

Web site (http://www.yale.edu/uhs/) and must be renewed annually. Applications must be received by September 15 for full-year or fall-term coverage, or by January 31 for spring-term coverage only.

YHP STUDENT AFFILIATE COVERAGE

Students on leave of absence or extended study or students paying less than half tuition may enroll in YHP Student Affiliate Coverage, which includes coverage for YHP Basic and for the benefits offered under YHP Hospitalization/Specialty Coverage. Prescription Plus Coverage may also be added for an additional cost. Applications are available from the YHP Member Services Department or can be downloaded from the YUHS Web site (http://www.yale.edu/uhs/) and must be received by September 15 for full-year or fall-term coverage, or by January 31 for spring-term coverage only.

YHP PRESCRIPTION PLUS COVERAGE

This plan has been designed for Yale students who purchase YHP Hospitalization/Specialty Coverage and student dependents who are enrolled in either the Two-Person Plan, the Student Family Plan, or Student Affiliate Coverage. YHP Prescription Plus Coverage provides protection for some types of medical expenses not covered under YHP Hospitalization/Specialty Coverage. Students are billed for this plan and may waive this coverage. The waiver form must be filed annually and must be received by September 15 for the full year or fall term or by January 31 for the spring term only. For a detailed explanation, please refer to the *YHP Student Handbook*.

Eligibility Changes

Withdrawal: A student who withdraws from the University during the first ten days of the term will be refunded the premium paid for YHP Hospitalization/Specialty Coverage and/or YHP Prescription Plus Coverage. The student will not be eligible for any YHP benefits, and the student's YHP membership will be terminated retroactive to the beginning of the term. The medical record will be reviewed, and any services rendered and/or claims paid will be billed to the student on a fee-for-service basis. At all other times, a student who withdraws from the University will be covered by YHP for thirty days following the date of withdrawal or to the last day of the term, whichever comes first. Premiums will not be prorated. Students who withdraw are not eligible to enroll in YHP Student Affiliate Coverage.

Leaves of Absence: Students who are granted leaves of absence are eligible to purchase YHP Student Affiliate Coverage during the term(s) of the leave. If the leave occurs during the term, YHP Hospitalization/Specialty Coverage will end on the date the leave is granted and students may enroll in YHP Student Affiliate Coverage. Students must enroll in Affiliate Coverage prior to the beginning of the term during which the leave is taken or within thirty days of the start of the leave (see pages 409 and 417). Coverage is not automatic and enrollment forms are available at the YHP Member Services Department or can be downloaded from the YUHS Web site (http://www.yale.edu/uhs/).

Extended Study or Reduced Tuition: Students who are granted extended study status or pay less than half tuition are not eligible for YHP Hospitalization/Specialty Coverage and YHP Prescription Plus Coverage. They may purchase YHP Student Affiliate Coverage during the term(s) of extended study. This plan includes coverage for YHP Basic and for the benefits offered under YHP Hospitalization/Specialty Coverage. Coverage is not automatic and enrollment forms are available at the YHP Member Services Department or can be downloaded from the YUHS Web site (http://www.yale.edu/uhs/). Students must complete an enrollment application for the plan prior to the start of the term.

For a full description of the services and benefits provided by YHP, please refer to the *YHP Student Handbook,* available from the YHP Member Services Department, 203.432.0246, 17 Hillhouse Avenue, PO Box 208237, New Haven CT 06520-8237.

Required Immunizations

Measles (Rubeola) and German Measles: All students who were born after December 31, 1956, are required to provide proof of immunization against measles (rubeola) and German measles (rubella). Connecticut state law requires two doses of measles vaccine. The first dose must have been given after January 1, 1969, *and* after the student's first birthday. The second dose must have been given after January 1, 1980. These doses must be at least 30 days apart. Connecticut state law requires proof of one dose of rubella vaccine administered after January 1, 1969, *and* after the student's first birthday. The law applies to all students unless they present (a) a certificate from a physician stating that such immunization is contraindicated, (b) a statement that such immunization would be contrary to the student's religious beliefs, or (c) documentation of a positive blood titer for measles and rubella.

Meningococcus (Meningitis): All students living in on-campus housing (dorms only) must be vaccinated against Meningococcal disease. The law took effect in September 2002, meaning that all returning students who plan to live in University housing must be immunized or show proof of immunization within the last five years. Students who are not compliant with this law will not be permitted to register for classes or move into the dormitories for the fall term, 2003. Please note that the State of Connecticut does not require this vaccine for students who intend to reside off campus.

Students who have not met these requirements prior to arrival at Yale University must receive the immunizations from YHP and will be charged accordingly. Further information is available at the YUHS Office of Health Promotion and Education, 432.4054.

COMPUTING AND TELECOMMUNICATIONS

www.yale.edu/its/

Information Technology Services (ITS), located at 175 and 221 Whitney Avenue, is the University central computing and communications services organization, providing academic computing, data networking, telephone services, voice and video networking,

computer sales, training, printing and copying services, and general user support (www.yale.edu/its).

Student Computing of Academic Media & Technology (AMT), a unit of ITS, furnishes general purpose computing clusters at many locations on campus, including the Graduate School's McDougal Center and the graduate student residences (Helen Hadley Hall and the Hall of Graduate Studies), where the computing facility is accessible to residents twenty-four hours a day (www.yale.edu/sc/). Windows and Apple computers and laser printers are available for open use by the Yale community at Connecticut Hall, Cross Campus Library, Dunham Laboratories, Kline Biology Tower, and the Social Sciences Statistical Laboratory.

The online purchasing site (www.yale.edu/eportal/) sells computers, networking cards, modems, and printers, as well as software and supplies. Apple, IBM, and Dell now support direct purchase of computers over the Internet, with systems properly configured for the Yale network. See the student computing site (www.yale.edu/sc/purchase) for more information on purchasing computer supplies. Up-to-date information on pricing and on ordering can be found at the eportal Web site (www.yale.edu/eportal/). Information about computer hardware repairs can be obtained at the repair Web site (www.yale.edu/repair/) or by calling the ITS Help Desk at 203.432.9000.

Network Access to Yale Services and Beyond

The University provides a large, central system for e-mail, Web page hosting, and other services for Yale College, the Graduate School, and selected professional schools. Yale's network offers a wide variety of local services through a campus-wide fiber-optic network, which is linked to both the worldwide Internet and the higher-performance Internet 2, specifically serving research universities. Services include Orbis, the University library's online catalogue; YaleInfo, a campus-wide Web-based information system that includes campus events, and Nexis, a database of newspapers and journal articles, as well as access to online training courses, Web courses, and various other services (www.yale.edu/computing).

Use of many of Yale's network resources requires a NetID and password. All new graduate students are automatically assigned a NetID, and all students in the Graduate School are provided with e-mail accounts.

Most rooms in residences, offices, and laboratories are equipped with Ethernet data outlets. Remote Access Services (www.yale.edu/ras), with offices at 221 Whitney Avenue, is the off-campus and roaming support center for the University.

To enhance support for graduate student research activities, the University provides network roaming access for laptop computers. Laptop Ethernet ports and wireless Ethernet access sites are available in residences, in the McDougal Center Common Room at 119 HGS, in the Sterling Memorial Library (SML) reading room and, for doctoral students, in the SML carrels. Registered users can access network resources through wired or wireless connections. www.yale.edu/

Telecommunications

www.yale.edu/telecom/

The ITS Telecommunications Office at 221 Whitney Avenue provides voicemail, paging, facsimile, and answering services, in addition to a full range of telephone services.Toll calls require a toll authorization number (TAN), which can be arranged through the telecommunications office as well as through departmental offices. Long-distance service for telephones on campus is through the University's private network, YALENET. YALENET calling cards are available to address off-campus needs.

OFFICE OF INTERNATIONAL STUDENTS AND SCHOLARS

www.oiss.yale.edu/

The Office of International Students and Scholars (OISS) coordinates services and support to Yale's international students, faculty, staff, and their dependents. OISS assists members of the Yale international community with all matters of special concern to them and serves as a source of referral to other university offices and departments. OISS staff can provide assistance with employment, immigration, personal and cultural adjustment, and family and financial matters, as well as serve as a source of general information about living at Yale and in New Haven. In addition, as Yale University's representative for immigration concerns, OISS provides information and assistance to students, staff, and faculty on how to obtain and maintain legal status in the United States. OISS issues the visa documents needed to request entry into the United States under Yale's immigration sponsorship and processes requests for extensions of authorized periods of stay in the United States, school transfers, and employment authorization. All international students and scholars must register with OISS as soon as they arrive at Yale, at which time OISS will provide information about orientation activities for newly arrived students, scholars, and family members. OISS programs, like the monthly international coffee hours, English conversation programs, and orientation receptions for newly arrived graduate students and postdocs, provide an opportunity to meet members of Yale's international community and become acquainted with the many resources of Yale University and New Haven.

OISS maintains an extensive Web site with useful information for students and scholars prior to and upon arrival in New Haven. As U.S. immigration regulations are complex and change rather frequently, we urge international students and scholars to visit the office and check the Web site for the most recent updates. International graduate students, postdocs, and visiting scholars can get connected with OISS by subscribing to one or both of the OISS e-mail lists. OISS-L is the electronic newsletter with important information for Yale's international community. YaleInternational E-Group is an interactive list through which over 1,000 international students and scholars keep each other informed about events in the area. Check the Web site for more information. To subscribe to either list, send a message to oiss@yale.edu.

Spouses and partners of international students and scholars will want to know about ISPY — International Spouses and Partners at Yale. Information about ISPY and other OISS programs can be found on the OISS Web site.

The Office of International Students and Scholars, located at 246 Church Street, Suite 201, is open Monday through Friday from 8.30 A.M. to 5 P.M.

RESOURCE OFFICE ON DISABILITIES

www.yale.edu/rod/

The Resource Office on Disabilities facilitates accommodations for undergraduate and graduate and professional school students with disabilities who register with and have appropriate documentation on file in the Resource Office. Early planning is critical. Documentation may be submitted to the Resource Office even though a specific accommodation request is not anticipated at the time of registration. It is recommended that matriculating students in need of disability-related accommodations at Yale University contact the Resource Office by June 1. Returning students must contact the Resource Office at the beginning of each term to arrange for course and exam accommodations.

The Resource Office also provides assistance to students with temporary disabilities. General informational inquiries are welcome from students and members of the Yale community and from the public. The mailing address is Resource Office on Disabilities, Yale University, PO Box 208305, New Haven CT 06520-8305. The Resource Office is located in William L. Harkness Hall (WLH), Rooms 102 and 103. Access to the Resource Office is through the College Street entrance to WLH. Office hours are Monday through Friday, 8.30 A.M. to 4.30 P.M. Voice callers may reach staff at 203.432.2324; TTY/TDD callers at 203.432.8250. The Resource Office may also be reached by e-mail (judith.york@yale.edu) or through its Web site.

Life at Yale

THE INTERNATIONAL CENTER OF NEW HAVEN

http://www.oiss.yale.edu/icnh/

Established in 1949, the International Center of New Haven is a nonprofit community-based organization. The Center's programs are based on the idea that both the international community in Greater New Haven and the local community can benefit from each other. The Center is located at 442 Temple Street, and the office is open from 9 A.M. to 4.30 P.M., Monday through Friday. The work of the International Center is carried out by a small professional staff and by many volunteers in the community. The Center organizes lectures, trips, picnics, and special events, as well as English as a Second Language (ESL) classes, in addition to a number of programs including the International Host Friendship Program, 'Round The World Women, and the International Classroom Project. The International House, a large Tudor mansion located at 406 Prospect Street in New Haven, is the venue of most of the International Center's activities and the home of sixteen students and scholars. Rooms are available for the academic year and summer. For more information on any of these programs, or on International House, telephone 203.432.6460, fax 203.432.6462, e-mail international.centernh@yale.edu, or visit the Web site.

RELIGIOUS LIFE AT YALE

The religious resources of Yale University serve all students, faculty, and staff. These resources are the University Chaplaincy (located on the lower level of Bingham Hall on Old Campus); the Church of Christ in Yale University, an open and affirming member congregation of the United Church of Christ; and Yale Religious Ministry, the on-campus association of clergy and nonordained representatives of various religious faiths. The ministry includes the Chapel of St. Thomas More, the parish church for all Roman Catholic students at the University; the Joseph Slifka Center for Jewish Life at Yale, a religious and cultural center for students of the Jewish faith; several Protestant denominational ministries and nondenominational groups; and religious groups such as the Baha'i Association, the New Haven Zen Center, and the Muslim Student Association. Additional information is available at http://www.yale.edu/chaplain/.

CULTURAL OPPORTUNITIES

A calendar listing the broad range of events at the University is issued weekly during the academic year in the *Yale Bulletin & Calendar*. The hours when special exhibitions and the University's permanent collections are open to the public are also recorded in this publication. Free copies of the *Yale Bulletin & Calendar* are available at many locations throughout the campus, and the paper is sent via U.S. Mail to subscribers; for more information, call 203.432.1316. The paper is also available online at http://www.yale.edu/opa/yb&c/index.html.

The Yale Peabody Museum of Natural History contains collections in anthropology, mineralogy, oceanography, paleontology, and geology.

The Yale University Art Gallery contains representative collections of ancient, medieval, and Renaissance art, Near and Far Eastern art, archaeological material from the University's excavations, Pre-Columbian and African art, works of European and American masters from virtually every period, and a rich collection of modern art. The landmark Louis I. Kahn building will be closed for renovation for two years beginning in the summer of 2003.The hub of the museum's activities will be the adjacent Swartwout building, housing Yale's world-renowned collections of American paintings, sculpture, and decorative arts, as well as a selection of masterworks from all other departments.

The Yale Center for British Art houses an extraordinary collection of British paintings, sculpture, drawings, and books given to the University by the late Paul Mellon, Yale Class of 1929 (www.yale.edu/ycba).

There are more than eighty endowed lecture series held at Yale each year on subjects ranging from anatomy to theology, and including virtually all disciplines.

More than four hundred musical events take place at the University during the academic year. These include concerts presented by students and faculty of the School of Music, the Department of Music, the Yale Concert and Jazz bands, the Yale Glee Club, the Yale Symphony Orchestra, and other undergraduate singing and instrumental groups. In addition to graduate recitals and ensemble performances, the School of Music features the Philharmonia Orchestra of Yale, the Chamber Music Society at Yale, the Duke Ellington Series, Great Organ Music at Yale, New Music New Haven, Yale Opera performances and public master classes, and the Faculty Artist Series. Among New Haven's numerous performing organizations are Orchestra New England, the New Haven Chorale, and the New Haven Symphony Orchestra.

For theatergoers, Yale and New Haven offer a wide range of dramatic productions at the University Theatre, Yale Repertory Theatre, Yale Cabaret, Long Wharf Theatre, Palace Theater, and Shubert Performing Arts Center.

ATHLETIC FACILITIES

The Payne Whitney Gymnasium is one of the most elaborate and extensive indoor athletic facilities in the world. This complex includes the 3,100-seat John J. Lee Amphitheater, the site for many indoor varsity sports contests; the Robert J. H. Kiphuth Exhibition Pool; the Brady Squash Center, a world-class facility with fifteen international-style courts; the Adrian C. Israel Fitness Center, a state-of-the-art exercise and weight-training complex; the Brooks-Dwyer Varsity Strength and Conditioning Center; the Colonel William K. Lanman, Jr. Center, a 30,000-square-foot space for recreational/ intramural play and varsity team practice; the Greenberg Brothers Track, an eighth-mile indoor jogging track; and other rooms devoted to fencing, gymnastics, rowing, wrestling, martial arts, general exercise, and dance. Numerous physical education classes in dance, martial arts, aerobic exercise, and sport skills are offered throughout the year. Graduate and professional school students may use the gym at no charge during the academic year and

for a nominal fee during the summer term. Academic and summer memberships at reasonable fees are available for faculty, employees, postdoctoral and visiting fellows, and student spouses.

The David S. Ingalls Rink, the Sailing Center in Branford, the Outdoor Education Center (OEC), the tennis courts, and the golf course are open to faculty, students, and employees of the University at established fees. Ingalls Rink has public skating Monday through Thursday from 11.30 A.M. to 12.45 P.M. and on weekends as the training schedule permits. Up-to-date information on hours is available at 203.432.0875. Skate sharpening is available daily; however, skate rentals are not available.

Approximately thirty-five club sports and outdoor activities come under the jurisdiction of the Office of Outdoor Education and Club Sports. Many of the activities, both purely recreational and instructional, are open to graduate and professional school students. Faculty, staff, and alumni, as well as groups, may use the Outdoor Education Center (OEC). The Center consists of two thousand acres in East Lyme, Connecticut, and includes cabins, campsites, pavilion, dining hall, swimming, boating, canoeing, and picnic groves beside a mile-long lake. Hiking trails surround a wildlife marsh. The OEC season extends from the third weekend in June through Labor Day and September weekends. For more information, telephone 203.432.2492 or visit the Web page at http://yale.edu/athletics/ (click on Sport and Rec, then on Outdoor Education).

Throughout the year, Yale University graduate and professional school students have the opportunity to participate in numerous intramural sports activities. These seasonal, team-oriented activities include volleyball, soccer, and softball in the fall; basketball and volleyball in the winter; softball, soccer, and volleyball in the spring; and softball in the summer. With few exceptions, all academic-year graduate-professional student sports activities are scheduled on weekends, and most sports activities are open to competitive, recreational, and coeducational teams. More information is available from the Intramurals Office in Payne Whitney Gymnasium, 203.432.2487, or at http://www.yale.edu/athletics/.

The Work of Yale University

The work of Yale University is carried on in the following schools:

Yale College: Courses in humanities, social sciences, natural sciences, mathematical and computer sciences, and engineering. Bachelor of Arts (B.A.), Bachelor of Science (B.S.).

For additional information,please write to theOffice of Undergraduate Admissions, YaleUniversity, PO Box208234,NewHaven CT 06520-8234;telephone,203.432.9300;e-mail,undergraduate.admissions@yale.edu; Web site, www.yale.edu/admit/

Graduate School of Arts and Sciences: Courses for college graduates. Master of Arts (M.A.), Master of Engineering (M.Eng.), Master of Science (M.S.), Master of Philosophy (M.Phil.), Doctor of Philosophy (Ph.D.).

For additional information, please write to the Yale Graduate School of Arts and Sciences, PO Box 208323, New Haven CT 06520-8323; telephone, 203.432.2771; e-mail, graduate.admissions@yale.edu; Web site, www.yale.edu/graduateschool/

School of Medicine: Courses for college graduates and students who have completed requisite training in approved institutions. Doctor of Medicine (M.D.). Postgraduate study in the basic sciences and clinical subjects. Combined program with the Graduate School of Arts and Sciences leading to Doctor of Medicine and Doctor of Philosophy (M.D./Ph.D.). Courses in public health for qualified students. Master of Public Health (M.P.H.), Master of Medical Science (M.M.Sc.) from the Physician Associate Program.

For additional information, please write to the Director of Admissions, Office of Admissions, Yale University School of Medicine, 367 Cedar Street, New Haven CT 06510; telephone, 203.785.2643; fax, 203.785.3234; e-mail, medical.admissions@yale.edu; Web site, http://info.med.yale.edu/education/admissions/

For additional information about the Department of Epidemiology and Public Health, an accredited School of Public Health, please write to the Director of Admissions, Yale School of Public Health, PO Box 208034, New Haven CT 06520-8034; e-mail, eph.admissions@yale.edu; Web site, http://publichealth.yale.edu/

Divinity School: Courses for college graduates. Master of Divinity (M.Div.), Master of Arts in Religion (M.A.R.). Individuals with an M.Div. degree may apply for the program leading to the degree of Master of Sacred Theology (S.T.M.).

For additional information, please write to the Admissions Office, Yale Divinity School, 409 Prospect Street, New Haven CT 06511; telephone, 203.432.5360; fax, 203.432.7475; e-mail, ydsadmsn@yale.edu; Web site, www.yale.edu/divinity/

Law School: Courses for college graduates. Juris Doctor (J.D.). For additional information, please write to the Admissions Office, Yale Law School, PO Box 208329, New Haven CT 06520-8329; telephone, 203.432.4995; e-mail, admissions.law@yale.edu; Web site, www.law.yale.edu/

Graduate Programs: Master of Laws (LL.M.), Doctor of the Science of Law (J.S.D.), Master of Studies in Law (M.S.L.). For additional information, please write to Graduate Programs, Yale Law School, PO Box 208215, New Haven CT 06520-8215; telephone, 203.432.1696; e-mail, gradpro.law@yale.edu; Web site, www.law.yale.edu/

School of Art: Professional courses for college and art school graduates. Master of Fine Arts (M.F.A.).

For additional information, please write to the Office of Academic Affairs, Yale University School of Art, PO Box 208339, New Haven CT 06520-8339; telephone, 203.432.2600; e-mail, artschool.info@yale.edu; Web site, www.yale.edu/art/

School of Music: Graduate professional studies in performance, composition, and conducting. Certificate in Performance, Master of Music (M.M.), Master of Musical Arts (M.M.A.), Artist Diploma, Doctor of Musical Arts (D.M.A.).

For additional information, please write to the Yale School of Music, PO Box 208246, New Haven CT 06520-8246; telephone, 203.432.4155; fax, 203.432.7448; e-mail, gradmusic.admissions@yale.edu; Web site, www.yale.edu/schmus/

School of Forestry & Environmental Studies: Courses for college graduates. Master of Forestry (M.F.), Master of Forest Science (M.F.S.), Master of Environmental Science (M.E.Sc.), Master of Environmental Management (M.E.M.), Doctor of Forestry and Environmental Studies (D.F.E.S.).

For additional information, please write to the Office of Academic Services, Yale School of Forestry & Environmental Studies, 205 Prospect Street, New Haven CT 06511; telephone, 800.825.0330 or 203.432.5100; e-mail, fesinfo@yale.edu; Web site, www.yale.edu/environment/

School of Architecture: Courses for college graduates. Professional degree: Master of Architecture (M.Arch.); nonprofessional degree: Master of Environmental Design (M.E.D.).

For additional information, please write to the Yale School of Architecture, PO Box 208242, New Haven CT 06520-8242; telephone, 203.432.2296; e-mail, gradarch.admissions@yale.edu; Web site, www.architecture.yale.edu/

School of Nursing: Courses for college graduates. Master of Science in Nursing (M.S.N.), Post Master's Certificate, Doctor of Nursing Science (D.N.Sc.).

For additional information, please write to the Yale School of Nursing, PO Box 9740, New Haven CT 06536-0740; telephone, 203.785.2389; Web site, www.nursing.yale.edu/

School of Drama: Courses for college graduates and certificate students. Master of Fine Arts (M.F.A.), Certificate in Drama, One-year Technical Internship (Certificate), Doctor of Fine Arts (D.F.A.).

For additional information, please write to the Registrar's Office, Yale School of Drama, PO Box 208325, New Haven CT 06520-8325; telephone, 203.432.1507; Web site, www.yale.edu/drama/

School of Management: Courses for college graduates. Professional degree: Master of Business Administration (M.B.A.).

For additional information, please write to the Admissions Office, Yale School of Management, PO Box 208200, 135 Prospect Street, New Haven CT 06520-8200; telephone, 203.432.5932; fax, 203.432.7004; e-mail, mba.admissions@yale.edu; Web site, www.mba.yale.edu/

Schedule of Academic Dates and Deadlines

FALL TERM 2003

Monday, August 25	New student orientation week begins.
Wednesday, August 27	Matriculation ceremony.
Thursday, August 28	SPEAK test for new international students in Ph.D. programs.
Friday, August 29	Registration and orientation in departments for all new students begins.
Tuesday, September 2	Registration for returning students begins. Orientation for all new teaching fellows.
Wednesday, September 3	Fall-term classes begin, 8.30 A.M.
Friday, September 5	Final day to pick up registration materials from academic departments.
Wednesday, September 17	Fall-term online course selection (OCS) ends. Final day for registration. *A fee of $25 is assessed for course schedules submitted after this date.* Final day to apply for a fall-term *personal leave of absence.* The entire fall-term tuition charge or continuous registration fee (CRF) will be canceled for students who withdraw from the Graduate School on or before this date or who are granted a *personal leave of absence* effective on or before this date.
Friday, September 26	One-half of the fall-term full-tuition charge will be canceled for students who withdraw from the Graduate School on or before this date or who are granted a *medical leave of absence* effective on or before this date (*The CRF is not prorated.*)
Wednesday, October 1	Final date for the faculty to submit grades to replace Temporary Incompletes (TIs) awarded during the 2002 – 2003 academic year. Due date for dissertations to be considered by the degree committees for award of the Ph.D. in December. Final day to file petitions for degrees to be awarded in December.

Friday, October 24	Midterm.
	Final day to add a fall-term course.
	Final day to withdraw from a fall-term course without a fee and without the course appearing on the transcript. *A fee of $25 per course is assessed and a "W" is recorded on the transcript for courses dropped after this date. Please note: Courses may be dropped with the $25 per-course fee through Friday, December 5.*
	Final day to change enrollment in a fall-term course from Credit to Audit *or* from Audit to Credit without a fee. *A fee of $25 per course is assessed for enrollment changes submitted after this date. Please note: Courses may be changed from Credit to Audit or from Audit to Credit through Friday, November 7.*
	One-quarter of the fall-term full-tuition charge will be canceled for students who withdraw from the Graduate School on or before this date or who are granted a *medical leave of absence* effective on or before this date. *The CRF is not prorated.*
Friday, October 31	Readers' reports are due for dissertations to be considered by the degree committees for award of the Ph.D. in December.
Friday, November 7	Departmental recommendations are due for candidates for December degrees.
	Final day to change enrollment in a fall-term course from Credit to Audit *or* from Audit to Credit.
Friday, November 14	Final day to withdraw a degree petition for degrees to be awarded in December.
Thursday, November 20	SPEAK test for international students in Ph.D. programs.
Saturday, November 22	Fall recess begins, 9 P.M.
Monday, December 1	Classes resume, 8.30 A.M.
Friday, December 5	Classes end, 5.20 P.M.
	Final day to withdraw from a fall-term course.
Saturday, December 20	Fall term ends; winter recess begins.

SPRING TERM 2004

Monday, January 12 — Registration and spring ID validation begin.

Spring-term classes begin, 8.30 A.M.

Wednesday, January 14 — Final grades for fall-term courses due.

Friday, January 16 — Friday classes do not meet. Monday classes meet instead.

Monday, January 19 — Martin Luther King Day. Administrative offices closed. Classes do not meet.

Friday, January 23 — Registration and spring ID validation end. Spring-term online course selection (OCS) ends. Final day for registration. *A fee of $25 is assessed for forms submitted after this date.*

Final day to apply for a spring-term *personal leave of absence.*

The entire spring-term tuition charge or CRF will be canceled for students who withdraw from the Graduate School on or before this date or who are granted a *leave of absence* effective on or before this date.

Friday, February 6 — One-half of the spring-term full-tuition charge will be canceled for students who withdraw from the Graduate School on or before this date or who are granted a *medical leave of absence* effective on or before this date. *The CRF is not prorated.*

Friday, March 5 — Midterm.

Spring recess begins, 5.20 P.M.

Final day to add a spring-term course.

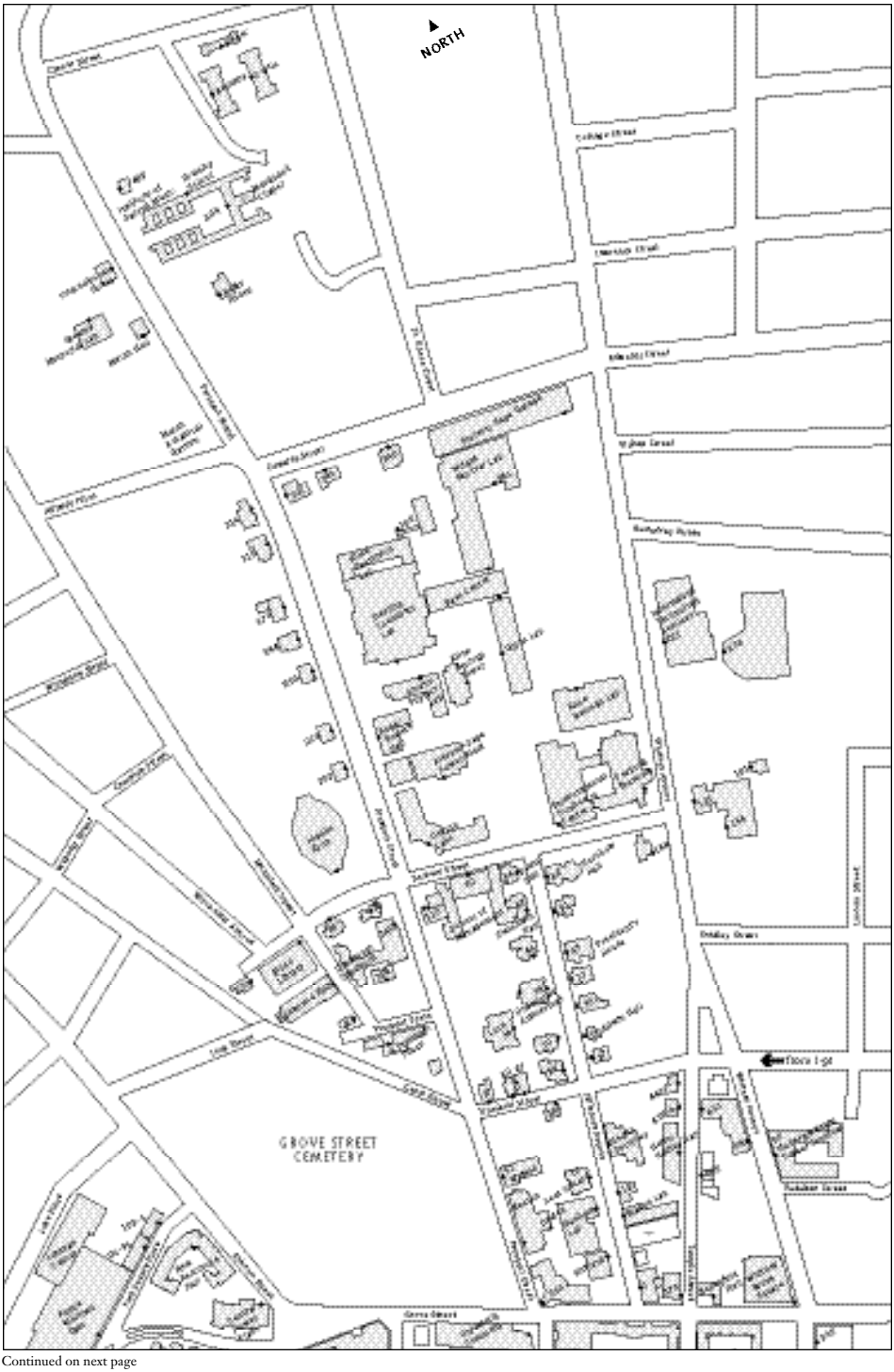
Final day to withdraw from a spring-term course without a fee and without the course appearing on the transcript. *A fee of $25 per course is assessed and a "W" is recorded on the transcript for courses dropped after this date. Please note: Courses may be dropped with the $25 per-course fee through Monday, April 26.*

Final day to change enrollment in a spring-term course from Credit to Audit *or* from Audit to Credit without a fee. *A fee of $25 per course is assessed for enrollment changes submitted after this date. Please note: Courses may be changed from Credit to Audit or from Audit to Credit through Monday, March 29.*

	One-quarter of the spring-term full-tuition charge will be canceled for students who withdraw from the Graduate School on or before this date or who are granted a *medical leave of absence* effective on or before this date. *The CRF is not prorated.*
Monday, March 15	Due date for dissertations to be considered by the degree committees for award of the Ph.D. in May.
	Final day to file petitions for degrees to be awarded in May.
Monday, March 22	Classes resume, 8.30 A.M.
Monday, March 29	Final day to change enrollment in a spring-term course from Credit to Audit *or* from Audit to Credit.
Friday, April 9	Good Friday; *classes meet.*
Thursday, April 15	Readers' reports are due for dissertations to be considered by the degree committees for award of the Ph.D. in May.
Friday, April 23	Departmental recommendations are due for candidates for May degrees.
	SPEAK test for international students in Ph.D. programs.
Monday, April 26	Final day to withdraw from a spring-term course. Monday classes do not meet. Friday classes meet instead. Classes end, 5.20 P.M.
Friday, April 30	Final day to withdraw a degree petition for degrees to be awarded in May.
Tuesday, May 11	Spring term ends.
Friday, May 14	Final grades for spring-term courses are due for candidates for M.A. and M.S. degrees to be awarded at Commencement.
Sunday, May 23	Graduate School Convocation.
Monday, May 24	University Commencement.
Monday, May 31	Final grades for spring-term courses and full-year courses are due.

Index

YALE UNIVERSITY CAMPUS NORTH



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YALE UNIVERSITY CAMPUS SOUTH & YALE MEDICAL CENTER

The University is committed to basing judgments concerning the admission, education, and employment of individuals upon their qualifications and abilities and affirmatively seeks to attract to its faculty, staff, and student body qualified persons of diverse backgrounds. In accordance with this policy and as delineated by federal and Connecticut law, Yale does not discriminate in admissions, educational programs, or employment against any individual on account of that individual's sex, race, color, religion, age, disability, status as a special disabled veteran, veteran of the Vietnam era, or other covered veteran, or national or ethnic origin; nor does Yale discriminate on the basis of sexual orientation.

University policy is committed to affirmative action under law in employment of women, minority group members, individuals with disabilities, special disabled veterans, veterans of the Vietnam era, and other covered veterans.

Inquiries concerning these policies may be referred to Valerie O. Hayes, Director of the Office for Equal Opportunity Programs, 104 W. L. Harkness Hall, 203.432.0849.

In accordance with both federal and state law, the University maintains information concerning current security policies and procedures and prepares an annual crime report concerning crimes committed within the geographical limits of the University. Upon request to the Office of the Secretary of the University, PO Box 208230, New Haven CT 06520-8230, 203.432.2310, the University will provide such information to any applicant for admission.

In accordance with federal law, the University prepares an annual report on participation rates, financial support, and other information regarding men's and women's intercollegiate athletic programs. Upon request to the Director of Athletics, PO Box 208216, New Haven CT 06520-8216, 203.432.1414, the University will provide its annual report to any student or prospective student.

Offices Serving Graduate Students

POLICE EMERGENCY: Dial 111 from any University telephone

HEALTH EMERGENCY: 432.0123

GRADUATE HOUSING OFFICE: 432.2167
420 Temple Street (Information about all housing for graduate students)

GRADUATE-PROFESSIONAL STUDENT CENTER: 432.2638
204 York Street (GYPSY bar; social activities)

GRADUATE-PROFESSIONAL STUDENT SENATE: 432.2632
204 York Street (Forum for discussion and representation of graduate and professional student concerns.)

GRADUATE STUDENT ASSEMBLY: 432.8893; www.yale.edu/assembly

GRADUATE STUDENT DOSSIER SERVICE: 432.8850
320 York Street (Maintains dossier files.)

INTERNATIONAL CENTER: 432.6460
442 Temple Street (An educational and social center serving all international students, faculty, and staff.)

OFFICE OF INTERNATIONAL STUDENTS AND SCHOLARS: 432.2305
246 Church Street (Assists all international students and scholars with immigration matters.)

OFFICE OF STUDENT FINANCIAL SERVICES: 432.2700
246 Church Street (Processes bills for tuition and other fees, disburses loans administered by the Graduate School.)

PAYROLL DEPARTMENT: 432.5408
155 Whitney Avenue (Disburses fellowship, traineeship, and assistantship stipends.)

STUDENT EMPLOYMENT OFFICE: 432.0167
246 Church Street (Assists students in obtaining part-time employment both inside and outside the University.)

STUDENT LOAN OFFICE: 432.2727
246 Church Street (Processes federal loans authorized by the Graduate School Financial Aid Office. Handles questions about repayment of student loans.)

UNIVERSITY HEALTH SERVICE: 432.0246 [urgent visit: 432.0123]
17 Hillhouse Avenue (Concerned with all health problems of member students and dependents. 24-hour coverage for emergency problems is available throughout the calendar year.)

UNIVERSITY POLICE: 432.4400
Phelps Gateway, Old Campus (Any student arrested by the New Haven Police Department for other than minor traffic violation should immediately contact the Chief of the University Police Dept. at 432.4407.)

BULLETIN OF YALE UNIVERSITY
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