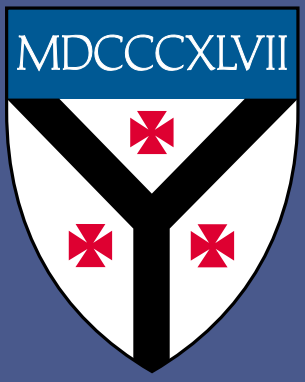
Graduate School of Arts and Sciences

Programs and Policies

2001 – 2002



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Series 97 Number 10 August 20, 2001

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BULLETIN OF YALE UNIVERSITY
Series 97 Number 10 August 20, 2001

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

Fellows
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Her Honor the Lieutenant Governor of Connecticut, *ex officio*.
George Leonard Baker, Jr., B.A., M.B.A., *Palo Alto, California.*
Roland Whitney Betts, B.A., J.D., *New York, New York (June 2005).*
Benjamin Solomon Carson, Sr., B.A., M.D., *West Friendship, Maryland (June 2003).*
Gerhard Casper, LL.M., PH.D., *Atherton, California.*
Susan Crown, B.A., M.A., *Chicago, Illinois.*
Charles Daniel Ellis, B.A., M.B.A., PH.D., *Greenwich, Connecticut.*
David Richmond Gergen, B.A., LL.B., *McLean, Virginia (June 2002).*
Holcombe Turner Green, Jr., B.A., LL.B., *Atlanta, Georgia.*
Linda Anne Mason, B.A., M.B.A., *Belmont, Massachusetts (June 2004).*
The Rt. Rev. Victoria Matthews, B.A., M.DIV., *Edmonton, Alberta, Canada.*
Barrington Daniel Parker, Jr., B.A., LL.B., *Stamford, Connecticut.*
John Ennis Pepper, Jr., B.A., M.A., *Cincinnati, Ohio.*
Kurt Lidell Schmoke, B.A., J.D., *Baltimore, Maryland.*
Theodore Ping Shen, B.A., M.B.A., *Brooklyn, New York (June 2007).*
Janet Louise Yellen, B.A., PH.D., *Berkeley, California (June 2006).*

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The Administration of the Graduate School

Susan Hockfield, PH.D., *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*
Diana Cordova, PH.D., *Assistant 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*

Lisa Brandes, PH.D., *Director, Student Life, McDougal Graduate Student Center*
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TBA, *Deputy Registrar, Faculty of Arts and Sciences*
Alice Oliver, *Director, Finance and Administration*
William C. Rando, PH.D., *Director, Teaching Fellow Preparation and Development*
Jamie Mowat Young, M.A.R., *Director of Admissions*

Calendar

FALL 2001

August 27	Monday	New student orientation week begins
August 28	Tuesday	Orientation for new international students begins
August 29	Wednesday	Matriculation ceremony
August 31	Friday	Registration and orientation in departments for *all* new students begins
September 4	Tuesday	Registration and fall ID validation for returning students begins
September 5	*Wednesday*	*Fall-term classes begin, 8.30 A.M.*
September 19	Wednesday	Registration ends, 4.30 P.M.
October 26	Friday	Midterm
November 17	Saturday	Fall recess begins, 9.00 P.M.
November 26	Monday	Classes resume, 8.30 A.M.
December 22	*Saturday*	*Fall term ends*
		Winter recess begins, 5.20 P.M.

SPRING 2002

January 14	Monday	Spring-term registration begins
		Spring-term classes begin, 8.30 A.M.
March 8	Friday	Midterm
		Spring recess begins, 5.20 P.M.
March 25	Monday	Classes resume, 8.30 A.M.
May 14	*Tuesday*	*Spring term ends*
May 26	Sunday	Graduate School Convocation
May 27	Monday	University Commencement

A Message from the Dean

Graduate education offers challenges and rewards that differ from those of undergraduate study. The goal of graduate education is to prepare a scholar to contribute to the advancement of human knowledge. A graduate student will explore one field in depth, will gain mastery of a specialized subject matter, and will learn to communicate knowledge in the classroom.To study a subject in depth in the free and open environment of a great university is an exhilarating opportunity. Each department and graduate program at Yale has its own community of scholars — distinguished faculty and talented students — who share a common interest in learning about a particular discipline. These discipline-based communities are enriched by the range of scholarly activity throughout the University. Our students gain immeasurably from working with the faculty and from interacting with their fellow students. Their education is facilitated by Yale's laboratories and the rich resources of its library and museum collections.

Graduate study at Yale University prepares students for careers in teaching and research, and for a wide variety of leadership positions. The contours of graduate education at Yale have changed over the years as intellectual inquiry has evolved. New disciplines have formed, traditional disciplines have taken on new life, and the knowledge base in all fields has grown rapidly. In recent years, new departments and programs have been established, and the Graduate School has continued to refine and improve degree programs in all areas.

This book, *Programs and Policies,* describes all the graduate programs currently available at Yale. It also contains practical information about registration and financial aid, and the full range of services available to our students. I encourage you to use this book as a guide to the activities of the Graduate School. Please never hesitate to contact the staff of the Graduate School with any questions you may have. All of us wish you fulfillment and success in your chosen programs of study.

Susan Hockfield

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, and Master of Science. 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-three departments and programs, fifty-seven of which offer courses of study leading to the Ph.D. degree. There are currently 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 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 550 students.

The Graduate School prepares students for careers 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 provide the link between undergraduates and the faculty. It is this shared sense of common purpose that makes Yale a community of scholars, and a place in which an unusually intimate exchange of ideas takes place.

RESOURCES FOR RESEARCH AND STUDY

Yale's outstanding facilities for research and study include a university library system of more than ten 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 other 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, the Kline Geology Laboratory, the Sterling Chemistry Laboratory, the fourteen-story Kline Biology Tower, the Becton Engineering and Applied 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 biomedical science laboratories in the Sterling Hall of Medicine.

THE DEAN

Susan Hockfield, 112 HGS, 432.2733, susan.hockfield@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:

Pamela Schirmeister, 2681 HGS, 432.7598, pamela.schirmeister@yale.edu
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; Economics; English Language and Literature; 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, 2678 HGS, 432.2744, richard.sleight@yale.edu
Ph.D. and terminal master's programs in Anthropology; Applied Mathematics; Astronomy; Biological and Biomedical Sciences; Biostatistics; Cell Biology; Cellular and Molecular Physiology; Chemistry; Computer Science; Ecology and Evolutionary Biology; Engineering and Applied Science (Applied Physics, Chemical Engineering, Electrical 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; Pathology; Pharmacology; Physics; Psychology; and Statistics

THE ASSISTANT DEANS

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

Diana Cordova, Assistant Dean, Humanities and Social Sciences, 2682 HGS, 436.2628, diana.cordova@yale.edu

Thomas Burns, Assistant Dean, Sciences, 2675 HGS, 432.1884, thomas.burns@yale.edu

Liza Cariaga-Lo, Assistant Dean, Director, Office for Diversity and Equal Opportunity, 2678 HGS, 436.1301, liza.cariaga-lo@yale.edu

OFFICE FOR DIVERSITY AND EQUAL OPPORTUNITY

Liza Cariaga-Lo, Assistant Dean, Director, 2678 HGS, 436.1301, liza.cariaga-lo@yale.edu

The Office for Diversity and Equal Opportunity works to expand the diversity within the student body and to enhance the intellectual experience of the entire scholarly community. The office focuses and 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, 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.

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.

TEACHING

The Teaching Fellow Program

Judith Dozier Hackman, Director, 130 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, 432.2583
www.yale.edu/graduateschool/mcdougal/

Facilities and Services

A generous gift from Mr. Alfred McDougal, a Yale alumnus, and his wife, Ms. Nancy Lauter, enabled Yale in 1997 to create the McDougal Graduate Student Center. 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 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 a large program room, 119 HGS, meeting rooms, a recreation room, an ITS student computing cluster with printer and copier, telephones, information kiosks, lockers, and vending machines, and the Resource Library. The center also has offices for the McDougal Fellows and Working at Teaching graduate student staff, the Graduate Student Assembly, as well as the directors and staff of Student Life, Graduate Career Services, and Teaching Fellow Preparation and Development, 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.

Office of Student Life

Lisa Brandes, Director
HGS 123, 432.2583
mcdougal.center@yale.edu
www.yale.edu/graduateschool/mcdougal/student_affairs/index.html

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

The Office of 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.

Office of Teaching Fellow Preparation and Development

William C. Rando, Director, 125 HGS, 432.2583, william.rando@yale.edu
www.yale.edu/graduateschool/mcdougal/tfpd/

The Office of Teaching Fellow Preparation and Development enhances the preparation of Yale graduate students for their current and future teaching responsibilities. The director collaborates with academic departments to expand the guidance and pedagogical training they provide to teaching fellows in their disciplines; organizes programs for graduate student teachers at the McDougal Center; advises Working at Teaching, a teacher preparation program led by graduate students; and provides one-on-one consultation and classroom observations for teaching fellows and other members of the Yale community.

Office of Graduate Career Services

Mary Johnson, Director, 124 HGS, 432.2583, graduate.career.services@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 semester, 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

120 HGS, McDougal Center, 432.8850, fax 432.8356, graduate.career.services@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

120A HGS, McDougal Center
www.yale.edu/graduateschool/mcdougal/resource.html

The Resource Library, a self-service facility, assists graduate students, postdoctoral appointees, and faculty in finding fellowships, research and travel funding, and information on teaching, careers, writing, 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, 129 HGS, 432.2739, alice.oliver@yale.edu
www.yale.edu/graduateschool/financial/

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

Jamie Young, Director, 105 HGS, 203.432.2773, jamie.young@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

TBA, Deputy Registrar, 141 HGS, 432.2743
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 respectively 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 374–75).

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 374–75).

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 373–74).

GRADUATE STUDENT ASSEMBLY

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. Each listing provides a roster of faculty, special admissions and degree requirements for that department or program, and the courses offered in 2001–2002. 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 357–66. 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 *2001 Fall Term Course Offerings,* or the individual departments or programs.

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
Hazel Carby

Director of Graduate Studies
Paul Gilroy [F] (493 College, paul.gilroy@yale.edu)
Christopher L. Miller [Sp] (493 College, christopher.miller@yale.edu)

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

Associate Professors
Elizabeth Alexander, Serene Jones, David Krasner, Patricia Pessar

Assistant Professors
Jennifer Baszile, Alicia Schmidt Camacho, Kamari Clarke, Nadine George, Jonathan Holloway, Kellie Jones, Diana Paulin, Michael Veal

Lecturers
Flemming Norcott, 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, Italian Language and Literature, 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

A writing sample of reasonable length should accompany the application and should describe the fields of interest that would be pursued in a combined degree. Applicants *must* specify African American Studies as their proposed department/field of study along with a participating department or program in their application (see *Fields of Study*).

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 States in the Late Twentieth Century (AFAM 505a), which is a required course for all *first-year* graduate students in the combined program; (2) Readings in Twentieth-Century American Political and Social History (AFAM 706a/AMST 714a/HIST 735a) and/or Readings in African American History since 1895 (AFAM 710b/AMST 742b/HIST 740b); (3) Transnationalism, Modernity, and Diaspora (AFAM 573a/ANTH 595a) and/or Recasting Gender: Religion, Science, and the Body (AFAM 683b/ANTH 596b); (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.

Master's Degrees

M.Phil. See Graduate School requirements, page 361.

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 357–66.

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. Hazel Carby.
M 1.30–3.20
A designated core course for students in the joint Ph.D. program; also open to students in American Studies. The interdisciplinary seminar includes readings from the fields of anthropology, critical legal studies, cultural studies, literary history, history, politics, and sociology. *Also AMST 643a.*

[**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. John Szwed.
T 1.30–3.20
An overview of the music and its cultural history, with consideration of the influence of jazz on the visual arts, dance, literature, and film; an introduction to the scholarship and methods of jazz studies. *Also AMST 703a[u], ANTH 681a[u].*

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

AFAM 563a, Ralph Ellison in Context. Robert Stepto.
TH 10.30–12.20
This seminar pursues close readings of Ralph Ellison's essays, short fiction, and novels, *Invisible Man* and *Juneteenth*. The "in context" component of the seminar involves working from

the Benston and Sundquist volumes on Ellison investigated, with at least Richard Wright, James Baldwin, and Romare Bearden also in view. The texts include Ellison, *The Collected Essays, Flying Home and Other Stories, Invisible Man, Juneteenth;* K. Benston, *Speaking for You;* E. Sundquist, *Cultural Contexts for Ralph Ellison's Invisible Man*; A. Nadel, *Invisible Criticism: Ralph Ellison and the American Canon*. This course is open to senior majors. *Also AMST 921a, ENGL 921a.*

[**AFAM 568b, Modern American Literature: Race and Nationality.**]

AFAM 573a, Transnationalism, Modernity, and Diaspora. Kamari Clarke.
W 2.30–4.20
As anthropologists continue to grapple with changing notions of "the field" from local to global, this course covers recent and emerging scholarship that explores theoretical problems of modernity, transnationalism, and diaspora in specific historical and ethnographic context. Drawing on a range of ideas from world systems theories of globalization and notions of the invention of diasporas, to postmodern ideas of social constructions, the emphasis is on the interrelations between local and global cultural processes. These processes disrupt the once-homogenizing tendencies of ethnography and instead push us to examine different criteria for analyzing and constructing communities. *Also ANTH 595a.*

AFAM 588b[u], Autobiography in America. Robert Stepto.
M 1.30–3.20
At least a dozen North American autobiographies are studied, mostly from the "American Renaissance" to the present. Discussion of various autobiographical forms and strategies as well as of various experiences of American selfhood and citizenship. Slave narratives, spiritual autobiographies, immigrant narratives, autobiographies of childhood or adolescence, relations between autobiography and class, region, or occupation. *Also AMST 710b[u], ENGL 948b[u].*

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

AFAM 595a, Problems in the Study of African American Literature. Elizabeth Alexander.
W 1.30–3.20
A consideration of critical problems such as: slave narratives as literary texts; dialect, folklore, and the vernacular; genre definition and practice; women writers and canon definition; points of contact between African American and American letters. Includes African American literature before 1900. Literary and visual material. *Also AMST 640a, ENGL 940a.*

AFAM 596a[u], Twentieth-Century African American Poetry. Robert Stepto.
T 1.30–3.20
The Afro-American practice of poetry between 1900 and 1960. Poets include Paul Laurence Dunbar, Langston Hughes, Sterling Brown, Gwendolyn Brooks, Margaret Walker, Robert Hayden. *Also AMST 641a.*

AFAM 632b, Race and Memory. Alicia Schmidt Camacho.
Th 1.30–3.20
A seminar in critical theory and methods for studying social movements and popular, vernacular cultures. Issues of modernity and "development," racialization, class formation, sexual and gender difference in the Americas through readings in subaltern studies, postcolonial theory, and ethnic studies. The course pairs primary texts with secondary, critical texts. We address the evocations of collective, popular memory by communities to recall or contest the condition of subaltern status. The course focuses on the Americas and U.S. imperial projects dating from the nineteenth century to the current moment. *Also AMST 644b.*

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

M 2.30–4.20

Explores social transition in various countries in Sub-Saharan Africa. In understanding the tensions between tradition and modernity, the crises of underdevelopment, and the role of cultural brokers I contributing to the globalization of various African cultural practices, we examine the ways in which various modes of popular culture reflect and shape new social phenomena. *Also ANTH 542b[u].*

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

AFAM 682a[u], Race, Class, and Public Policy. Dalton Conley.

T 2.30–4.20

An investigation into the state of black-white inequality since the 1960s. This research seminar addresses theories of race; the role of societal institutions in perpetuating or ameliorating racial inequality; the race-class debate; the issues of affirmative action and social policy. *Also SOCY 652a[u].*

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

W 2.30–4.20

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. *Also ANTH 596b[u].*

AFAM 687a, Race and Races in American Studies. Matthew Jacobson.

F 1.30–3.20

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 706a, Readings in Twentieth-Century American Political and Social History. Glenda Gilmore.

Th 10.30–12.20

Recent trends in American political history from the 1800s, with an emphasis on the social analysis of mass politics and reform. *Also AMST 714a, HIST 735a.*

AFAM 709b, Research in Twentieth-Century American Political and Social History. Glenda Gilmore.

W 10.30–12.20

Projects chosen from the post-Civil War period, with emphasis on twentieth-century social and political history, broadly defined. Research seminar. *Also AMST 709b, HIST 736b.*

[**AFAM 710b, Readings in African American History since 1895.**]

[**AFAM 712b, Modernity and Its Others: Self, Subject, and Cultural Differences.**]

AFAM 715b[u], Black Communities in the Twentieth Century. Derrick Gilbert.
T 2.30–4.20
A review of historical and contemporary issues confronting urban black communities in twentieth-century America. Using ethnographic studies, an exploration of the social, economic, political, and cultural history of the black experience within the context of community. *Also SOCY 615b[u].*

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 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 or 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 HSAR 781a or b.*

AFAM 746a, Race and Representation in U.S. Literature and Culture. Diana Paulin, Sanda Lwin.
Th 3.30–5.20
This seminar introduces theories of difference through the lens of Asian American and African American literary and cultural productions. We draw from theoretical readings in fields such as gender studies, performance/theater studies, postcolonial studies, and legal studies. This comparative approach aims to interrogate conventional black/white paradigms that tend to dominate inquiries on race in American Studies. By reading foundational texts in critical theory alongside theories of difference, we look at subject formation in relation to the intersecting categories of race, national, gender, sexuality, and class. Topics to be considered

may include racial/sexual minorities, history and memory, alliances across racial and national boundaries, and the politics of inclusion/exclusion. *Also AMST 672a, ENGL 942a.*

[**AFAM 756a, Imperialism and Identity in Early North America.**]

AFAM 758b, Readings in African American History to Emancipation. Jennifer Baszile.
W 3.30–5.20
This seminar surveys classic and recent scholarship on the African diaspora in North America. Topics include regional and temporal varieties of slavery and freedom, gender, religion, race, work, resistance, and emancipation. Attention is given to urban and rural communities. *Also AMST 706b, HIST 708b.*

AFAM 759b, Magic Realism in the Americas. Vera Kutzinski.
M 10.30–12.20
This seminar focuses on remappings of the subject within twentieth-century counterrealist writing from different parts of the Americas. Authors include Isabel Allende, Robert Antoni, Erna Brodber, Alejo Carpentier, William Faulkner, Janet Frame, Gabriel García Márquez, Toni Morrison, Wilson Harris, Pauline Melville, Juan Rulfo, and Lawrence Scott. *Also AMST 767b, CPLT 854b, ENGL 922b.*

AFAM 768b, Issues in Performance Art. Kellie Jones.
T 1.30–3.20
Wedged between the rudiments of theater and the gestures of visual art, performance art came to prominence at the end of the twentieth century. This course concentrates on artists and practices after 1960. However, we also consider the roots of this form in the first part of the twentieth century as well as in earlier periods. Central to our investigations are discussions surrounding performance as catalytic process, as temporal art, and issues of the body as form. African American performance art is the focus for the semester. *Also HSAR 696b.*

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

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

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

AFAM 854b, The French Atlantic Triangle and the Literature of the Slave Trade. Christopher L. Miller.
Th 10.30–12.20
An analysis of the Atlantic world that was created by the slave trade, in its French version, as seen through history, philosophy, and literature from the eighteenth through the twentieth century. Readings from Voltaire, the journal of a slave-trading sailor, Rousseau, Madame de Duras, Baron Roger, Mérimée, Sue, Césaire, Sembene, T. Mandeleau. In English. *Also AFST 739b, CPLT 723b, FREN 939b.*

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
Christopher Udry (*Economics*)

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

Professors
Lea Brilmayer (*Law School*), Hazel Carby (*African American Studies*), Robert Evenson (*Economics*), Owen Fiss (*Law School*), William Foltz (*Political Science*), Dimitri Gutas (*Near Eastern Languages & Civilizations*), Robert Harms (*History*), Andrew Hill (*Anthropology*), Christopher L. Miller (*French; African American Studies*), Curtis Patton (*Epidemiology*), Gustav Ranis (*Economics*), Lamin Sanneh (*History; Divinity School*), Ian Shapiro (*Political Science*), William Simpson (*Arabic; Near Eastern Languages & Civilizations*), John Szwed, Robert Thompson (*History of Art*), Christopher Udry (*Economics*), Robin Winks (*History*)

Associate Professors
Ann Biersteker (*Linguistics*), Ahmad Dallal (*Arabic; Near Eastern Languages & Civilizations*), David Watts (*Anthropology*), Eric Worby (*Anthropology*)

Assistant Professors
David Graeber (*Anthropology*), Lawrence King (*Sociology*), Michael Mahoney (*History*), Michael Veal (*Music*), Leonard Wantchekon (*Political Science; Economic Growth Center*)

Lecturers
Maxwell Amoh (*Outreach Coordinator*), Anne-Marie Foltz (*Epidemiology & Public Health*), Bassam Frangieh (*Near Eastern Languages & Civilizations*), Peter Marris (*Sociology*), Sandra Sanneh (*African Languages*), Gerald Thomas (*African American Studies; History*), John Wa'Njogu (*African Languages*)

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 200,000 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 is intended for students who will later continue in a Ph.D. program, 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 to 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.
This course considers disciplinary and interdisciplinary research methodologies in African studies. The central focus of the course is on field methods and archival research in the social sciences and humanities. Topics considered 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 541a, Comparative Perspectives on African Literatures.**]

AFST 598u, Introduction to an African Language. Sandra Sanneh and staff.
First-year instruction in an African language other than those regularly offered, through a totally oral approach, with emphasis on oral fluency.

AFST 600u, Elementary Kiswahili. John Wa'Njogu.
Beginning course, with emphasis on spoken language and conversational skills. Basic grammar, vocabulary, and cultural skills learned gradually through practice in speaking, listening, reading, and writing.

AFST 601u, Intermediate Kiswahili. John Wa'Njogu.
Training in speaking, reading, writing, and comprehending the language.

AFST 603u, Advanced Kiswahili. John Wa'Njogu.
Reading in literature and modern expository writing, as well as continued practice of spoken Kiswahili.

AFST 604a or b, Topics in Kiswahili Literature. Ann Biersteker.
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.

AFST 610u, Elementary Yoruba. Staff.
Beginning course, with emphasis on spoken language and conversational skills. Basic grammar, vocabulary, and cultural skills learned gradually through practice in speaking, listening, reading, and writing.

AFST 611u, Intermediate Yoruba. Staff.
Training in speaking, reading, writing, and comprehending the language.

AFST 612u, Advanced Yoruba. Staff.
Reading in literature and modern expository writing, as well as continued practice in spoken Yoruba.

AFST 614u, Elementary Zulu. Sandra Sanneh.
Beginning course, with emphasis on spoken language and conversational skills. Basic grammar, vocabulary, and cultural skills learned gradually through practice in speaking, listening, reading, and writing.

AFST 615u, Intermediate Zulu. Sandra Sanneh.
Training in speaking, reading, writing, and comprehending the language.

AFST 616u, Advanced Zulu. Sandra Sanneh.
An advanced language course intended to improve the student's aural and written comprehension, as well as speaking and writing skills. Emphasis on acquiring a command of idiomatic usage and stylistic nuance.

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 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 674a[u], Africa in the International Arena. William Foltz.
W 1.30–3.20
This research seminar investigates the roles Africa and individual African states play and have played in world affairs. Emphasis is placed on the post-World War II era, and particularly the period since 1960, but students may center their research on earlier times if that would help illuminate recent trends. Broad topics include relations among African states; regional and subregional organization; conflict and peace keeping; policies of outside powers toward Africa; the Cold War and its aftermath. *Also PLSC 674a[u].*

[**AFST 684b, The Ritualization of Power in Africa.**]

[**AFST 711a, Culture and Power in West Africa.**]

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. A good reading knowledge of French is essential. *Also PLSC 717b[u].*

AFST 739b, The French Atlantic Triangle and the Literature of the Slave Trade. Christopher L. Miller.
Th 10.30–12.20
An analysis of the Atlantic world that was created by the slave trade, in its French version, as seen through history, philosophy, and literature from the eighteenth through the twentieth century. Readings from Voltaire, the journal of a slave-trading sailor, Rousseau, Madame de Duras, Baron Roger, Mérimée, Sue, Césaire, Sembene, T. Mandeleau. In English. *Also AFAM 854b, CPLT 723b, FREN 939b.*

AFST 764a[u], Africa and the Disciplines. Christopher L. Miller, William Foltz.
T 1.30–3.20
The seminar is designed to introduce students to the study of Africa. The main emphasis is on how each discipline reconceptualizes the field and also on the ways in which each discipline draws from others in the process. The course combines basic information with some of the dominant and changing ideas embodied in each of the major disciplines represented. *Also PLSC 784a[u].*

AFST 839b, Environmental History of Africa. Robert Harms.
W 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 843b, Ethnicity and Tradition in African History.**]

AFST 844a, Memory and Orality in African History. Michael Mahoney.
Th 1.30–3.20
Introduces students to oral research methodology, as well as to particular debates about that methodology within African historiography. Discussion also focuses on memory and popular historical understanding and how this non-guild historiography interacts with what academics do. *Also HIST 844a.*

[**AFST 849b, African Historiography: The Agrarian History of Africa.**]

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. (Note: defense of thesis proposal required at end of program's third term.)

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

Director of Graduate Studies
John Mack Faragher (230 HGS, john.faragher@yale.edu)

Professors
Jean-Christophe Agnew, Richard Brodhead, Jon Butler, Hazel Carby, Edward Cooke, Jr., Nancy Cott, Michael Denning, Wai Chee Dimock, Kai Erikson, John Mack Faragher, Glenda Gilmore, Dolores Hayden, Matthew Jacobson, Vera Kutzinski, Charles Musser, Alexander Nemerov, Michael Roemer (*Adjunct*), Stephen Skowronek, Robert Stepto, Harry Stout, John Szwed, Alan Trachtenberg, John Harley Warner, Bryan Wolf

Associate Professors
Kathryn Dudley, Joshua Gamson, Matthew Frye Jacobson, Thomas Otten, Patricia Pessar (*Adjunct*), Jace Weaver, Laura Wexler

Assistant Professors
Elizabeth Dillon, Jonathan Holloway, Amy Hungerford, Guillermo Irizarry, Robert Johnston, Mary Lui, Sanda Lwin, Diana Paulin, Stephen Pitti, Alicia Schmidt Camacho, Steven Stoll, Willie Strong, Michael Trask, 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, one each year a designated "core" course. 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 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. upon completion of all predissertation requirements, including the prospectus.

Combined Ph.D. Program: American Studies/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.

Master's Degrees

M.Phil. See Graduate School requirements, page 361.

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 606a, The Figure of "The Indian" in American Literature and Culture. Alan Trachtenberg.

T 1.30–3.20

The seminar examines interpretations of the native peoples of North America in writing, thought, art, and popular culture in the United States from the seventeenth to the early twentieth century. Against a background of the history of contact and conflict between European Americans and Indians, the class considers how changing conceptions and images of native peoples have played a formative role in the making of an "American" literary tradition. Reading and discussion, and research in Beinecke collections. *Also ENGL 899a.*

AMST 640a, Problems in the Study of African American Literature. Elizabeth Alexander.

W 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 595a, ENGL 940a.*

AMST 641a, Twentieth-Century African American Poetry. Robert Stepto.
T 1.30–3.20
The Afro-American practice of poetry between 1900 and 1960. Poets include Paul Laurence Dunbar, Langston Hughes, Sterling Brown, Gwendolyn Brooks, Margaret Walker, Robert Hayden. *Also AFAM 596a*[u].

AMST 643a, Theorizing the Racial Formation of the United States in the Late Twentieth Century. Hazel Carby.
M 1.30–3.20
This interdisciplinary seminar includes readings from the fields of anthropology, critical legal studies, cultural studies, literary history, history, politics, and sociology. *Also AFAM 505a.*

AMST 644b, Race and Memory. Alicia Schmidt Camacho.
Th 1.30–3.20
A seminar in critical theory and methods for studying social movements and popular, vernacular cultures. Issues of modernity and "development," racialization, class formation, sexual and gender difference in the Americas through readings in subaltern studies, postcolonial theory, and ethnic studies. The course pairs primary texts with secondary, critical texts. We address the evocations of collective, popular memory by communities to recall or contest the condition of subaltern status. The course focuses on the Americas and U.S. imperial projects dating from the nineteenth century to the current moment. *Also AFAM 632b.*

AMST 652b, Research Seminar in Twentieth-Century U.S. Cultural Studies and Cultural History. Michael Denning.
W 1.30–3.20
Seminar members develop and present a substantial essay in twentieth-century U.S. cultural studies or cultural history. Readings are drawn from contemporary scholarship in fields seminar members are researching; particular attention is paid to the forms of cultural studies writing and the relation between textual interpretation, historical narrative, and archival research.

AMST 663a, Problems in Nineteenth-Century American Literature. Wai Chee Dimock.
W 10.30–3.20
This course, a broad survey of nineteenth-century American literature, is also an introduction to the vocabularies and strategies of reading. Focusing on the phenomenal world of each text as a linguistic construct, we examine its constellation of words through a variety of critical lenses, from racial and gender politics to narrative form, semantic resonances, and literary genealogies. Works by Emerson, Melville, Stowe, Douglass, Hawthorne, Whitman, James, Twain, Wharton. Each primary text is read in conjunction with at least one critical essay. *Also ENGL 851a.*

AMST 672a, Race and Representation in U.S. Literature and Culture. Diana Paulin, Sanda Lwin.
Th 3.30–5.20
This seminar introduces theories of difference through the lens of Asian American and African American literary and cultural productions. We draw form theoretical readings in fields such as gender studies, performance/theater studies, postcolonial studies, and legal studies. This comparative approach interrogates conventional black/white paradigms that tend to dominate inquiries on race in American Studies. By reading foundational texts in critical theory alongside theories of difference, we look at subject formation in relation to the intersecting categories of race, national, gender, sexuality, and class. Topics considered may include racial/sexual minorities, history and memory, alliances across racial and national boundaries, and the politics of inclusion/exclusion. *Also AFAM 746a, ENGL 942a.*

AMST 680a[u], Reading Race and Gender. Vron Ware.
W 1.30–3.20
An exploration of feminist writing that demonstrates how race and gender are constituent of each other. Comparative examples from the United States, the United Kingdom, and South Africa. Themes include: theories of race and gender formation; gender and white supremacism; sex and race; and class, ethnicity, and domestic service. *Also SOCY 528a[u].*

AMST 700a, Introduction to the Historiography of the United States. Nancy Cott.
T 12.30–4
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.
F 1.30–3.20
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 703a[u], Introduction to Jazz Studies. John Szwed.
T 1.30–3.20
An overview of the music and its cultural history, with consideration of the influence of jazz on the visual arts, dance, literature, and film; an introduction to the scholarship and methods of jazz studies. *Also AFAM 557a[u], ANTH 681a[u].*

AMST 704a, Religion and Modernity in Europe and America, 1850-2000. Jon Butler.
T 10.30–12.20
Examines the confrontation of religion with the modern in both Europe and America from the mid-nineteenth century to the present. Readings concentrate on the meaning of modernity for religious belief and practice and on the implications of urbanization, industrialization, and the rise of technocratic society for sustaining religious faith. Among issues concerned are the fate of miracles, religion and modern politics, ethnicity, gender, "therapeutic" religion, and religion's apparent persistence despite the advance of secularization, at least in America, and its potential to assess the alleged uniqueness of "modernity." *Also HIST 750a, RLST 523a.*

AMST 706b, Readings in African American History to Emancipation. Jennifer Baszile.
W 3.30–5.20
This seminar surveys classic and recent scholarship on the African diaspora in North America. Topics include regional and temporary varieties of slavery and freedom, gender, religion, race, work, resistance, and emancipation. Attention to urban and rural communities. *Also AFAM 758b, HIST 708b.*

AMST 709b, Research in Twentieth-Century American Political and Social History. Glenda Gilmore.
W 10.30–12.20
Projects chosen from the post-Civil War period, with emphasis on twentieth-century social and political history, broadly defined. Research seminar. *Also AFAM 709b, HIST 736b.*

AMST 710b[u], Autobiography in America. Robert Stepto.
M 1.30–3.20
At least a dozen North American autobiographies, mostly from the "American Renaissance" to the present, studied. Discussion of various autobiographical forms and strategies as well as of various experiences of American selfhood and citizenship. Slave narratives, spiritual autobiographies, immigrant narratives, autobiographies of childhood or adolescence, relations between autobiography and class, region, or occupation. *Also AFAM 588b[u], ENGL 948b[u].*

AMST 714a, Readings in Twentieth-Century American Political and Social History. Glenda Gilmore.
Th 10.30–12.20
Recent trends in American political history from the 1800s, with an emphasis on the social analysis of mass politics and reform. *Also AFAM 706a, HIST 735a.*

AMST 723b, Language and Landscape: Rhetorics of American Painting 1848–1870. Alexander Nemerov.
Th 1.30–3.20
In the middle of the nineteenth century, American landscape painters sublimated the dark energies of earlier artists, notably Thomas Cole. They also helped make landscape a "national" art ostensibly more expressive of the country than, say, the genre painting of the late 1830s and 1840s. This sublimated imagery — of smooth fields, sunny days, and distant mountains — grew in tandem with the era's bourgeois art criticism, and more broadly with the middle-class American novel in these years. This course studies not just the interrelation between landscape and language in mid-nineteenth-century American painting — the role of Ruskin, of *The Crayon,* and of art criticism generally — but more precisely whether or not the era's paintings may be felt to be "written" or "spoken." Did mid-century landscape painters understand the structures of their paintings in terms of the era's smooth, polished, and unperturbed prose? Did they see painting mountains instead of saloons or pumpkin patches as an avoidance of "dialect" in favor of polite middle-class speech? If so, what to make of paintings that speak in both tongues, that use the language both of the cabin and the grand sublimatory view out the cabin's window? *Also HSAR 723b.*

AMST 730a, The Home Front: American Visual Culture 1941–1945. Alexander Nemerov.
W 3.30–5.20
During the war years, Hollywood made many propaganda films, and painters made many pictures aiming to benefit the war effort; in this seminar, however, we examine films and paintings which manifestly have little to do with the war — films such as *Meet Me in St. Louis, Shadow of a Doubt, The Ghost Ship, The Curse of the Cat People,* and *The Body Snatcher;* paintings such as Gorky's *Liver is the Cock's Comb* and *One Year the Milkweed* — in order to understand something of a "home front culture": a culture of diversions and distractions that is yet haunted by a pathos, a deep awareness, of the bloodshed all around. *Also HSAR 730a.*

AMST 738a, Reading and Research in Western and Frontier History. John Mack Faragher.
W 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 HIST 738a.*

AMST 739b, Approaches to Native American Studies. Jace Weaver.
T 3.30–5.20
Examination of the variety of approaches to the field of Native American studies with special attention to its development. Readings and methods from anthropology, sociology, history, literature, and religious and cultural studies discussed.

AMST 740a, Native American Law and Policy. Jace Weaver.
TH 4–6
Understanding United States laws and policies toward Native Americans is fundamental to any understanding of Native/non-Native relations in this country. This course examines such laws and policies from the colonial period to the present. Attention is also given to tribal justice systems.

AMST 741a[u], Apocalyptic Religion in Cross-Cultural Perspective. Jace Weaver.
TH 1.30–3.20
This course examines millennial and "end-time" beliefs in a variety of cultures around the world. Attention given to Jewish and Christian texts as well as Native American traditions, African and Pacific Islander movements, and modern manifestations such as Jonestown, the Branch Davidians, and Heaven's Gate.

AMST 749a, Poetics and Politics of Ethnography. Kathryn Dudley.
W 1.30–3.20
Through an examination of contemporary controversies in anthropology — Mead/Freeman, Sahlins/Obeyesekere, Chagnon/Tierney — this course explores the range of representational, methodological, and theoretical issues involved in the practice of ethnography.

AMST 763b[u], The Anthropology of Sound. John Szwed.
TH 1.30–3.20
The socially mediated nature of sound, and the cultural consequences of technologies of sound transmission, modification, and recording. Topics include the pre- and postindustrial soundscapes; audio ethnography; the art of noise; synaesthesia; problems of originality and plagiarism (covers, sampling, mixing, machine music, etc.); world music; audio imperialism and terrorism; musical utopias; imaginary soundscapes. *Also ANTH 587b[u].*

AMST 767b, Magic Realism in the Americas. Vera Kutzinski.
M 10.30–12.20
This seminar focuses on remappings of the subject within twentieth-century counterrealist writing from different parts of the Americas. Authors include Isabel Allende, Robert Antoni, Erna Brodber, Alejo Carpentier, William Faulkner, Janet Frame, Gabriel García Márquez, Toni Morrison, Wilson Harris, Pauline Melville, Juan Rulfo, and Lawrence Scott. *Also AFAM 759b, CPLT 854b, ENGL 922b.*

AMST 790b, 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 790b.*

AMST 793b, Power: Historical and Theoretical Approaches. Jean-Christophe Agnew.
TH 10.30–12.20
An introduction to the widely different ways in which power and its correlative concepts (domination, coercion, oppression, authority, legitimacy, hegemony, resistance, etc.) have been treated by historians, sociologists, anthropologists, and political theorists. Case studies test the various approaches in different contexts. *Also HIST 793b.*

AMST 812b[u], American Documentary Film and Photography. Charles Musser, Laura Wexler.
W 3.30–5.20, *screenings* T 7
Examination of a series of historical moments in which documentary plays a significant cultural role. Topics include the relationship between photographic and cinematic practices and theories generated by makers and critics; filmic constructions of gender, race, class, and national identity in the twentieth century; and changing conceptions of photographic truth.

AMST 814a, Problems in Film History. Charles Musser.
T 3.30–5.20, screenings M 7
Engages a range of historiographical issues in film studies, including the roles of technology, exhibition, and spectatorship as well as topics such as intermediality, and intertextuality. Through a focus on international early cinema and American race cinema of the silent period, a range of methodological approaches are considered. Particular attention is give to the interaction between scholars and archives.

AMST 827a, Executive Politics and the Presidency. Stephen Skowronek.
W 3.30–5.20
An examination of the structure and operations of the American presidency. Topics include the political development of the presidential office, the politics of leadership, relations with Congress and the Court, and the exercise of political power within the EOP. *Also PLSC 820a.*

AMST 828b, American Political Development. Stephen Skowronek.
W 3.30–5.20
Examination of the broad patterns of political change and institutional development in American national government from 1789, with particular attention to recurrent problems of party-building and state-building. *Also PLSC 828b.*

AMST 841b, Transatlantic Print Culture and the Early American Novel. Elizabeth Dillon.
W 1.30–3.20
An examination of the relation between the form of the novel and conditions of colonialism and postcolonialism in the Anglo-American world of the eighteenth century. Rather than reading early American novels as allegories of nation foundation, we consider these texts in relation to the transatlantic print public sphere in which they circulated, and the transatlantic economy in which many of the characters in these novels circulate as well. Readings include a range of theoretical works concerning the rise of the novel, the emergence of the print public sphere, and the development of colonialism, as well as novels from both sides of the Atlantic by Behn, C. B. Brown, W. H. Brown, Cooper, Defoe, Edgeworth, Foster, Richardson, Rowlandson, Rowson, Scott, Tenney, and Tyler. *Also ENGL 841b.*

AMST 842b, American Theory: Cultural Criticism and Social Change in the Twentieth Century. Michael Trask.
W 10.30–12.20
Focus on the theory-function in modern U.S. culture, with particular emphasis on the decades between the Great War and Vietnam. We look at both critical and literary texts that actively

take up the cause of theory, including those of Bourne, Mencken, Wilson, Rahv, Trilling, Howe, Dos Passos, Hurston, Ellison, Mailer, Friedan, Arendt, McCarthy, Bellow, Marcuse, Goffman, and Ginsberg; and at contemporary theorists of theory, including Jameson, Anderson, and Giddens. Topics include the place of "America" as an object of critical inquiry and the dominance of liberalism in American political thought. *Also ENGL 917b.*

AMST 860b, Modernity and Nineteenth-Century American Visual Culture. Bryan Wolf.
T 1.30–3.20
This course examines the relationship between "liberal culture," visuality, and modernity. It considers the privileged role played by seeing in the modern world, looking both at paintings and literary texts organized around questions of perception. In particular, the seminar focuses on the "dream of transparency," the way that seeing works ideologically to affirm the tenets of liberal belief; we examine both the construction and "deconstruction" of this dream. Topics include visuality and the public sphere; landscape and "depoliticized speech"; genre and hegemony; race and identity; managerial culture and disembodied vision. Painters examined include: Wright of Derby, Copley, Cole, Durand, Church, Mount, Bingham, Homer, Eakins. Writers include: Wheatley, Irving, Emerson, Poe, Douglass, Hawthorne, H. Wilson, Chestnutt. Methodological sessions are devoted to Barthes, Foucault, and Jameson. *Also ENGL 951b.*

AMST 869a, Research Colloquium in Women's and Gender Studies. Laura Wexler.
An interdisciplinary research seminar investigating contemporary theory and methods in Women's and Gender Studies. Requirements include a research paper, works-in-progress presentations, peer reviews, and reviews of the critical literature in a variety of humanities and social science fields.

AMST 870b[U], Photography and Images of the Social Body. Laura Wexler.
Th 7–8.50
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.

AMST 921a, Ralph Ellison in Context. Robert Stepto.
Th 10.30–12.20
This seminar pursues close readings of Ralph Ellison's essays, short fiction, and novels, *Invisible Man* and *Juneteenth*. The "in context" component of the seminar involves working from the Benston and Sundquist volumes on Ellison to discern a portrait of the modernist African America Ellison investigated, with at least Richard Wright, James Baldwin, and Romare Bearden also in view. The texts include Ellison, *The Collected Essays, Flying Home and Other Stories, Invisible Man, Juneteenth;* K. Benston, *Speaking for You*; E. Sundquist, *Cultural Contexts for Ralph Ellison's Invisible Man;* A. Nadel, *Invisible Criticism: Ralph Ellison and the American Canon. Also AFAM 563a, ENGL 921a.*

ANTHROPOLOGY

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

Chair
Andrew Hill

Director of Graduate Studies
Harold Scheffler (Rm 10, 51 Hillhouse, 432.3673, harold.scheffler@yale.edu)

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

Associate Professors
Kathryn Dudley (*American Studies*), Patricia Pessar (*Adjunct, American Studies*), Linda-Anne Rebhun

Assistant Professors
Bernard Bate, Richard Bribiescas, Kamari Maxine Clarke, David Graeber, Isak Niehaus (*Visiting*), Eric Sargis, Thomas Tartaron, Eric Worby

Lecturers
Marcello Canuto, Carol Carpenter (*Forestry & Environmental Studies*), Nora Groce (*Epidemiology & Public Health*), Valter Sinder (*Visiting*)

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.

Master's Degrees

M.Phil. See Graduate School requirements, page 361.

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; fax, 203.432.3669; e-mail, anthropology@yale.edu; Web site, http://www.yale.edu/anthropology/.

Courses

ANTH 500a, Seminar in Sociocultural 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 501a, Field Methods and Research Design. Helen Siu.
W 10–11.50
The course offers critical evaluation of the nature of ethnographic research. Research design includes the rethinking of site, voice, and ethnographic authority.

ANTH 510b, Resistance, Rebellion, and Survival Strategies in Rural 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. *Also HIST 807b.*

ANTH 513a[u], Language, Culture, and Ideology. J. Joseph Errington.
T 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 515b[u], Culture and Political Economy. Helen Siu.
T 1.30–3.20
This seminar is a critical introduction to anthropological formulations of the junctures of meaning, interest, and power. Readings include classical and contemporary ethnographies that are theoretically informed and historically situated. Enrollment limited to twenty-four.

ANTH 526a, Peasantries in Latin America. Enrique Mayer.
T 1.30–3.20
A review of the major theories about the rural-based — sometimes culturally distinct — societies of Latin America. A second concern are the contemporary trends of change in agrarian societies in Latin America due to market expansion, colonization, illegal crops, urban migration, and political participation of the peasant sector. The course also looks at current policy debates about rural areas and political upheavals such as Shining Path, Colombian guerrillas, and the Zapatistas in Chiapas.

ANTH 531a, Ethnography and the Futures of Anthropology. William Kelly.
M 3.30–5.20
This seminar offers critical readings of recent ethnographies to assess the possibilities of our core representational form in light of challenges to and within contemporary culture theory. Examples of texts are Peter Whiteley's *Rethinking Hopi Ethnography,* Dorinne Kondo's *About Face,* and Charles Piot's *Remotely Global*. The seminar is open only to graduate students (and advanced undergraduate anthropology majors) who have taken ANTH 500a and b or equivalent course work.

ANTH 541a, Agrarian Societies: Culture, Society, History, and Development. Michael Dove, Linda-Anne Rebhun, James Scott.
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 542b, Social Change and Popular Culture in Sub-Saharan Africa. Kamari Clarke.
M 2.30–4.20
Explores social transition in various counties in Sub-Saharan Africa. In understanding the tensions between tradition and modernity, the crisis of underdevelopment, and the role of cultural brokers in contributing to the globalization of various African cultural practices, we examine the ways in which various modes of popular culture reflect and shape new social phenomena. *Also AFAM 656b[u].*

ANTH 544a, Brazilian Readings: Identity and Fragmentation. Valter Sinder.
W 3.30–5.20
Assessment of the narrative boundaries between history, literature, biography, and cultural anthropology, taking as point of reference historical novels and essays published in Brazil since 1980. Knowledge of Portuguese helpful.

ANTH 548a, Gender and Media in India. Bernard Bate.
Th 1.30–3.20
Examines variously mediated narratives and performances of gender in India. Expanding on folkloristic and anthropological approaches to gender(ed) performance in story, song, and theater, we consider recent feminist/scholarly examinations of such media as television, film, advertising, and literature. Topics range from classical epic (*Ramayana, Shilapathigaram*)

including stories of gods and goddesses aired in film and television to the cultural production associated with contemporary political praxis and the gendering of the political field.

ANTH 560b[u], 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 individuals exacts a toll on that commitment.

ANTH 562b[u], Topics in Chinese Anthropology and History. Helen Siu.
W 1.30–3.20
The seminar explores the Chinese identity as it has been reworked over the centuries. It familiarizes student with major works in Chinese anthropology and their intellectual connections with general anthropology and historical studies. Topics include kinship and marriage, marketing systems, rituals and popular religion, ethnicity and state making, and the cultural nexus of power.

ANTH 569a[u], Economic Anthropology. Enrique Mayer.
W 1.30–3.20
An 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 576b[u], Anthropology of the Object. Eric Worby.
TTh 1–2.15
An exploration of the culturally variable means through which value and significance are attributed to objects. Topics for discussion include gift-giving and commodity exchange; the classification collection, and display of art and artifacts; the gendered and racialized body as object for self and other; advertising, consumption, and commodity fetishism; concepts of property; the politics of value.

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 587b[u], The Anthropology of Sound. John Szwed.
Th 1.30–3.20
The socially mediated nature of sound, and the cultural consequences of technologies of sound transmission, modification, and recording. Topics include the pre- and postindustrial soundscapes; audio ethnography; the art of noise; synesthesia; problems of originality and plagiarism (covers, sampling, mixing, machine music, etc.); world music; audio imperialism and terrorism; musical utopias; imaginary soundscapes. *Also AMST 763b[u].*

ANTH 595a, Transnationalism, Modernity, and Diaspora. Kamari Clarke.
W 2.30–4.20
As anthropologists continue to grapple with changing notions of "the field" from local to global, this course covers recent and emerging scholarship that explores theoretical problems of modernity, transnationalism, and diaspora in specific historical and ethnographic contexts. Drawing on a range of ideas from world systems theories of globalization to notions of the invention of diasporas, to postmodern ideas of social constructions, the emphasis is on the interrelations between local and global cultural processes. These processes disrupt the once homogenizing tendencies of ethnography and instead push us to examine different criteria for analyzing and constructing communities. *Also AFAM 573a.*

ANTH 596b[u], Recasting Gender: Religion, Science, and the Body. Kamari Clarke.
W 2.30–4.20
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. *Also AFAM 683b[u].*

ANTH 597a, 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, focusing on applied problems regarding the participation of people in such projects and the impacts such projects have on people. Communities are a major focus, particularly the social divisions and social ties relevant to the community management of resources. The course reviews different types of development and conservation projects and the particular problems they pose for indigenous people. It also examines short-term methodologies for evaluating the social aspects of such projects. This course is a prerequisite for F&ES 752b and F&ES 759b. *Also F&ES 757a.*

[**ANTH 598b, Sustainable Development and Conservation: Advanced Readings in Social Theory. Carol Carpenter, Michael Dove.**]

ANTH 610b, Society and Environment: Advanced Readings in Social Theory. Michael Dove, Carol Carpenter.
Th 2.30–5.20
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 626b[u], Anthropological Perspectives on Gender and Health. Linda-Anne Rebhun.
W 1.30–3.20
Examines how issues of gender articulate with health as examined by anthropologists. Topics include women's health (reproductive issues, STDs, sexual violence, genital surgry, etc.), men's health (especially alcohol and drug use, STDs, violence, occupational issues), and issues of sexual identity, with a special emphasis on political, economic, and cultural aspects of gender and health. In addition, we look at moral/political issues like abortion and new reproductive technologies from an anthropological perspective.

ANTH 629b^{u}, Rhetorics and Publics. Bernard Bate.
M 2.30–4.20
An examination of the relationship between ideas of language use and function and the organization and imaginary of sociopolitical practice. We query such concepts as "rhetoric" and "the public" in a variety of historical and ethnographic contexts, from the ideas of language among Spanish and Nahuatl speakers during the conquest of Mexico to the oratory of Patrick Henry and Abraham Lincoln.

ANTH 634a^{u}, Anthropology of the Postcolonial State. Eric Worby.
M 3.30–5.20
Ethnographc 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 on the public sphere; ritual and aesthetic dimensions of rule and resistance; tensions between popular, civic, and global culture.

ANTH 681a^{u}, Introduction to Jazz Studies. John Szwed.
T 1.30–3.20
An overview of the music and its cultural history, with consideration of the influence of jazz on the visual arts, dance, literature, and film; an introduction to the scholarship and methods of jazz studies. *Also AFAM 557a^{u}, AMST 703a^{u}.*

ANTH 702b^{u}, Archaeological Method and Theory II. Marcello Canuto.
W 1.30–3.20
The principles archaeologists use to explain human cultural development from the material record of the past. Questions considered include: What is archaeology and what are its aims? Is there or is there not a coherent body of archaeological theory to which most archaeologists subscribe? What appear to be the most productive theoretical approaches for understanding and interpreting the past? *Also ARCG 702b^{u}.*

ANTH 705Lb^{u}, Archaeology Laboratory II. Thomas Tartaron.
Th 1–4
Practical experience in preparation, analysis, and interpretation of artifacts and nonartifactual archaeological data. Students undertake term projects. *Also ARCG 705Lb^{u}.*

ANTH 712a^{u}, Ancient Civilizations of Mesoamerica. Marcello Canuto.
TTh 11.30–12.45
The Indian civilizations of Mexico and Central America from earliest times through the Spanish conquest. *Also ARCG 712a^{u}.*

ANTH 716b^{u}, Neanderthals and Wise Men. Frank Hole.
TTh 1–2.15
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 716b^{u}.*

ANTH 719a^{u}, Ethnohistory and Archaeology. Roderick McIntosh.
Th 2.30–4.20
Review of the major problems and methodologies associated with the use of ethnohistory by archaeologists. How do archaeologists construct a historical imagination? Looks at a variety of sources: colonial and "visitor" documents, peoples' written description of themselves, oral traditions, classic ethnographies, and art history. *Also ARCG 719a^{u}.*

ANTH 726a^{u}, Practicum in Archaeology. Frank Hole.
M 1.30–3.20
Hands-on experience in the study of archaeological artifacts, utilizing collections from the Near East and America. Students develop skill in attribute analysis, classification, illustration, and cultural and chronological interpretation. *Also ARCG 726a^{u}.*

ANTH 732a^{u} and 733La^{u}, Archaeological Field Techniques and Archaeology Lab I. Thomas Tartaron.
TTh 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 737b^{u}, Archaeological Research Design. Frank Hole.
MW 1–2.15
Various approaches to designing archaeological research are presented and discussed through the use of case studies. As final projects students design and present their own research proposals. *Also ARCG 737b^{u}.*

ANTH 740a^{u}, Maya Archaeology. Marcello Canuto.
W 2.30–4.20
Examination of current problems in Maya archaeology, epigraphy, iconography, and ethnohistory. Topics include the preclassic, classic, and postclassic periods. the development and collapse of classic Maya civilization, economic and political organization, warfare, and external relations. *Also ARCG 740a^{u}.*

ANTH 741b^{u}, Archaeology of Communities. Marcello Canuto.
Th 2.30–4.20
An examination of households and of their integration into communities in ancient complex societies. Heavily emphasizing theoretical perspectives from cultural anthropology, this course studies archaeological approaches to a holistic study of everyday life in ancient societies. Reading is drawn from diverse fields of ethnography, ethnoarchaeology, ethnohistory, and archaeology. *Also ARCG 741b^{u}.*

ANTH 745a^{u}, Human Landscapes of the Past: A Landscape Archaeology Approach. Thomas Tartaron.
TTh 11.30–12.45
Examination of landscape as a powerful concept in archaeology, and the basis of a thriving research agenda within the discipline. This course trces the intellectual development of landscape perspectives in archaeology, from a primary concern with adaptive and economic aspects of human-environment interactions to more recent interst in cognitive and culturally constructed landscapes. Case studies reveal a multiplicity of archaeological approaches. Permission from instructor required for non-archaeology/anthropology undergraduates. *Also ARCG 745a^{u}.*

ANTH 753a^{u}, Early Prehistory. Frank Hole.
TTh 1–2.15
The formation of modern society began with the beginning of food production and the establishment of permanent settlements. Triggered by climatic and environmental factors, the Neolithic Revolution led to innovations in architecture, art, metallurgy, religion, diet, technology, trade, and social organization that provided the foundations for the earliest civilizations. This course focuses on the Neolithic period in the region including the Eastern Mediterranean, Turkey, Iraq, and western Iran. *Also ARCG 753a^{u}.*

ANTH 803b, Reproductive Ecology of Humans and Nonhuman Primates. Staff.
This seminar surveys the current understanding of the physiology of reproductive function within the control of evolutionary and life history theory. Emphasis is placed on population variation in female and male reproductive endocrinology as well as the sources of that variation.

ANTH 811a, Behavioral Endocrinology. Staff.
This seminar examines the role of hormones in the evolution and expression of human and nonhuman primate behavior. Emphasis is placed on behaviors that are associated with aggression, stress, mating, and parenting. Advanced undergraduates are welcome with instructor's permission.

ANTH 815a, Primate Functional Morphology. Eric Sargis.
Examination of the form and function of primate cranial, dental, and postcranial morphology. Includes the relationship between diet and body size, as well as locomotion and body size; craniodental adaptations in relation to dietary differences; postcranial adaptations in relation to differential substrate use; and postcranial adaptations for various locomotor modes. Paleobiological implications for fossil primates are also considered.

ANTH 816b, Topics and Issues in Systematics. Eric Sargis.
Examination of the methodological and theoretical bases for phylogenetic analysis and classifiction. Focus is on cladistic methodology, but phenetic and classical methods are covered as well. Major controversies in systematics are also discussed. Morphological studies of primates and other mammals serve as primary examples, but molecular studies are also considered.

ANTH 851a, Topics and Issues in Evolutionary Theory. David Watts and staff.
A seminar focusing 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 864b, Human Osteology. Eric Sargis.
TTh 11.30–12.45
A lecture and lab course on the characteristics of the human skeleton and its use in studies of function morphology, paleodemography, and paleopathology. Laboratories familiarize students with skeletal parts; lectures focus on the nature of bone tissue, its biomechanical modification, sexing, ageing, and interpretation of lesions.

ANTH 875b, 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. Formerly ANTH 819.

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 965a or b, Directed Research in Physical Anthropology.
By arrangement with faculty.

APPLIED MATHEMATICS

A. K. Watson Hall, 436.1263
M.S., M.Phil., Ph.D.

Chair and Director of Graduate Studies
Ronald Coifman (AKW 107a, 432.1278, cch2@gauss.math.yale.edu)

Professors
Andrew Barron (*Statistics*), Richard Beals (*Mathematics*), Donald Brown (*Economics*), Ronald Coifman (*Mathematics; Computer Science*), 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 (*Mechanical Engineering; Applied Physics*), Steven Zucker (*Computer Science; Electrical Engineering*)

Associate Professor
Joseph Chang (*Statistics*)

Assistant Professors
James Aspnes (*Computer Science*), Nicolas Hengartner (*Statistics*), Marten Wegkamp (*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.

Honors Requirement

Students must meet the Graduate School's Honors requirement by the end of the fourth term of full-time study (see pages 359–60).

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.

A. Douglas Stone

Professors
William Bennett, Jr. (*Emeritus*), Richard Chang, Joseph Dillon, Jr. (*Adjunct*), Paul Fleury, John Gore, Robert Grober, Victor Henrich, Arvid Herzenberg (*Emeritus*), Pierre Hohenberg (*Adjunct, Physics*), Marshall Long, Tso-Ping Ma, Daniel Prober, Nicholas Read, Mark Reed, Subir Sachdev, Ramamurty Shankar, Mitchell Smooke, Katepalli Sreenivasan, A. Douglas Stone, John Tully, Robert Wheeler (*Emeritus*), Werner Wolf, Jerry Woodall

Associate Professors
Adam Anderson, Sean Barrett, Mark Kasevich

Assistant Professors
Charles Ahn, Janet Pan, Robert Schoelkopf

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, magnetic resonance imaging, and medical instrumentation.

For admissions and degree requirements, and for course listings, see Engineering and Applied Science, pages 120–32.

ARCHAEOLOGICAL STUDIES

51 Hillhouse, 432.3772
M.A.

Chair and Director of Graduate Studies
Frank Hole (*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*), Karl Turekian (*Geology & Geophysics*), Harvey Weiss (*Near Eastern Languages & Civilizations*)

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

Courses

ARCG 702b[u], Archaeological Method and Theory II. Marcello Canuto.
W 1.30–3.20
The principles archaeologists use to explain human cultural development from the material record of the past. Questions considered include: What is archaeology and what are its aims? Is there or is there not a coherent body of archaeological theory to which most archaeologists subscribe? What appear to be the most productive theoretical approaches for understanding and interpreting the past? *Also ANTH 702b[u].*

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

ARCG 712a[u], Ancient Civilizations of Mesoamerica. Marcello Canuto.
TTH 11.30–12.45
The Indian civilizations of Mexico and Central America from earliest times through the Spanish conquest. *Also ANTH 712a[u].*

ARCG 716b[u], Neanderthals and Wise Men. Frank Hole.
TTH 1–2.15
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 716b[u].*

ARCG 719a[u], Ethnohistory and Archaeology. Roderick McIntosh.
TH 2.30–4.20
Review of the major problems and methodologies associated with use of ethnohistory by archaeologists. How do archaeologists construct an historical imagination? Looks at a variety of sources: colonial and "visitor" documents, peoples' written description of themselves, oral traditions, classic ethnographies, and art history. *Also ANTH 719a[u].*

ARCG 726a[u], Practicum in Archaeology. Frank Hole.
M 1.30–3.20
Hands-on experience in the study of archaeological artifacts, utilizing collections from the Near East and America. Students develop skill in attribute analysis, classification, illustration, and cultural and chronological interpretation. *Also ANTH 726a[u].*

ARCG 732a[u] and 733La[u], Archaeological Field Techniques and Archaeology Lab I. Thomas Tartaron.
TTH 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 737b[u], Archaeological Research Design. Frank Hole.
MW 1–2.15
Various approaches to designing archaeological research are presented and discussed through the use of case studies. As final projects students design and present their own research proposals. *Also ANTH 737b[u].*

ARCG 740a[u], Maya Archaeology. Marcello Canuto.
W 2.30–4.20
Examination of current problems in Maya archaeology, epigraphy, iconography, and ethnohistory. Topics include the preclassic, classic, and postclassic periods, the development and collapse of classic Maya civilization, economic and political organization, warfare, and external relations. *Also ANTH 740a[u].*

ARCG 741b[u], Archaeology of Communities. Marcello Canuto.
TH 2.30–4.20
An examination of households and of their integration into communities in ancient complex societies. Heavily emphasizing theoretical perspectives from cultural anthropology, this course studies archaeological approaches to a holistic study of everyday life in ancient societies. Reading is drawn from diverse fields of ethnography, ethnoarchaeology, ethnohistory, and archaeology. *Also ANTH 741b[u].*

ARCG 745a[u], Human Landscapes of the Past: A Landscape Archaeology Approach. Thomas Tartaron.
TTH 11.30–12.45
Examination of landscape as a powerful concept in archaeology, and the basis of a thriving research agenda within the discipline. This course trces the intellectual development of landscape perspectives in archaeology, from a primary concern with adaptive and economic aspects of human-environment interactions to more recent interst in cognitive and culturally constructed landscapes. Case studies reveal a multiplicity of archaeological approaches. Permission from instructor required for non-archaeology/anthropology undergraduates. *Also ANTH 745a[u].*

ARCG 753a[u], Early Prehistory. Frank Hole.
TTH 1–2.15
The formation of modern society began with the beginning of food production and the establishment of permanent settlements. Triggered by climatic and environmental factors, the Neolithic Revolution led to innovations in architecture, art, metallurgy, religion, diet, technology, trade, and social organization that provided the foundations for the earliest civilizations. This course focuses on the Neolithic period in the region including the Eastern Mediterranean, Turkey, Iraq, and western Iran. *Also ANTH 753a[u].*

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

Related courses:

HSAR 740b, Pre-Columbian Art in the Yale University Art Gallery. Mary Miller.

HSAR 746a, Mexican Art of the Sixteenth Century. Mary Miller, Jaime Lara.

NELC 510a[u], Conflicts that Shaped Pharaonic Egypt. John Darnell.

ASTRONOMY

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

Chair
Charles Bailyn

Director of Graduate Studies
Robert Zinn [F] (262 JWG, 432.3017, robert.zinn@yale.edu)
Sabatino Sofia [Sp] (256 JWG, 432.3011, sabatino.sofia@yale.edu)

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

Associate Professor
Paolo Coppi

Assistant Professors
Sarbani Basu, Priya Natarajan

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 are expected to 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 359–60).

Master's Degree

M.Phil. See Graduate School requirements, page 361.

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 510a[u], Stellar Populations.**]

ASTR 518a, Stellar Dynamics. Gordon Drukier.
The dynamics and evolution of star clusters; structure and dynamics of our galaxy; theories of spiral structure; formation and dynamical evolution of galaxies.

ASTR 520a, Computational Astrophysics. Staff.
The analytic and numerical/computational tools necessary for effective research in astrophysics 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 530b[u], Galaxies.**]

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

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

ASTR 555a, Observational Techniques. William van Altena.
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, Interstellar Matter and Star Formation. Richard Larson.
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 570, High Energy Astrophysics.**]

[**ASTR 575, Astrometry.**]

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

ASTR 590b, Solar Physics. Sabatino Sofia.
The very detailed observations possible for 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. Priya Natarajan.
The large-scale contents and structure of the universe and the origin of galaxies.

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

ATMOSPHERIC SCIENCE

Advisory Committee
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*)

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, and dynamics 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 225 Yale biological science faculty in all departments, both at the School of Medicine and on the main university campus. Moreover, in conjunction with the Bristol-Myers Squibb Educational Alliance Program, in Wallingford, Connecticut, BBS gives students the opportunity to gain firsthand experience in pharmaceutical research at one of the country's most important centers for drug discovery.

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 Invertebrate Breakfast); 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 but at present comprise the following: (1) Biological Sciences; (2) Cell Biology and Molecular Physiology; (3) Genetics and Development; (4) Immunology; (5) Microbiology; (6) Molecular Biophysics and Biochemistry;

(7) Neuroscience; and (8) Pharmacological Sciences and Molecular Medicine. 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 sixty-five to seventy-five, with between five and fifteen 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 or in selected laboratories at the Bristol-Myers Squibb facility. 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.

BIOLOGICAL SCIENCES

No additional requirements or recommendations.

CELL BIOLOGY AND MOLECULAR PHYSIOLOGY

In special cases, Medical College Admission Test (MCAT) scores may be substituted for the GRE General Test scores.

GENETICS AND DEVELOPMENT

A strong background that includes biology and chemistry (both organic and physical chemistry) and mathematics is recommended.

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.

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
Margaret Riley (*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 (EEB) 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.

PROGRAM IN BIOMEDICAL ENGINEERING

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

Professors
Robert Apfel, James Duncan, John Gore, Robert Grober, Csaba Horváth, Steven Segal, Frederick Sigworth, Steven Zucker

Associate Professors
Adam Anderson, Lawrence Staib, Hemant Tagare

Assistant Professor
Jacek Cholewicki

FIELDS OF STUDY

Fields include the physics of image formation (MRI, ultrasound, nuclear medicine, and X-ray), 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 120–32.

BIOSTATISTICS

60 College Street, 785.2844
M.S.

Division Head
Robert Makuch

Director of Graduate Studies
Theodore Holford (201 LEPH, 785.2838, theodore.holford@yale.edu)

Fields Of Study

The faculty 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 141–52, 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 EPH Admissions Office, Epidemiology and Public Health, Yale University, PO Box 208034, New Haven CT 06520-8034; e-mail, norman.silliker@yale.edu.

CELL BIOLOGY

C-443 Sterling Hall of Medicine, 785.4302
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
James Anderson (*Internal Medicine*), Norma Andrews (*Microbial Pathogenesis*), Roland Baron (*Orthopedics*), Lynn Cooley (*Genetics*), Pietro De Camilli, Susan Ferro-Novick, Jorge Galán (*Microbial Pathogenesis*), Fred Gorelick (*Internal Medicine*), James Jamieson, Keith Joiner (*Internal Medicine*), Thomas Lentz, Vincent Marchesi, Ira Mellman, Mark Mooseker (*Molecular, Cellular, & Developmental Biology*), Peter Novick, John Rose, Elisabetta Ullu (*Internal Medicine*), Graham Warren

Associate Professors
Carl Hashimoto, Michael Nathanson (*Internal Medicine*), Michele Solimena (*Internal Medicine*), Sandra Wolin

Assistant Professors
Karin Reinisch, 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, virus-cell interactions, cell biology of protozoan parasites and of pathogen/host interactions, cell biology of the immune response, cell biology of bone remodeling and of the cytoskeleton. Approaches to these topics include biochemistry and molecular biology; yeast, *Drosophila*, and *Dictyostelium* genetics; immunocytochemistry and electron microscopy; cell fractionation; and antibody production.

Special Admissions Requirements

An undergraduate major in biology, biophysics, molecular biology, or biochemistry is recommended; the GRE General Test is required; a relevant GRE Subject Test is encouraged.

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 59–61).

Special Requirements for the Ph.D. Degree

Five courses are required: CBIO 602a, 603a, 606b, 727b and MB&B 743b, in addition to one elective. 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 362; this degree is normally granted only to students who are withdrawing from the Ph.D. program.

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 520, Research in Cell Biology and Molecular Physiology. Catherine Berlot.
Three ten-week periods of directed research/reading in selected laboratories. For first-year graduate students in the Cell Biology and Molecular Physiology track. *Also C&MP 520.*

CBIO 601, The Molecular and Cellular Basis of Human Disease. Pietro De Camilli, Fred Gorelick, and staff.
This course comprises 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 and 603a, Molecular Cell Biology and Tutorial. Ira Mellman, Sandra Wolin, Graham Warren, Mark Mooseker.
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.

CBIO 606b, Advanced Molecular Cell Biology. Peter Novick.
This seminar course, which meets once a week, covers several topics in Modern Cell Biology. It should serve to introduce students to areas they might not have considered in prior courses.

CBIO 676b, Responsible Conduct of Research. Mark Solomon 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. *Also MB&B 676b.*

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. The topics this year focus on the proteasome and proteolysis, the cytoskeleton and cytoskeletal motors, and signaling systems. Each topic is spread over 3–6 sessions, starting with an introductory overview and followed by detailed analysis of key papers.

CELLULAR AND MOLECULAR PHYSIOLOGY

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

Chair
Steven C. Hebert

Director of Graduate Studies
Fred Sigworth (BE-42 SHM, 785.5773, fred.sigworth@yale.edu)

Professors
Peter Aronson (*Internal Medicine/Nephrology*), Robert Berliner (*Emeritus*), Henry Binder (*Internal Medicine/Endocrinology*), Walter Boron, Emile Boulpaep, Arthur Broadus (*Internal Medicine/Endocrinology*), Thomas Brown (*Psychology*), Michael Caplan, W. Knox Chandler, Lawrence Cohen, Arthur DuBois (*Epidemiology*), Barbara Ehrlich (*Pharmacology*), Bliss Forbush III, John Geibel (*Surgery*), Gerhard Giebisch, Gabriel Haddad (*Pediatrics*), Steven Hebert, Joseph Hoffman, Leonard Kaczmarek (*Pharmacology*), Edward Moczydlowski (*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
Catherine Berlot, Marie Egan (*Pediatrics*), Steve Goldstein (*Pediatrics*), George Richerson (*Neurology*)

Assistant Professors
Michael Apkon (*Pediatrics*), Cecilia Canessa, Reiko Maki Fitzsimonds, P. Darrell Neufer, Vincent Pieribone

Fields of Study

Major training programs are in cellular and molecular physiology, membrane biophysics, and neurobiology. Individual programs are tailored for each student and can span the range from biophysics, biochemistry, and cell and molecular biology to organ systems and whole animal physiology.

Special Admissions Requirements

Courses in mathematics through elementary calculus, biology and biochemistry, and organic and physical chemistry are recommended. The GRE General Test is required.

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 59–61).

Special Requirements for the Ph.D. Degree

Formal requirements for the Ph.D. include two or three terms of course work in which the grade of Honors must be achieved in at least two term courses by the end of the

second year, a qualifying examination taken at the end of that course work, submission of a thesis proposal no later than the end of the third year, and completion and satisfactory defense of the thesis. Students with appropriate background may fulfill requirements for the Ph.D. degree in four years.

Students consult with the DGS and the Committee on Graduate Training to design a suitable program of courses. This program forms a coherent background for the expected area of dissertation research and also satisfies the department's subject and proficiency requirements. Students must obtain advanced training in at least three out of four other areas that crucially underlie research: physical science, molecular science, cell science, and genetics. These breadth requirements may be met by course work throughout the university. Also during the first two terms, each student should explore research projects in several 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 fourth term in residence, will cover areas of physiology that complement the student's major research interest. After passing the qualifying examination and submitting a satisfactory prospectus, a student is admitted to candidacy and then begins concerted research on his or her thesis. The completed dissertation must describe original research making a significant contribution to knowledge.

An important aspect of graduate training in cellular and molecular physiology 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

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.

Program materials are available upon request to the Director of Graduate Studies, 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 520, Research in Cell Biology and Molecular Physiology. Catherine Berlot. Three ten-week periods of directed research and reading in selected laboratories. For first-year graduate students in the Cell Biology & Molecular Physiology Track. *Also CBIO 520.*

C&MP 550a, Physiological Systems. Steven Segal and staff.
MWF 9.30–10.20
We develop a foundation in human physiology and the principles of feedback and regulation of homeostasis at the cellular level and of the organism as a whole. The biophysical properties of cells, tissues, and organs are developed in context of the functions they perform. We first examine cellular and membrane physiology, which leads into the physiology of skeletal muscle and its neural control, smooth muscle in hollow organs, and the heart as a muscular pump.

The regulation of cardiac output, blood flow, and vascular exchange are each considered in context and then integrated in light of exercise physiology and the maintenance of arterial pressure. The respiratory system is considered in light of the mechanical interactions between the lung and the chest wall, convection and diffusion of gasses, and respiratory control of acid-base balance. We continue by exploring the functional organization of the kidney, how urine is formed, and how salt, fluid, and acid-base homeostasis are regulated. The digestive system is developed in the context of energy balance and temperature regulation, substrate metabolism, and its regulation by hormones. Calcium, water, and electrolyte balance are incorporated in further exploration of the endocrine system, which concludes with the physiology of reproduction. The organization of the central nervous system is then considered in light of synaptic physiology, learning and memory, and the special senses. Examining the body's innate and acquired defense mechanisms concludes the overall course material. In addition, graduate students evaluate pertinent research topics on a weekly basis through directed readings, written reports, and group conferences with the instructor. *Also ENAS 550a, MCDB 550a*[u].

C&MP 560b, Cell and Molecular Physiology from Fundamental Mechanisms to Human Disease. Michael Caplan, Knox Chandler.

MWF 1.30–2.30

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.

C&MP 710b, Electron Cryo-Microscopy: A Versatile Tool for Studying the Structure of Biological Macromolecules and Their Supramolecular Assemblies. 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 MB&B 710b4.*

CHEMICAL ENGINEERING

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

Chair
Lisa Pfefferle

Professors
F. Peter Boer (*Adjunct*), Daniel Crothers (*Adjunct, Chemistry*), Menachem Elimelech, Thomas Graedel, Gary Haller, William Hancock (*Adjunct*), Csaba Horváth, Lisa Pfefferle, Joseph Pignatello (*Adjunct*), Daniel Rosner, L. Lee Wikstrom (*Adjunct*), Kurt Zilm (*Adjunct, Chemistry*)

Associate Professors
Eric Altman, Gaboury Benoit, Michael Loewenberg, John Walz

Assistant Professors
Roger Ely, Marshall Grant

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, molecular beams, aerosol science and technology, surface science, and biotechnology.

For admissions and degree requirements, and for course listings, see Engineering and Applied Science, pages 120–32.

CHEMISTRY

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

Chair
Andrew Hamilton

Director of Graduate Studies
Gary Brudvig [F] (SCL 122, 432.5202, gary.brudvig@yale.edu)
TBA [Sp]

Professors
Sidney Altman (*Molecular, Cellular, & Developmental Biology*), Jerome Berson (*Emeritus*), Gary Brudvig, William Chupka (*Emeritus*), Robert Crabtree, R. James Cross, Jr., Donald Crothers, 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 (*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
Charles Schmuttenmaer, Scott Strobel (*Molecular Biophysics & Biochemistry*)

Assistant Professors
David Austin, Victor Batista, J. Patrick Loria, 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 Degrees

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. William Jorgensen.
MWF 9.30–10.20
A discussion of structure and mechanism in organic chemistry. Fall: bonding, structure and strain; carbanions, carbocations, and carbenes. Spring: conjugated systems, aromaticity, orbital symmetry, and pericyclic reactions; free radicals, biradicals, carbonyl group reactions, and photochemistry.

CHEM 523[u], Synthetic Methods in Organic Chemistry. John Wood.
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
A discussion of the use of nuclear magnetic resonance spectroscopy, vibrational spectroscopy, optical spectroscopy, electron-spin resonance spectroscopy, and other physical techniques to determine structural and dynamic properties of organic molecules.

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 540[u], Molecules and Radiation I. Kurt Zilm.
MWF 8.30–9.20
The basic quantum mechanics of spectroscopy including the use of angular momentum operators, matrix methods, and time-dependent quantum mechanics. Applications from magnetic resonance.

CHEM 542b[u], Molecules and Radiation II. Charles Schmuttenmaer.
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. Patrick Loria.
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 550b[u], Theoretical and Inorganic Chemistry. John Faller.
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 552a[u], Organometallic Chemistry. Robert Crabtree.
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 554b, Bio-Inorganic Chemistry. Ann Valentine.
TTh 10.30–11.45
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, Advanced Topics in Inorganic Chemistry. John Hartwig.
A discussion of contemporary mechanistic problems in transition metal chemistry. The course shows how fundamental physical organic principles have been used to address problems in transition metal systems relevant to coordination, bioinorganic, organometallic, and synthetic organic chemistry.

CHEM 557a[u], Modern Coordination Chemistry. John Faller.
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 558a, Research Topics in Biophysics. Donald Crothers.
TTh 2–3.30
An advanced treatment of the fundamental physical properties that dictate the behavior of biological molecules. Taught with participation of a number of biophysics faculty and extends to their current research specialties. *Also MB&B 658a.*

CHEM 560L, Advanced Physical Methods in Molecular Science. Patrick Vaccaro [F], R. James Cross [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. David Austin.
TTh 9–10.15
Chemical biology is a broad discipline encompassing the many fields of and all chemical aspects of biological processes. This course focuses on developing an understanding of the fundamental chemical species found in nature, their interaction with biological macromolecules, and their subsequent effect on biological function. Topics include natural products and chemical ecology, affinity chromatography for protein discovery, small molecule/receptor interactions, cellular signaling and signal transduction, functional genomics and proteomics, protein design, and chemical biological applications to drug development.

[**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 572b[u], Advanced Quantum Mechanics. John Tully.
Topics in quantum mechanics that are essential for understanding modern chemistry, physics, and biophysics. Topics include the interaction of radiation with matter, using quantized 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
Victor Bers (404 PH, 432.0980, victor.bers@yale.edu)

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

Associate Professor
Elizabeth Tylawsky

Assistant Professors
Michael Anderson, Stephen Colvin, Björn Ewald, Corinne Pache, Shilpa Raval, Celia Schultz

Lecturers
Judith Barringer, Veronika Grimm, Carlos Noreña

Senior Research Scholar/Lecturer
Ann Ellis Hanson

Affiliated Faculty
Tad Brennan (*Philosophy*), Maria Georgopoulou (*History of Art*), Dimitri Gutas (*Near Eastern Languages & Civilizations*), Bentley Layton (*Religious Studies*), David Quint (*Comparative Literature*)

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

(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 which must include two outside the strict limits of classics, one being either in ancient history or in classical art and archaeology; three seminars (two in one language and one

in the other); four courses in the history of Greek and Latin literature, or a reasonable equivalent; and one course in historical or comparative linguistics; (4) satisfaction of the departmental composition requirement in Greek and Latin; (5) translation examinations in Greek and Latin, and general oral examinations in Greek and Latin literature by the end of the fifth term; (6) a special examination, to be taken by the end of the sixth term of residence, consisting of two areas of special concentration in each language to be selected by the candidate with the approval of the director of graduate studies; (7) a dissertation prospectus to be submitted and approved by the end of the seventh term of residence; (8) 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, including the prospectus, not later than the end of the seventh term 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 course of study follows the program in languages and literature (omitting the history of either Greek or Latin literature and linguistic courses), either the Greek or Latin portion of the translation and general oral examinations and oral qualifying examinations in Greek and Roman history. Further details should be obtained from Professors Kagan or Matthews or from the director of graduate studies.

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. The required fourteen courses will roughly be divided between the two departments, but distribution may be adjusted to suit the interests of individual students. Students are admitted to candidacy by passing a written and oral comprehensive examination in classical art and archaeology and securing acceptance of their dissertation prospectus. Students must pass departmental reading examinations in German and one other modern language, usually French or Italian. Further details should be obtained from Professor D. Kleiner or 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. Fourteen courses

are to be taken, not fewer than seven in the Classics department (including two seminars, two terms of the history of Greek or Latin literature, and a term course in historical or comparative linguistics. In Comparative Literature students must take at least four courses on postclassical European literature and two on literary theory or methodology. Students must pass entrance examinations in both classical languages and either the Greek or Latin translation and literature examinations. In addition, an oral examination should be taken during the third year on eight topics appropriate to both disciplines, selected in consultation with the directors of graduate studies. The modern language requirements (French or German) are the same as for students in Comparative Literature.

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, page 361.

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 726a[u], Greek Religious Texts. Corinne Pache.
MW 2.30–3.45
Close reading of selected Greek texts dealing with religious issues including the gods, heroes, death, burial, and oracles.

GREK 732a[u], Greek Philosophical Texts: Aristotle's *De Anima*. Tad Brennan, Gabriel Richardson.
F 1.30–3.20
An introduction to the techniques of philosophical exegesis used in the study of ancient Greek texts. Students acquire and practice interpretive skills by applying them to the philosophical analysis of the text selected for this year, Aristotle's *De Anima*. Some reading knowledge of Greek required. *Also PHIL 612a[u].*

GREK 741a[u], Aeschylus: The *Oresteia*. Victor Bers.
TTh 1–2.15
A close study of the trilogy: poetry, staging, religion, politics.

GREK 742b[u], Homer's *Odyssey*. Corinne Pache.
TTh 1–2.15
Reading of the complete *Odyssey* in translation, with close reading and translation of selected passages of the poem in Greek. Special emphasis on narrative techniques and oral poetics.

GREK 745b[u], Mycenaean Greek: Linear B Text. Stephen Colvin.
MWF 9.30–10.20
An introduction to the script, language, and context of the Linear B tablets of Mycenaean (Bronze Age) Greece, including a basic introduction to Greek historical phonology and morphology.

GREK 790a[u], Syntax and Stylistics. Victor Bers.
TTh 9–10.15
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] and 799b[u], Survey for the Major in Classics: History of Greek Literature. Stephen Colvin [F], Victor Bers [Sp].
MWF 1.30–2.20 [F], TTh 9–10.15 [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 710b[u], Livy. Celia Schultz.
MWF 10.30–11.20
Focuses on the first decade of Livy's *Ab Urbe Condita.*

LATN 721a[u], Vergil's *Aeneid*. Celia Schultz.
MWF 10.30–11.20
An in-depth study of Vergil's *Aeneid* within its political context.

LATN 744a[u], The Roman Empire: History in Latin Inscriptions. John Matthews.
W 2.30–4.20
Issues in Roman political, social, religious, and legal history, from the first century B.C. to the fifth century A.D., as seen through Latin inscriptions selected for their inherent interest and variety of content as well as for the explicitly epigraphic questions that they may raise. *Also HIST 522a[u].*

LATN 764b[u], Ovid's *Metamorphoses*. Shilpa Raval.
MWF 1.30–2.20
An intensive introduction to the *Metamorphoses* with particular attention to questions of narrative, gender, politics, and literary history.

LATN 790a[u], Advanced Latin Prose Composition. Ann Ellis Hanson.
TTh 11.30–12.45
An augmented version of LATN 390 (see *Yale College Programs of Study* for description). 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.

LATN 798a[u] and 799b[u], History of Latin Literature. Susanna Braund.
TTh 2.30–3.45 [F], TTh 11.30–12.45 [Sp]
A full survey of Latin literature ranging from the earliest texts to the sixth century C.E., with the main focus on the period of second-century B.C.E. to second century C.E. In the fall term we look at the "public" voices of Latin literature (epic, historiography, oratory) and in the

spring some alternative voices, including the exile, the lover, the philosopher, the satirist, and the poetic inventor. The course oscillates between diachronic, synchronic, generic, and topical models of organization.

CLSS 605b, Greek Papyrology. Ann Ellis Hanson.
M 2.30–4.20
The course surveys literary and documentary papyri of Greek and Roman Egypt, concentrating on documents housed in the Beinecke Library from the late Ptolemaic and Roman periods. Major thrusts include learning to make use of the manifold research aids papyrologists have provided for dealing with the only extensive body of highly diverse texts to survive from the ancient world; manipulation of the papyri as sources for social and other histories; gaining familiarity with the language of the papyri and the reading of literary and documentary hands. Evaluation through a number of short reports and the preparation for publication of previously unpublished papyri in the Beinecke collection.

CLSS 608a, The City of Rome: Topography and History. Carlos Noreña.
T 2.30–4.20
A broad examination of the city of Rome to c. 400 A.D. The first part of the seminar surveys the topography of the city with emphasis on the principal monuments and the articulation of public space. The second part explores various aspects of Rome as a pre-industrial megalopolis, including city administration, provisioning, commerce, population, housing, and daily life.

CLSS 650b, Topics in Roman History and Culture. John Matthews, Susanna Braund.
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 806b, Greek Vase Painting. Judith Barringer.
W 2.30–4.20
A detailed study of Greek vases from Attica and elsewhere in the Greek world — their fabric, ornament, artisans, market, function, and social context — from the Geometric through the late Classical period, c. 750–340 B.C., using both traditional and more theoretical methods (e.g., iconology, semiotics, gender studies, sociohistorical issues). Readings to include both ancient authors and modern scholarship. The course draws heavily on the Yale University Art Gallery's collection, and field trips are scheduled to the Museum of Fine Arts, Boston, and the Metropolitan Museum of Art. *Also HSAR 574b.*

CLSS 835a, Death in Rome: Myths and Monuments, Rituals and Viewers. Björn Ewald.
M 3.30–5.20
An introduction to Roman funerary art from Republican times to c. 300 A.D., in a broad cultural and anthropological context. Topics include burial customs and grave rituals, funerary speeches and inscriptions, as well as the spatial contexts in which the monuments were seen. Special emphasis on Roman sarcophagi, perhaps the most significant body of images from the Roman world. *Also HSAR 578a.*

CLSS 837b, Ancient Literary Criticism. Michael Anderson.
M 2.30–4.20
Greek attitudes toward the nature and functions of literature, mainly poetry, as witnessed in both critical and poetic texts. Principal readings are drawn from Homer, Hesiod, Pindar,

Aristophanes, Callimachus, Plato, Aristotle, Philodemus, Longinus, and ancient scholia. Topics for discussion include inspiration, poetry as memorial, epinician poetry, literature and education, fiction and falsehood, catharsis, stylistic criticism, textual criticism, and the differing concerns of ancient and modern criticism.

CLSS 864b, Latin Prose Fiction. Susanna Morton Braund.
W 2.30–4.20
A detailed study of the three surviving texts of classical Latin that can be viewed as prose fiction: *Satyrica* of Petronius, *Apocolocyntosis* of Seneca, and *Metamorphoses* of Apuleius. These early imperial texs, all of which raise thorny questions concerning title and genre, provoke inquiry about the nature of narrative. Topics include naïve and omniscient narrators; the appropriation of epic narrative structures; other manifestations of intertextuality and parody; the symbolism of food, sex, and excretion; performance and theatricality; and the relationship of knowledge and redemption.

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

CLSS 910a or b, Directed Research.
By arrangement with faculty.

COMPARATIVE LITERATURE

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

Chair
Michael Holquist

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, David Quint

Associate Professor
Ann Gaylin

Assistant Professors
Ala Alryyes, Vilashini Cooppan, Catherine Labio, Pericles Lewis

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 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 Renaissance 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.

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 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, page 361. 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.

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].
T 10.30–12.20 [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 semester on Italy and in the second on northern Europe. *Also ENGL 565a/b, RNST 500.*

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.
Th 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 559a, Sexual Textualities in Fin-de-Siècle Vienna. Leo Lensing.
Th 3.30–5.20
An investigation of the ways in which discourses on sexuality dominated literary and artistic production within Viennese modernism. Readings and visual analysis of Altenberg, Freud, Hofmannsthal, Klimt, Kokoschka, Kraus, Schiele, Schnitzler, and others. Special attention is given to hybrid forms—Altenberg's "inscribed" photographs, Kokoschka's illustrated texts, Kraus's textual and photographic montages—and to creative and polemical interactions—Schnitzler's and Kraus's critiques of psychoanalysis, Kokoschka's and Schiele's revisions of Klimt, Hofmannsthal's responses to Freud. Readings in German, discussion in English. *Also GMAN 692a.*

CPLT 650b, Problems in the Study of Early Modern Print Culture: The Abstraction and Materiality of the Text. Abby Zanger.
F 10.30–12.20
What is a text? A material object, printed, bound, distributed, acquired, and (perhaps?) read? Or is it defined by the series of abstract qualities such as aesthetic excellence, Derridian indecideability, Barthesian readers, or its status as intellectual property? By exploring the nature of the text as understood by French and Anglo-American literary, biographical, and historical notions of print culture, this course reconsiders, via a series of case studies, the now-contested notions of print, authorship, textual property, edition, corpus, censorship, orality, and thus the notion of the text itself. Materials examined are drawn from literature, philosophy, drama, ephemera such as pamphlets, and engraved media such as prints, broadsides, and maps. Figures studied include Shakespeare, Cervantes, Crenne, Montaigne, Descartes, Molière, Lafayette, and others. Secondary readings include Benjamin, Habermas, Anderson, Chartier, Stallybrass, and Bourdieu.

CPLT 672b, Milton. David Quint.
Th 1.30–3.20
Milton's poetry and some of his controversial prose, investigating the relation of the poetry to its historical contexts. Focus is on the literary, religious, social, and political forces that shaped Milton's verse. *Also ENGL 672b.*

CPLT 700a, Heidegger: *The Origin of the Work of Art*. Karsten Harries.
T 10.30–12.20
A critical reading of the central text. Special emphasis is placed on its relationship to Hegel's *Lectures on Aesthetics*. *Also PHIL 700a.*

CPLT 701b, Kant: *The Critique of Judgment*. Karsten Harries.
T 10.30–12.20
Also PHIL 701b.

CPLT 706b[u], The New Map of the World: Vico's Poetic Philosophy. Giuseppe Mazzotta.
T 3.30–5.20
The focus of the seminar is to examine Vico's thought globally and in the historical context of the late Renaissance and the Baroque. Starting with Vico's *Autobiography,* working to his University Inaugural Orations, *On the Study of Methods of Our Time,* the seminar delves into his juridical-political texts and submits the second *New Science* (1744) to a detailed analysis. Some attention is given to Vico's poetic production and the encomia he wrote. The over-arching idea of the seminar is the definition of Vico's new discourse for the modern age. To this end issues such as baroque encyclopedic representations, the heroic imagination, the senses of "discovery," the redefinition of "science," reversal of neo-Aristotelian and neo-Platonic poetics, the crisis of the Renaissance, the role of the myth, etc., figure prominently in the discussions. Taught in English. *Also ITAL 700b[u].*

CPLT 723b, The French Atlantic Triangle and the Literature of the Slave Trade. Christopher L. Miller.
TH 10.30–12.20
An analysis of the Atlantic world that was created by the slave trade, in its French version, as seen through history, philosophy, and literature from the eighteenth through the twentieth century. Readings from Voltaire, the journal of a slave-trading sailor, Rousseau, Madame de Duras, Baron Roger, Mérimée, Sue, Césaire, Sembene, and T. Mandeleau. In English. *Also AFAM 854b, AFST 739b, FREN 939b.*

CPLT 726a, Postcolonial Readings and Colonial Texts. Rolena Adorno.
TH 4–6
This course aims to create a dialogue between colonial writings and postcolonial formulations. Works of El Inca Garcilaso de la Vega, Sor Juana Inés de la Cruz, Bartolomé de las Casas, Guaman Poma de Ayala, and others are examined as texts of their own times and interrogated for their role as emblems of postcolonial discursivity. Each anchors clusters of pertinent theoretical readings, which include Memmi, Appiah, and others. Taught in English. Primary texts in Spanish (some available in English translation); theoretical works in English or Spanish. *Also SPAN 825a.*

CPLT 730b, Spectres of History. Aleida Assman.
W 1.30–3.20
"The past is not dead, it is not even past." This sentence from Faulkner (which was reused by Christa Wolf as the first sentence of her autobiographical novel *Kindheitsmuster*) captures well the experience of an ongoing troubled relationship with traumatic experiences of the past. The aim of the course is to provide an introduction to theoretical approaches to trauma from the point of view of different disciplines and to read literary texts that address the impact of various traumas of history. Texts to be discussed: Shakespeare, *Hamlet*; Leslie Marmon Silko, *Ceremony*; Toni Morrison, *Beloved*; Ruth Klueger, *weiter leben. Also GMAN 730b.*

CPLT 789a, Testimony: Crises of Witnessing in Literature, Psychoanalysis, and History. Shoshana Felman.

W 3.30–5.20

Elie Wiesel has said that our age has invented a new genre, that of testimony. 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, judgement and forgiveness, and the concrete interrelations between language, silence, mourning, injury, identity, and cross-cultural exchange. *Also FREN 789a.*

CPLT 818a[u], Opera in Germany: Mozart to Kurt Weill. Cyrus Hamlin.

MW 1–2.15

Survey of the development of opera in the culture of the German-speaking countries from the end of the eighteenth to the beginning of the twentieth century. Emphasis on the literary and theatrical aspects of these works, with regard to the interaction of text and music and the challenge of performance in the theater. Works considered include Mozart, *Die Zauberflöte;* Beethoven, *Fidelio;* Weber, *Der Freischütz;* Wagner, *Der Fliegende Holländer, Tannhäuser,* and *Die Meistersinger von Nürnberg;* Strauss, *Elektra, Der Rosenkavalier, Ariadne auf Naxos,* and *Die Frau ohne Schatten;* Berg, *Wozzeck;* and Weill, *Rise and Fall of the City of Mahagonny.* No knowledge of German or training in music is required. Readings in English; conducted in English. *Also GMAN 655a.*

CPLT 852a, Literature and Public Life, 1750–1800. David Bromwich.

M 10.30–12.20

This seminar is about the consolidation and the decline of the English Augustan ideal of public life. We look at some ways in which the study of history, political thought, and the arts were brought into conjunction by the use of such metaphors as "representation," and we discuss the implications of the belief in a public ordering of sentiments and cultivation of feelings. A question asked throughout is what, if anything, connects the eighteenth-century idea of the common good with the emergent idea of "consciousness"? *Also ENGL 751a.*

CPLT 853a, Word and Image from Lessing to Foucault. Thomas Otten.

TH 3.30–5.20

A study of the relations — the fictive resemblances and inevitable assimilations — of verbal and visual media in theory from Lessing's *Laocoön* to Foucault's *This is Not a Pipe*, along with close analysis of poems and novels by Dryden, Pope, Keats, Browning, Dante Gabriel Rossetti, Hawthorne, James, Stevens, Ashbery, May Swenson, and Jorie Graham. As that list suggests, the course considers several different kinds of intersections between literature and art: the ecphrastic tradition (passages which describe painting or sculpture), the visual shapes of literary texts, the *Künstlerroman* (the novel tracing an artist's development), and the concept of portraiture. *Also ENGL 953a.*

CPLT 854b, Magic Realism in the Americas. Vera Kutzinski.

M 10.30–12.20

This seminar focuses on remappings of the subject within twentieth-century counterrealist writing from different parts of the Americas. Authors include Isabel Allende, Robert Antoni, Erna Brodber, Alejo Carpentier, William Faulkner, Janet Frame, Gabriel García Márquez, Toni Morrison, Wilson Harris, Pauline Melville, Juan Rulfo, and Lawrence Scott. *Also AFAM 759b, AMST 767b, ENGL 922b.*

CPLT 919b, Eisenstein, Pudovkin, Vertov. John MacKay.

M 1.30–3.20

An examination of all the major cinematic and theoretical works of Sergei Eisenstein, Vsevolod Pudovkin, and Dziga Vertov, centering on the period 1925–1945. We consider the films in light of the theories, the filmmakers in light of one another, and Soviet film and theory in light of contemporary developments worldwide. Attention is also paid to the international legacy of these filmmakers, and particularly their reception during the 1960s and 1970s (Godard, Marker, Barthes). No knowledge of Russian required. *Also RUSS 747b.*

CPLT 934b, The Archive of Popular Front France. Dudley Andrew.

T 3.30–5.20

Taken more as a cultural than as a political movement, the Popular Front names a period during which the French literary establishment found itself — willingly or not — writing for an enlarged audience, and joining or competing with other expressions and practices. I propose labeling these expressions and practices an "archive," for they make available a variety of historical and critical trajectories without privileging one to the exclusion of others. This seminar examines the changing voice of the novel (Céline and Malraux, certainly) in the context of popular fiction. More fundamentally, it looks at the relation of book publishing to journals, radio, cinema, music hall, and the highly publicized expositions of 1931 and 1937. Finally, it considers the status of "disciplines" within and outside the academy and in a highly politicized milieu: history, ethnography, psychoanalysis, criticism, and philosophy all underwent changes during the 1930s that we need to register, if not account for. In addition to common readings each week, participants may expect to screen at least one film per week and rummage in journals of the period. Competency in French is desirable, but not required.

CPLT 977b, Tolstoy, Novelness, and World Literature. Michael Holquist.

T 1.30–3.20

Although he created works in many different genres, Tolstoy is primordially associated with the novel. There are those who think of him as *the* novelist. And yet Tolstoy himself despised generic thinking in general, and normative concepts of "the novel" in particular. In this seminar we examine some of the contradictions that swirl around the idea of the novel as it is complicated by the case of Tolstoy. We of course read *War and Peace, Anna Karenina,* and *Resurrection,* as well as some of Tolstoy's short fiction and polemical essays. In addition we examine theoretical speculation about novels that might be helpful in understanding their peculiarity in shaping Tolstoy's achievement. In particular, we meditate questions about the relation between the novel and its complex filiation with concepts of 'Europe.' Readings and discussion in English, but Russian, German, and French texts are read in the original by those having the relevant languages. *Also RUSS 673b.*

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*), Stanley Eisenstat, Joan Feigenbaum, Michael Fischer, David Gelernter, Paul Hudak, Ravindran Kannan, Drew McDermott, Vladimir Rokhlin, Martin Schultz, Edward Tufte (*Political Science*), Steven Zucker

Associate Professors
James Aspnes, Peter Belhumeur (*Electrical Engineering*), Zhong Shao

Assistant Professors
Daniel Friendly (*Electrical Engineering*), Dana Henry (*Electrical Engineering*), Arvind Krishnamurthy, Yorgis Makris (*Electrical Engineering*), Carsten Schuermann

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 (not including CPSC 690 or 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, page 361.

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. Carsten Schürmann.
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.
Software structures, architectures, and algorithms for parallel and distributed applications, focusing on coordination frameworks for asynchronous concurrency (on the code that creates and manages multiple processes and performs the interprocess communication necessary to create integrated ensembles). Coordination languages and program-development environments. The fast-changing WAN-software picture. Parallel and distributed programming exercises on LANs. (Taught in alternate years.)

CPSC 525a[u], Distributed Computing. James Aspnes.
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 529b[u], Functional Programming.
Methods for synthesizing functional programs from formal specifications and verifying correctness properties of programs. Topics include higher-order functions, pattern matching, abstract algebraic datatypes, polymorphic types, advanced typing issues such as type classes and higher-order modules, lazy/eager evaluation, equational reasoning, and realization of effects via continuations and monads. The functional languages Haskell and/or ML are used in the course. (Taught in alternate years.)

CPSC 530b[u], Formal Semantics. Zhong Shao.
MWF 11.30–12.20
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 537b[u], Introduction to Databases.
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. Daniel Friendly.
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 540a[u], Numerical Computation I. Martin Schultz.
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 560b[u], Theoretical Methods in Computer Science. Joan Feigenbaum.
TTh 2.30–3.45
This course offers an introduction to the main areas of theoretical computer science and provides a theoretical background for research in computer science. Topics from three areas: (1) complexity theory: review of machine models (Turing and RAM machines), basic complexity classes (polynomiality, nondeterminism, randomization, parallel models), measures of complexity (computational, communicational, informational); (2) algorithms and their analysis (fundamental algorithms in graph theory, number theory, sorting, and searching); (3) data structures and their role in the efficient implementation of algorithms.

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 569b[u], Randomized Algorithms.
Beginning with an introduction to tools from probability theory including some inequalities like Chernoff bounds, the course covers randomized algorithms from several areas; graph algorithms, algorithms in algebra, approximate counting, probabilistically checkable proofs, and matrix algorithms. (Not taught every year.)

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 574b, Autonomous Systems.
The basic principles of building a purposeful autonomous robotic system. Lectures cover the theory and practice of control systems, sensors, representation of the environment, and planning. Students construct a simulated autonomous system, and are given the opportunity to work with a real mobile robot. (Taught in alternate years.)

CPSC 575b, Computational Vision and Biological Perception. Steven Zucker.
TTh 1–2.15
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 576b[u], Computer Vision. Peter Belhumeur.
Computational accounts of visual perception: image formation, image transformations, line and curve extraction, segmentation, shape, stereo, motion, texture, and model-based object recognition. A review of relevant mathematical tools, algorithms, and results from studies of human vision. *Also ENAS 914b[u].*

[**CPSC 577a[u], Neural Networks.**]

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 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
Edward Kamens

Director of Graduate Studies
John Whittier Treat (307 HGS, 432.2864, john.treat@yale.edu)

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

Assistant Professors
Christopher Hill, Charles Laughlin

Senior Lectors
Anton Chen, Wen-tao Cheng, Seungja Choi, Koichi Hiroe, Zhengguo Kang, Esther Kuo, Yoshiko Maruyama, John Montanaro, Ling Mu, Michiaki Murata, Masahiko Seto, Jaehoon Shim, Wei Su, William Zhou

Lectors
Hairong Cheng, Hiroyo Nishimura, Mari Stever, Li-li Teng, Jing Wu

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, 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 Japanese literature may substitute Chinese (modern or literary Chinese) for one of the European languages.

At the end of the second full academic year, the student must take a written examination in the language of his or her specialization. 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 Chinese must pass a reading test in Japanese; 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 submit it 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 and dissertation topic.

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 are appointed as teaching fellows in their third and fourth years in the Graduate School.

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 515u, Elementary Modern Chinese. William Zhou and staff.
515–1: MTWThF 9.30–10.20
515–2: MTWThF 9.30–10.20
515–3: MTWThF 9.30–10.20
515–4: MTWThF 10.30–11.20
515–5: MTWThF 10.30–11.20
515–6: MTWThF 10.30–11.20
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 Beginners. William Zhou and staff.
518–1: MTWThF 9.30–10.20
518–2: MTWThF 9.30–10.20
Elementary modern Chinese for students who speak Chinese but have no knowledge of reading or writing. To be followed by CHNS 533.

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. Prerequisite: CHNS 515 or equivalent.

CHNS 533[u], Intermediate Modern Chinese for Advanced Beginners. Zhengguo Kang, Ling Mu.
533–1: MTWThF 8.30–9.20
533–2: MTWThF 9.30–10.20
An intermediate course designed for students with sufficient oral proficiency, concentrating on intensive training in listening, speaking, reading, and writing. Prerequisite: 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 550[u], Advanced Modern Chinese. Wen-tao Cheng.
550–1: MTWThF 9.30–10.20
550–2: MTWThF 10.30–11.20
Third level of the standard track foundational sequence of modern Chinese language study in the areas of speech, listening, reading, and writing. Audio-visual materials, oral presentations, skits, and longer and more frequent writing assignments are used to assimilate more sophisticated grammatical structures. Students are also introduced to a wide variety of written forms and styles. Use of both traditional and simplified forms of Chinese characters. After CHNS 530.

CHNS 553[u], Advanced Modern Chinese for Advanced Learners. Wei Su.
MTWThF 9.30–10.20
Completes the advanced learner track in Chinese. Intended for students with strong speaking and listening skills. Completes in one year the transition from simplified to authentic texts accomplished over the third and fourth years of the standard track (CHNS 550 and 556). Readings and exercises on contemporary Chinese social life supplemented with documents, published articles, and excerpts from television broadcasts and films. Use of both simplified and traditional forms of Chinese characters. After CHNS 533.

CHNS 556[u], Readings in Contemporary Chinese Texts. Wei Su.
556–1: MW 11.30–12.45
556–2: TTh 11.30–12.45
Completes the standard track 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 557[u], Readings in Modern Chinese Short Stories. Wen-tao Cheng and Charles Laughlin.
TTh 10–11.15
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. Prerequisite: CHNS 550 or equivalent.

CHNS 560[u], Introduction to Literary Chinese. Hugh Stimson.
MWF 10.30-11.20
Reading and interpretation of texts in various styles of literary Chinese (*wenyan*), with attention to basic problems of syntax and literary style. Prerequisite: CHNS 530 or equivalent.

CHNS 561[u], Literary Chinese through Modern Chinese. Zhengguo Kang.
TTh 1–2.15
Integrates the learning of literary Chinese (*wenyan*) with acquisition of modern language skills, with attention to basic problems of syntax and literary style. Conducted in Chinese. Prerequisite: CHNS 530 or equivalent.

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 570a[u], Man and Nature in Chinese Poetry. Kang-i Sun Chang.
TTh 2.30–3.45
An exploration of concepts of nature and politics in traditional Chinese poetry and criticism, with special attention to historical contexts and cultural meanings. Topics include the centrality of lyricism; depictions of nature and self-cultivation; poetic talent and imagination; travel in literature; the relation of poetry to painting; erotic love and political allegory; images of utopian communities as compared to the Western notion of Utopia; treatments of literary friendships, patrons, 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 will be assigned.

CHNS 571a[u], Fantasy and Romance in Chinese Fiction and Film. Charles Laughlin.
MW 1–2.15
Traces the emergence of imaginative fiction in premodern China, with emphasis on the crucial role played by themes of love, religious insight, and the supernatural. Includes short stories from the third to the twentieth century as well as selected films based on them. No knowledge of Chinese required.

[**CHNS 574b[u], The Revolutionary Tradition in Modern Chinese Literature.**]

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

CHNS 576b[u], Gender in the Chinese Poetic Tradition. Kang-i Sun Chang.
TTh 2.30–3.45
A study of women poets in traditional China, with some attention to representation of women in male poetry as well. Issues include literary canon and traditions, feminine voice and allegory, the abandoned woman, women in exile, the dichotomy of "yin" and "yang," gender and genre; body and sexuality, notions of love, aesthetics of illness, and the function of memory. All readings are in translation; no knowledge of Chinese is assumed. For those who can read the language, additional readings in Chinese will be assigned.

[**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 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. Kang-i Sun Chang.
W 10:30–12:20
A study of major themes in Chinese love poetry and criticism of love poetry, with special attention to how authors in traditional China defined their love poems and their audiences. Topics include authors' strategies of allegory and self-promotion; the implications of generic choice; the role of critics and readers; the function of commentary; issues of gender and sexuality; love and religious experience; possible impact on Chinese modernity. Writers include Tao Qian, Du Fu, Li Shangyin, Li Qingzhao, Qian Qianyi, Gong Zizhen, and Gu Taiqing.

CHNS 670, Advanced Literary Chinese. Hugh Stimson.

CHNS 689b, Middle Chinese Phonology. Hugh Stimson.
The sound system of seventh-century Chinese as presented in the Guang Yun and its development into the sounds of modern Mandarin.

CHNS 695a, The Poetics of Place in Modern Chinese Literature. Charles Laughlin.
W 2.30–4.20
Readings of twentieth-century Chinese literary works from all genres in the original Chinese, arranged around the topic of the literary construction of space and place.

CHNS 696a, Chinese Literary Criticism. Kang-i Sun Chang.
W 10:30–12:20
A reading of the *Han shi waizhuan*, *Benshi shi*, and later *shihua* in the contexts of both ancient Chinese culture and commentary traditions. The goals of this course are to understand the various concepts of "culture" that proliferated in traditional China and to examine their persistent influences. In what way is traditional Chinese literary criticism largely a form of anecdotal account? Why is contextualization such an important part of interpretation? What constitutes the community of the *shihua* readers (both male and female)? All these questions are addressed in the seminar.

CHNS 697b, Critical Debates in Modern Chinese Literary Studies. Charles Laughlin.
W 2.30–4.20
This course approaches the history of modern Chinese literary studies by means of controversial or otherwise influential scholarly contributions and critical responses to them. Chinese literary works at the center of such debates are also assigned.

[**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 517b[u], Elementary Japanese I. Mari Stever and staff.
517b – 1: MTWThF 10.30 – 11.20
517b – 2: MTWThF 10.30 – 11.20
First term of a three-term sequence that provides a semi-intensive introduction to modern Japanese as an alternative to Intensive Japanese (JAPN 520a, 521b). Drills in pronunciation and sentence patterns, conversations, and lectures on grammar. Introduction to reading and writing *kana* and about sixty *kanji*. To be followed by JAPN 518a and 519b. Credit only upon completion of JAPN 518a.

JAPN 518a[u], Elementary Japanese II. Mari Stever and staff.
518a – 1: MTWThF 11.30 – 12.20
518a – 2: MTWThF 10.30 – 11.20
518a – 3: MTWThF 10.30 – 11.20
Second term of Elementary Japanese. Drills in conversation; lectures on grammar; reading and writing, including the introduction of about one hundred new *kanji*. Prerequisite: JAPN 517b or equivalent. Credit only upon completion of 519b or 521b.

JAPN 519b[u], Elementary Japanese III. Hiroyo Nishimura and staff.
519b – 1: MTWThF 11.30 – 12.20
519b – 2: MTWThF 11.30 – 12.20
519b – 3: MTWThF 11.30 – 12.20
Third term and completion of Elementary Japanese. Drills in conversation; lectures on grammar; reading and writing, including the introduction of 150 new *kanji*. Prerequisite: JAPN 518a or equivalent.

JAPN 520a[u], Intensive Japanese I. Michiaki Murata and staff.
MWF 8.30 – 10.20, TTh 9 – 10.15
An intensive course in spoken Japanese; drills in pronunciation and conversation; lectures on grammar; and an introduction to reading and writing, which includes *katakana, hiragana,* and about 75 *kanji.*

JAPN 521b[u], Intensive Japanese II. Michiaki Murata and staff.
MWF 8.30 – 10.20, TTh 9 – 10.15
Second-term intensive course in modern spoken Japanese. Continued drills and lectures; extensive reading and writing practice, including about 225 additional *kanji.* After JAPN 520a.

JAPN 540[u], Advanced Modern Japanese. Masahiko Seto, Yoshiko Maruyama, and staff.
540 – 1: MWF 9.30-10.20, TTh 9 – 10.15
540 – 2: MWF 9.30-10.20, TTh 9 – 10.15
The course emphasizes continued development in both written and spoken Japanese while reinforcing the previously learned patterns and structures. Besides the text, teaching materials include audio and video tapes for listening comprehension and speaking practice. Multi-media materials are also provided to facilitate the student's learning. At the end of the year students will be ready to begin reading short stories and simple articles from newspaper and magazines. Prerequisite: JAPN 519b, 521b, or equivalent.

JAPN 550[u], Advanced Modern 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 and discussion of television and radio broadcasts. Writing practice includes diary, letters, essays, and criticism. Prerequisite: JAPN 540 or equivalent.

JAPN 557u, Readings in Contemporary Media and Literature. Masahiko Seto, Christopher Hill.
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
This course, intended for those at the fourth-year level in their study of modern Japanese, is designed to help students prepare for the leap into either graduate-level courses in Japanese literature or the study of written Japanese without the aid of a classroom teacher.

JAPN 560au, Introduction to Literary Japanese. Edward Kamens.
TTh 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. Edward Kamens.
T 1.30–3.20
Close analytical readings of a sequence of selections from texts of the Nara through Tokugawa periods: prose, poetry, and various genres. Prerequisite: JAPN 560 or equivalent.

JAPN 565b, Literary Chinese (*Kambun*) for Students of Japanese. Stanley Weinstein.
An introduction to the traditional Japanese method of reading literary Chinese texts. Selections from the dynastic histories and pre-Ch'in philosophers.

[**JAPN 570au, Premodern Japanese Literary Tradition.**]

JAPN 572bu, *The Tale of Genji* and *The Pillow Book*. Edward Kamens.
M 7–8.50
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.

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

JAPN 577au, Modern Japanese Fiction and Its Margins. Christopher Hill.
MW 1–2.15
The mainstream and the margins of modern Japanese fiction from the turn of the century to the 1970s. Readings include canonical authors and works by members of ethnic minorities, women, and self-declared decadents. No knowledge of Japanese required.

[**JAPN 578au, Modern Japanese Fiction in Translation.**]

[**JAPN 579au, Structure of Japanese.**]

JAPN 581bu, Japanese Literature after 1970. John Whittier Treat.
TTh 11.30–12.45
A continuation of JAPN 578a, this course reads and examines Japanese literature published between 1970 and the present. Writers may include Murakami Ryu, Maruya Saiichi, Shimada Masahiko, Nakagami Kenji, Yoshimoto Banana, Yamada Eimi, Murakami Haruki, and Medoruma Shun. Two papers and participation in classroom discussions required. No knowledge of Japanese required.

JAPN 700, Readings in Premodern Japanese Literature. Edward Kamens.
F 9–10.50
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. Christopher Hill.
T 3.30–5.20
The transformations of literature and thought in the Meiji period. Topics include vernacularization, urban growth, and the representation of space, gender, and nationalism.

JAPN 870b, The Literary and the Visual in Taisho Japan. John Whittier Treat, Mimi Yiengpruksawan.
W 3.30–5.20
The Taisho period (1912–1926) was one of intense ferment for both Japanese writers and painters, many of whom closely collaborated. This seminar examines prominent figures of the day who contributed significantly to Taisho Modernism in either the plastic or the literary arts or both. These figures include the White Birch School (Shirakabaha) writers and painters; "I-novel" practioners such as Chikamatsu Shuko; masters of oil self-portraiture such as Kishida Ryusei; and high modernists such as Kawabata Yasunari and Akutagawa Ryunosuke. Guest lecturers address special topics throughout the semester. Prerequisites: fluent reading ability in modern Japanese and basic familiarity with the history of modern Japanese art; or the permission of the instructors. *Also HSAR 805b.*

JAPN 885a, 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 500a[u], Premodern Korea in the East Asian Context. Jae-hoon Shim.
MW 2.30–3.45
Korean civilization from prehistoric times to 1800. Emphasis on the archaeological record, interactions with China and Japan, and religious and state ideologies. All readings in English.

[**KREN 501a[u], Modern Korea in the World.**]

KREN 515[u], Elementary Korean. Seungja Choi and staff.
515–1: MTWThF 9.30–10.20
515–2: MTWThF 9.30–10.20
A beginning course in modern Korean. Drills in oral expression, lectures on grammar, and an introduction to the writing system (*Hankul*).

KREN 535[u], Intermediate Korean. Seungja Choi and staff.
535–1: MTWThF 10.30–11.20
535–2: MTWThF 10.30–11.20
Continued development of skills in modern Korean, spoken and written, leading to intermediate-level proficiency. Prerequisite: KREN 515 or permission of instructor.

KREN 550[u], Advanced Modern Korean. Jae-hoon Shim.
MWF 9.30–10.20
An advanced Korean language course designed to further develop students' proficiency in 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*) (205 OAG, 56 High Street, 432.2682, mimi.yiengpruksawan@yale.edu)

Director of Graduate Studies
John Treat (307 HGS, 432.2864, john.treat@yale.edu)

Professors
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*), John Whittier Treat (*East Asian Languages & Literatures*), Stanley Weinstein (*East Asian Languages & Literatures; Religious Studies*), Mimi Yiengpruksawan (*History of Art*)

Assistant Professors
Michael Austin (*History*), Christopher Hill (*East Asian Languages & Literatures*), Sharon Kinsella (*Sociology*), Pierre-François Landry (*Political Science*), Charles Laughlin (*East Asian Languages & Literatures*)

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 may be completed in either one or two years of course work at Yale, depending upon the extent of prior East Asian study and of previous college-level study of East Asia. Normally, students entering the program are expected to have completed the equivalent of *at least one intensive* year of study of Chinese or Japanese (or two years of intensive language study or the equivalent, if the program is to be completed in one year of course work at Yale) and should present evidence thereof at the time of application. 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. A program of study for completion of the degree in two years would normally include two to four terms of language study and additional courses, as described above, totaling fourteen courses. It is very likely that students who have taken the undergraduate major in Chinese or Japanese or in East Asian Studies at Yale, or a comparable course of study elsewhere, will be able to complete their M.A. program in one year.

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 M.A. Degree

The course of study consists of (1) courses in Chinese or Japanese language (at least through Yale's third-year advanced level or its equivalent) and (2) an approved group of courses relating to China or Japan (and, where appropriate, to the theoretical and methodological tools of a discipline in which the student may plan to earn a Ph.D.) sufficient in number to reach a total of at least eight term courses for a program to be completed in one year or at least fourteen term courses for a program to be completed in two years. Students who take an intensive intermediate language course in the first year of a two-year program receive three term credits for completion of both terms of that course.

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; Web site, www.yale.edu/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, 432.3837, www.eeb.yale.edu
M.S., Ph.D.

Chair
TBA

Director of Graduate Studies
Margaret Riley (101 OML, 432.3837)

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

Associate Professors
Junhyong Kim, Sean Rice, Margaret Riley, Anne Yoder

Assistant Professors
David Skelly (*Forestry & Environmental Studies*), Paul Turner

Lecturers
Adalgisa Caccone, Theodora Pinou, Nancy Rosenbaum, Marta Martinez Wells

Fields of Study

The Department of Ecology and Evolutionary Biology (EEB) 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 a survey course in methods and research design and participate in (1) a program of ethics of research and authorship; (2) weekly EEB seminars; and (3) symposia of faculty and graduate student

research. In addition, graduate students must enroll in a minimum of three additional graduate-level courses (numbered 500 and above) during their first two years of study. All students are required to teach two courses 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 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.

Teaching experience is regarded as an integral part of the graduate training program. All students are required to serve as teaching fellows for two terms, normally at the Teaching Fellow 2 level. This teaching is typically done during the first two years of 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 EEB department also requires an average grade of at least High Pass in course work during the first two years of study.

Master's Degrees

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 501a, Methods and Research Design. Staff.
This course provides an introduction to the methods and approaches generic to most research in the biological sciences. Topics include quantification and measurement, data analysis, sequence analysis, phylogenetic reconstruction and the comparative method, morphometrics, experimental design, presentation of results, and grant writing. This course is required for all first-year EEB students.

E&EB 510a[u], Introduction to Statistics: Life Sciences. Joseph Chang, Junhyong Kim.
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.

E&EB 515a[u], Conservation Biology and the Environment. Jeffrey Powell, Oswald Schmitz, Stephen Stearns, Adalgisa Caccone.

MW 9.30–10.20, 1 HTBA

An introduction to the basic ecological and evolutionary principles underpinning efforts to conserve the earth's biodiversity. These principles are then examined in the context of efforts to halt the rapidly increasing disappearance of both plants and animals. Case studies are examined in detail. While some sociological and economic issues are discussed, the emphasis is on the biological aspects of these crucial problems.

E&EB 520a[u], Population Ecology. Staff.

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. Margaret Riley, 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.**]

[**E&EB 530a[u], Field 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. Marta Martinez Wells.

MW 11.30–12.45

An introduction to animal behavior, including proximate causes, development, and control of behavior; communication; mating systems and sexual selection; and the evolution of social systems.

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

TTh 9–10.15

A consideration of social and ethical problems raised by advances in biological and medical research. Several timely topics examined in depth, with frequent student oral reports.

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.

[**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 570b[u], Herpetology. Theodora Pinou.
TTh 1–2.15
A comparative approach to the evolution, anatomy, physiology, ecology, behavior, geographic distribution, and classification of amphibians; venoms and toxins also discussed.

E&EB 571Lb[u], Laboratory for Herpetology. Theodora Pinou.
T 2.30
Laboratory and field studies of amphibians and reptiles. Examination of the morphology and systematics of amphibians and reptiles; various phylogenetic methods of sampling and species identification.

E&EB 610b[u], Evolutionary Genetics. Jeffrey Powell.
Introduction to population genetics and phylogenetics. Theoretical fundamentals and empirical data, with an emphasis on molecular aspects.

E&EB 615La[u], Laboratory in Molecular Systematics. Adalgisa Caccone.
W 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 620a, Biology and Conservation of Endangered Species and Biodiversity.**]

[**E&EB 621b, World Population and Environmental Issues.**]

E&EB 628a[u], Comparative Physiology. Theodora Pinou.
TTh 11.30–12.45
A comparative approach to the diversity of physiological processes employed by different animal species, and how these adaptations are related to the physical environment.

E&EB 629La[u], Laboratory for Comparative Physiology. Theodora Pinou.
Th 1.30
An opportunity to examine various physiological principles of animals under varying environmental conditions. Use of live animals is limited. Some principles are examined using computer simulation.

[**E&EB 640b[u], Community Ecology.**]

[**E&EB 641Lb[u], Laboratory for Community Ecology.**]

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

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

E&EB 660b[u], Wildlife Conservation Ecology. Oswald Schmitz.
The course explores the evolutionary ecological basis for animal behavior and life history, how behavior evolves, and what factors ultimately shape animal decision making and life histories. Links animal behavior with population dynamics using demographic models that translate behavior into life history strategies. Finally the course examines how environmental perturbations influence animal life histories to alter population structure and dynamics. *Also F&ES 560b.*

E&EB 665b[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 760b.*

[**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. Adalgisa Caccone.
T 3.30–5.20
The goals of this seminar are to understand the potential and limits of a wide range of molecular approaches to the study of ecological and systematic oriented questions with particular emphasis on conservation biology questions. It includes student presentations together with lectures and a discussion of primary literature. *Also F&ES 578b.*

E&EB 680a[u], Population Biology. Stephen Stearns.
TTh 9–10.15
Advanced discussion of life history evolution, sex allocation theory, the evolution of sex, the evolution of phenotypic plasticity, and evolutionary conflict theory. Instructors give introductory lectures, students pick topics and present lectures themselves.

[**E&EB 800b, Computational Analysis of Biological Information.**]

E&EB 808a, Topics in the Statistical Analysis of Genomic Data. Junhyong Kim, Joseph Chang.
Several recently developed statistical methods have either already played an important role in the analysis of genomic and post-genomic data or appear to be promising candidates to do so. We study hidden Markov models, Bayesian networks, support vector machines and kernel methods, and perhaps other topics to be determined. For each topic, instructors present introductory lectures on the statistical theory, models, and methods of analysis. Students work on projects and present results, which may include computer implementations of the statistical techniques, analyses of biological sequence and gene expression data using available programs, and reports on research papers. Although there are no specific prerequisites, the course makes substantial use of probability theory, statistics, introductory biology, and computation; students without background in some of these areas may need to do additional work and should consult the instructors before enrolling. Open to undergraduates with permission of instructors.

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 827b, Advanced Topics of Computational Biology: Emergence and Evolutionary Innovation.**]

E&EB 845a, Advanced Evolutionary Theory. Sean Rice.
TTh 4–5.30
A lecture course covering the mathematical and conceptual basis of the major branches of evolutionary theory, including traditional and emerging areas. Emphasis on the biological insights that are gained from the theory. Open to undergraduates with permission of the intructor.

E&EB 900a–b, First-Year Introduction to Research and Rotations. Margaret Riley.

E&EB 950a or b, Second-Year Research.
By arrangement with faculty.

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 36, 432.3719, truman.bewley@yale.edu)

Professors
Donald Andrews, Steven Berry, Truman Bewley, William Brainard, Donald Brown, Eduardo Engel, Robert Evenson, Ray Fair, John Geanakoplos, Pinelopi Goldberg, Timothy Guinnane, Koichi Hamada, Gerald Jaynes, Michael Keane, Alvin Klevorick, Richard Levin, Robert Mendelsohn, Stephen Morris, Barry Nalebuff, William Nordhaus, David Pearce, Merton Peck, Peter Phillips, Benjamin Polak, Gustav Ranis, John Rust, Herbert Scarf, T. Paul Schultz, Robert Shiller, Martin Shubik, T. N. Srinivasan, Christopher Udry

Associate Professors
Dirk Bergemann, Jean Lanjouw, Philip Levy

Assistant Professors
Patrick Bayer, Hanming Fang, Donato Gerardi, George Hall, Ann Huff-Stevens, Stefan Krieger, Carolyn Moehling, Giuseppe Moscarini, Martin Pesendorfer, Christopher Timmins

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 passing grade 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. (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 pages 363–64 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 206 of this publication.

Program materials are available upon request to the Director of Graduate Studies, Economics Department, Yale University, PO Box 208268, New Haven CT 06520-8268. See our Web site: www.econ.yale.edu/

Courses

ECON 500a, General Economic Theory: Microeconomics. Truman Bewley, Benjamin Polak.
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.
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. Stefan Krieger, 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, Leeat Yariv.
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. Dirk Bergemann, Tim Van Zandt.
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. David Pearce.
A forum for advanced students to examine critically recent papers in the literature and present their own work.

ECON 525a, Advanced Macroeconomics: I. Robert Shiller, Robert Townsend.
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, General Economic Equilibrium Theory: Existence, Uniqueness, and Tatonnement Stability. Donald Brown.
A systematic introduction to general equilibrium theory, noncooperative game theory, and social choice, emphasizing the relation between individuals and group rationality.

ECON 531b, Mathematical Economics: II. John Geanakoplos.
Primary focus on general equilibrium analysis. Topics include consumer preference theory, demand functions, fixed-point theorems and their application to demonstrating the existence of competitive equilibria, the computation of equilibrium prices, Pareto optimality, the core of an economy, and related topics in n-person game theory.

[**ECON 532a[u], General Equilibrium under Uncertainty.**]

[**ECON 533a and b, Workshop on Discrete Mathematics and Applications.**]

ECON 535b, Applications of General Equilibrium Theory. Herbert Scarf, T. N. Srinivasan.
A number of examples of applied general equilibrium models are presented, selected from the fields of international trade, poverty and economic development, environmental studies, finance and real business cycles. Algorithms for the solution of general equilibirum models are also discussed.

ECON 537a and 538b, Microeconomic Theory Workshop. Staff.
Presentations by research scholars and participating students.

ECON 540a and 541b, Workshop in International and Macroeconomics. Faculty.
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.
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. Robert Evenson.
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. Xavier Gine.
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. Offer Lieberman.
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. Donald Brown.
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 552a, 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 554b, Econometrics V.**]

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 its applications in econometrics. 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. Theory and empirical application discussed.

ECON 558a, Statistics and Econometrics. Offer Lieberman.
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 559b, Advanced Topics in Econometrics. Katsumi Shimotsu, Zhijie Xiao.
Higher-order asymptotics, inference on regression quantiles, semiparametric and nonparametric estimation in time series regression, long-range dependence, and inference about memory.

[**ECON 560a, Computational Economics.**]

ECON 567a and 568b, Econometrics Workshop. Staff.
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. Carolyn Moehling.
This course studies the process of economic growth as it has occurred in the American economy.

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. Jean Lanjouw, Martin Pesendorfer.
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.
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. Hanming Fang, Martin Pesendorfer.
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. T. Paul Schultz.
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. Jonathan Ingersoll.
Theory of single-period financial models. Risk aversion, stochastic dominance, the canonical portfolio problem, the fundamental theorem of asset pricing, mean-variance analysis and its uses, mutual fund separation theory, arbitrage pricing theory, asset pricing in complete markets, and selected empirical topics. *Also MGMT 740a.*

ECON 671b, Financial Economics II. Zhiwu Chen.
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, Karine Van der Straeten.
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. Hanming Fang, William Brainard.
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 700b, International Economics: Trade. Pinelopi Goldberg.
Pure theory of international trade covering the following topics: classical theory of comparative advantage and its modern counterpart, neoclassical theory (Heckscher-Ohlin-Samuelson model); recent models of trade with scale economies, product differentiation, and monopolistic competition; models of trade investment, innovation, and growth; gains from trade, commodity price-factor relations, theory of commercial policy.

ECON 701a, International Economics: Finance. Staff.
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 702b, International Economics. T. N. Srinivasan.
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. Cheryl Doss.
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 730a, Economic Development. T. N. Srinivasan.
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. T. Paul Schultz.
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 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. Faculty.
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 802a[u], Economic Development of Japan.**]

[**ECON 804b[u], Economic Problems of Latin America.**]

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
Mark Reed

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
Peter Belhumeur, Jung Han, Lawrence Staib, Hemant Tagare

Assistant Professors
Daniel Friendly, Dana Henry, Richard Lethin (*Adjunct*), Yiorgos Makris, Janet Pan

FIELDS OF STUDY

Fields include control systems, neural networks, communications and signal processing, intelligent sensors, biomedical image processing, microelectronic materials and devices, nanoelectronic science and technology, optoelectronics, computer engineering, VLSI design and routing, computer vision and image processing, and robotics.

For admissions and degree requirements, and for course listings, see Engineering and Applied Science, pages 120–32.

ENGINEERING AND APPLIED SCIENCE

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

Dean
Paul Fleury

Director of Graduate Studies
Alessandro Gomez (432.4252, grad-engineering@yale.edu)

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
A. Douglas Stone

Professors
William Bennett, Jr. (*Emeritus*), Richard Chang, Joseph Dillon, Jr. (*Adjunct*), Paul Fleury, John Gore, Robert Grober, Victor Henrich, Arvid Herzenberg (*Emeritus*), Pierre Hohenberg (*Adjunct, Physics*), Marshall Long, Tso-Ping Ma, Daniel Prober, Nicholas Read, Mark Reed, Subir Sachdev, Ramamurty Shankar, Mitchell Smooke, Katepalli Sreenivasan, A. Douglas Stone, John Tully, Robert Wheeler (*Emeritus*), Werner Wolf, Jerry Woodall

Associate Professors
Adam Anderson, Sean Barrett, Mark Kasevich

Assistant Professors
Charles Ahn, Janet Pan, Robert Schoelkopf

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, magnetic resonance imaging, and medical instrumentation.

Chemical Engineering

Chair
Lisa Pfefferle

Professors
F. Peter Boer (*Adjunct*), Daniel Crothers (*Adjunct, Chemistry*), Menachem Elimelech, Thomas Graedel, Gary Haller, William Hancock (*Adjunct*), Csaba Horváth, Lisa Pfefferle, Joseph Pignatello (*Adjunct*), Daniel Rosner, L. Lee Wikstrom (*Adjunct*), Kurt Zilm (*Adjunct, Chemistry*)

Associate Professors
Eric Altman, Gaboury Benoit, Michael Loewenberg, John Walz

Assistant Professors
Roger Ely, Marshall Grant

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, molecular beams, aerosol science and technology, surface science, and biotechnology.

Electrical Engineering

Chair
Mark Reed

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
Peter Belhumeur, Jung Han, Lawrence Staib, Hemant Tagare

Assistant Professors
Daniel Friendly, Dana Henry, Richard Lethin (*Adjunct*), Yiorgos Makris, Janet Pan

FIELDS OF STUDY

Fields include control systems, neural networks, communications and signal processing, intelligent sensors, biomedical image processing, microelectronic materials and devices, nanoelectronic science and technology, optoelectronics, computer engineering, VLSI design and routing, computer vision and image processing, and robotics.

Mechanical Engineering

Chair
Marshall Long

Professors
Robert Apfel, Ira Bernstein, Boa-Teh Chu, Juan Fernández de la Mora, Alessandro Gomez, Robert Gordon, Amable Liñan-Martinez (*Adjunct*), Marshall Long, Lisa Pfefferle, Daniel Rosner, Ronald Smith, Mitchell Smooke, Katepalli Sreenivasan, George Veronis, Peter Wegener (*Emeritus*), Forman Williams (*Adjunct*)

Associate Professor
Wei Tong

Assistant Professors
Jerzy Blawzdziewicz, David Wu, Bjong Yeigh (*Adjunct*)

Lecturers
Beth Anne Bennett, Natalie Jeremijenko, Kailasnath Purushothaman, Glenn Weston-Murphy

FIELDS OF STUDY

Mechanics of Fluids: Acoustics and bioeffects of ultrasound; bulk and surface properties of liquids (including metastable liquids, radiation-induced bubble formation, and surfactant-induced effects); dynamics and stability of drops and bubbles; 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. Examples of projects include 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; and transient nucleation in multicomponent systems.

Program in Biomedical Engineering

Professors
Robert Apfel, James Duncan, John Gore, Robert Grober, Csaba Horváth, Steven Segal, Frederick Sigworth, Steven Zucker

Associate Professors
Adam Anderson, Lawrence Staib, Hemant Tagare

Assistant Professor
Jacek Cholewicki

FIELDS OF STUDY

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

Program in Environmental Engineering

Professors
Robert Berner, F. Peter Boer (*Adjunct, Chemical Engineering*), Menachem Elimelech, Thomas Graedel, Lisa Pfefferle, Joseph Pignatello (*Adjunct, Chemical Engineering*), Daniel Rosner, Karl Turekian

Associate Professors
Gaboury Benoit, John Walz

Assistant Professors
Ruth Blake, Roger Ely, James Saiers

Lecturers
Sheryl Stuart, James Wallis

FIELDS OF STUDY

Fields include physical and chemical processes for water quality control, aquatic and environmental chemistry, transport and fate of chemical substances in the environment, colloidal and interfacial phenomena in aquatic systems, environmental engineering microbiology, membrane separation processes, biological processes and bioremediation, aerosol science and technology, incineration of toxic wastes, industrial ecology, geochemistry and bio-geochemistry, adsorption and desorption of organic pollutants in soils and groundwater, geochemical cycles and the global environment, and chemical reactions at the mineral-water interface.

Special Requirements for the Ph.D. Degree

The student plans his/her course of study in consultation with faculty advisers (the student's advisory committee). A minimum of twelve term courses is required, normally completed in the first two years. Mastery of the mathematical topics, as covered, for example, in ENAS 500a and ENAS 501b, is expected and two 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 four should be outside the area of the dissertation. 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. At the beginning 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. A pamphlet entitled *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.

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, page 361.

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 www.eng.yale.edu/GIF/grad/courses.html for the most updated course listing.

ENAS 500a, Mathematical Methods I. A. Douglas Stone.
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. Peter Belhumeur.
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 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 2.30–3.45
Introduction to the fundamental concepts, algorithms, and design techniques for testing digital systems. Covered 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 521a, Classical and Statistical Thermodynamics.**]

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.**]

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 orthopedic surgery and sports medicine.

ENAS 575b[u], Computational Vision and Biological Perception. Steven Zucker.
TTh 1–2.15
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. John Gore.
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. Marshall Long.
TTh 9–10.15
Aspects of computer-aided design and manufacture including reasons for increased use of CAD/CAM, the computer's role in the mechanical engineering design and its manufacturing process, hardware and software elements of typical commercial systems, and computer graphics and drafting.

ENAS 602b, Chemical Reaction Engineering. Lisa Pfefferle.
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 603a, Energy Mass and Momentum Processes. Michael Loewenberg.
M 5–7.30
Application of continuum mechanics approach to the understanding and prediction of fluid flow systems that may be chemically reactive, turbulent, or multiphase.

[**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 611a[u], Separation Processes.**]

ENAS 612a, Colloidal Separations. John Walz.
MWF 2.30–3.20
This course provides an overview of the various processes that are used in the separation of particles with characteristic dimensions in the colloidal range (about 1 nanometer to 1 micron). Both the fundamental principles involved as well as some practical aspects are covered. Topics include flocculation, particle deposition, flotation, capillary separation, field flow fractionation, filtration, and membrane separation techniques.

[**ENAS 614a, Surface Spectroscopy.**]

ENAS 618a, Catalysis: An Integrated Approach. Gary Haller.
TTh 1–2.15
An historical survey of catalytic processing and chemical kinetics of catalyzed reactions, followed by fundamentals of bonding to surfaces, elementary steps in heterogeneous and

homogeneous catalysis, a brief survey of biocatalysis, and finally applied catalysis including reaction engineering, catalyst preparation, and catalyst characterization by physical, chemical, and spectroscopic methods.

ENAS 619b, Advanced Transport: Topics in Multiphase Chemical Reaction Engineering. Daniel Rosner.
TH 4–6
Focus on fundamental aspects of transport phenomena including fluid mechanics and heat and mass transport. Scaling principles and asymptotic analysis emphasized. Topics include creeping flow, potential flow, and boundary layer transport in low- and high-Reynolds-number flows.

[**ENAS 626a[u], Chemical Engineering Process Control.**]

ENAS 640b, Aquatic Chemistry. Gaboury Benoit.
TTH 10–11.20
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. Robert Ely.
MW 9–10.15
Fundamental aspects of microbiology and biochemistry, including stoichiometry, kinetics, and energetics of biochemical reactions, microbial growth, and microbial ecology, as they pertain to biological processes for the transformation of environmental contaminants; principles for analysis and design of aerobic and anaerobic processes including suspended- and attached-growth systems, for treatment of conventional and hazardous pollutants in municipal and industrial wastewaters and in groundwater.

ENAS 642b, 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 2.30–3.45
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. James Wallis.
TTh 4–5.15
The course objectives are threefold: (1) to teach the principles and operation of geographic information systems (GIS), focusing in particular on Arc View and its Spatial Analyst extension; (2) to show how spatial hydrologic modeling can be done by developing a digital representation of the environment within a GIS, then adding to that function simulating the hydrologic processes; and (3) to develop individual experience in the use of GIS in Water Resources through execution of a term project, and presenting it orally and in written form using HTML on the World Wide Web. This is a Web-based course with enrollment limited by availability of computer hardware and software.

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 Hydrogeology. James Saiers.
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.

ENAS 647b, Hydrogeological 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 659a[u], Microfabrication, Micromachining, and Micro-electromechanical Systems, MEMS. James Klemic.
TTh 9–10.15
Survey and critical review of microfabrication techniques for building MEMS. Emphasis on applications. Topics include micromechanical scaling laws, microlithography, bulk and surface micromachining, microtransduction, device modeling and layout, foundry services, commercial MEMS devices, assembly and packaging, and current trends and future goals.

ENAS 704a[u], Theoretical Fluid Dynamics. Ira Bernstein.
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 708b, Fundamentals of Combustion.**]

ENAS 709a, Special Topics in Combustion. Alessandro Gomez and Forman Williams.
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, numerical integration, and solution of ordinary differential equations.

ENAS 748b[u], Applied Numerical Methods II. Mitchell Smooke.
TTh 2.30–3.45
An introduction to numerical methods for solution of ordinary and partial differential equations. One-step, multistep and Runge Kutta methods for initial value problems, finite difference methods in the solution of elliptic parabolic and hyperbolic partial differential equations.

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. Boa-Teh Chu.
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.
TTh 6–7.15
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 789a, Turbulence and Related Problems.**]

ENAS 810b, Nonlinear Optics. Richard Chang.
TTh 2.30–3.45
Fundamental aspects of laser interaction with matter, including both linear and nonlinear optical responses. Actual electro-optical and magneto-optical devices (such as harmonic doublers, parametric oscillators, modulators, and isolators) are introduced and analyzed.

[**ENAS 815b, Detection of Radiation.**]

ENAS 821b[u], Physics of Medical Imaging. John Gore, Adam Anderson.
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], Charles Ahn [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. Subir Sachdev.
MW 9–10.30
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 and 857b, Theory of Solids I and II. Simon Mochrie [F], Nicholas Read [Sp].
MW 9–10.30 [F], MTh 1–2.30 [Sp]
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 and 651b.*

[**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.

ENAS 866a, MOS Device Physics and Technology. Tso-Ping Ma.
Topics include basic MOS device physics, science and technology of thermal SiO_2, interface properties of MOS structures, experimental techniques to probe MOS parameters, hot-carrier

effects, radiation effects, channel mobility and carrier transport in MOS inversion layers, scaling of MOS devices, low temperature properties of MOS devices, SOI device physics and technology, advanced gate dielectrics, MOS devices with wide-bandgap semiconductors, nonvolatile memory devices, ferroelectric memory devices, single-electron MOS transistors, other MOS topics of current interest.

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 will be fabricated and packaged for testing by student. Prerequisite: circuits at the level of introductory physics and computer programming.

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. Daniel Friendly.
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 & Neural Networks. Kumpati Narendra.
An introduction to the control of dynamical systems with parametric uncertainty. Emphasis on analytical models and stability results. Extension of concepts to the adaptive control of nonlinear systems using neural networks.

ENAS 912a[u], Digital Image Processing. James Duncan.
TTH 9–10.15
Concepts and techniques of enhancement, image restoration, image reconstruction from projections, scene analysis, and image understanding.

ENAS 913a, Advanced Topics in Medical Imaging and Computer Vision. Hemant Tagare.
The aim of this course is to look at some advanced topics in imaging. This year the course concentrates on differential geometry of curves and surfaces and its applications to imaging.

ENAS 914b[u], Computer Vision. Peter Belhumeur.
Computational accounts of visual perception: image formation, image transformations, line and curve extraction, segmentation, shape, stereo, motion, texture, and model-based object recognition. Topics include a review of relevant mathematical tools, algorithms, and results from studies of human vision. *Also CPSC 576b[u].*

[**ENAS 917a[u], Optical Properties of Semiconductors.**]

[**ENAS 918b, Data/Telecommunication Technology.**]

ENAS 928b, Compound Semiconductor Materials Science, Processing, Devices, and Characterization. Jerry Woodall.
Includes properties of important semiconductors, epitaxy, materials science, contacts, devices: fabrication, operation and applications, p-n and Schottky diodes, LEDs, lasers, photodetectors including Solar Cells, MESFETs and MOSFETs, HEMTs and HBTs, materials and device characterization.

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 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. Robert Apfel, 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 comprised 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

Director of Graduate Studies
Jill Campbell (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, John Hollander, Margaret Homans, Vera Kutzinski, Traugott Lawler, Lawrence Manley, Annabel Patterson, Lee Patterson, Linda Peterson, David Quint, Claude Rawson, Joseph Roach, John Rogers, Robert Stepto, Alan Trachtenberg, Alexander Welsh, Bryan Wolf, Ruth Bernard Yeazell

Associate Professors
Thomas Otten, Sarah Winter

Assistant Professors
Nigel Alderman, Ala Alryyes, Jennifer Baker, Joseph Bizup, Jessica Brantley, Wes Davis, William Deresiewicz, Elizabeth Dillon, Mary Floyd-Wilson, Laura Frost, Matthew Giancarlo, Blair Hoxby, Amy Hungerford, David Krasner, Pericles Lewis, Sanda Lwin, Stefanie Markovits, Christopher R. Miller, Diana Paulin, Michael Trask, 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; by July 15 following the second year, each student must have completed at least twelve courses with grades of Honors in at least four of these courses and not more than one Pass. 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. The three-language option: three languages, all to be passed by departmental exam, 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); and (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, page 361. 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 Director of Graduate Studies, English Department, Yale University, PO Box 208302, New Haven CT 06520-8302.

Courses

ENGL 500a, Old English. Roberta Frank.
MW 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 505b^{u}, Readings in Old Norse Poetry and Prose: Chronicles of the Vikings. Roberta Frank.
MW 11.30–12.45
An introduction to the literature of earliest Norway and Iceland. Texts (read in the original) include runic inscriptions left behind by the Vikings, verse of their official skalds, the sometimes irreverent mythological poetry of the Edda, and the sagas telling of the Norse discovery of America. Prerequisite: LING 182/582 or permission of the instructor. *Also LING 583b^{u}.*

ENGL 534a^{u}, *Piers Plowman*. Traugott Lawler.
W 10.30–12.20
A reading of the whole poem in the B text, with some reference to the A and C texts; regular assignments also in the critical and scholarly literature.

ENGL 545a, Early Chaucer. Matthew Giancarlo.
M 3.30–5.20
A study of Chaucer's early works, focusing on the *Troilus and Criseyde* as well as his other early narrative poems, but not including the *Canterbury Tales*. Attention is paid to Middle English language and culture, as well as to the modern critical reception of Chaucer's poetry.

ENGL 550a, Spenser. Lawrence Manley.
TH 10.30–12.20
A study of *The Faerie Queene* and several of the minor poems, with some attention to antecedent and collateral works, Spenserian influence, and modern critical approaches.

ENGL 565a/b, Introduction to Renaissance Studies. David Quint [F], Lawrence Manley [Sp].
T 10.30–12.20 [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 semester on Italy and in the second on northern Europe. *Also CPLT 501, RNST 500.*

ENGL 672a^{u}, Milton's Shorter Poems. John Hollander.
M 1.30–3.20
This seminar provides an occasion to explore the range of Milton's shorter poems, as well as introducing students to a considerable sample of sixteenth- and seventeenth-century verse. Texts include *Comus* and *Arcades* along with other Stuart masques; *Lycidas* with other pastoral elegy, and with Spenser's *January*; the earlier and later sonnets along with exemplary English (and, in translation, some Italian) sonnets from the mid-sixteenth century on; Milton's translations for the Psalms along with the history of the Psalter in English. Some attention is paid to the erotic poetry that Milton generally eschewed.

ENGL 672b, Milton. David Quint.
TH 1.30–3.20
A study of Milton's poetry and some of his controversial prose. We investigate the relation of the poetry to its historical contexts, focusing on the literary, religious, social, and political forces that shaped Milton's verse. At least seven weeks of the course are devoted to *Paradise Lost*. *Also CPLT 672b.*

ENGL 711b, Satire: Rochester to Sterne. Claude Rawson.
T 1.30–3.20
A study of the many forms of satire written in English between 1660 and 1750, generally regarded as the most important period in the history of English satire. We consider the broad range of satiric poetry from the rough, forthright, and often blasphemous or obscene poems of Oldham and Rochester, or the light and seemingly demotic verses of Butler, Prior, and Swift, to the higher and more "correct" couplets of Dryden or Pope or Samuel Johnson. Prose and dramatic satire, including Swift's *Gulliver's Travels* and *A Modest Proposal*, Gay's *Beggar's Opera,* and Fielding's *Jonathan Wild*, are also studied, as well as the satirical dimension of Sterne's *Tristram Shandy*. Preliminary consideration of the older satirical models, including the Roman poets Horace and Juvenal, and some early English satirists, chiefly Donne. Attention to satire's conservative or "progressive" tendencies; its aggressive, punitive, or reformative purposes; its potential for self-satire; and its more and less effective forms.

ENGL 726a, Richardson, Fielding, Sterne. Jill Campbell.
M 1.30–3.20
A study of the major works of three mid-eighteenth-century writers who defined "the novel" in different but interrelated ways. *Pamela, Joseph Andrews, Clarissa, Tom Jones, Tristram Shandy,* and *A Sentimental Journey,* with selected critical and theoretical readings.

ENGL 751a, Literature and Public Life, 1750–1800. David Bromwich.
M 10.30–12.20
This seminar is about the consolidation and the decline of the English Augustan ideal of public life. Attention to ways in which the studies of history, political thought, and the arts were brought into conjunction by the use of such metaphors as "representation," and to the implications of the belief in a public ordering of sentiments and cultivation of feelings. A question asked throughout is, What, if anything, connects the eighteenth-century idea of the common good with the emergent idea of "consciousness"? *Also CPLT 852a.*

ENGL 756a, Byron, Shelley, and Keats. Paul Fry.
W 1.30–3.20
Close attention to the major works of the "second generation" poets, with emphasis both on the way they read their predecessors, especially Wordsworth, and on the way they read each other. Underlying this approach is the conviction that between them these three poets divide up, or triangulate, the possible "romantic" stances that the Wordsworthian legacy (varyingly understood, of course) makes available. Underlying this conviction in turn is the oft-challenged belief that "romanticism" is indeed a viable concept in intellectual and literary history.

ENGL 758b[u], Romantic Epic. Leslie Brisman.
TTH 11.30–12.20
Wordsworth, Blake, and the history of the self as an alternative to preoccupation with the French Revolution. Some attention to the general phenomenon of new and old historicism in recent literary criticism, and to the involvement of the second-generation Romantic poets in the politics of their time; but the primary focus is on the monumental poetic projects of Wordsworth and Blake.

ENGL 810b, Victorian Poetry. Linda Peterson.
T 10.30–12.20
A study of the major poetry (with some prose and paintings) of Tennyson, Browning, Barrett Browning, D. G. Rossetti, Christina Rossetti, and Swinburne. We pay particular attention to the relation between Victorian poetry and its Romantic antecedents, issues of gender and genre, the publishing contracts for verse, and the cultural function of poetry as it was conceived by the poets and their audiences.

ENGL 818a, George Eliot and Nineteenth-Century Realism. Ruth Bernard Yeazell.
T 1.30–3.20
George Eliot's development as a novelist from *Scenes of Clerical Life* (1857) through *Daniel Deronda* (1876), in the context of debates about the nature and function of realism both in the nineteenth century and since. Taking our cue from the novelist's own comparison of her early work to Dutch genre painting, we devote at least some attention to realism in the visual as well as the verbal arts.

ENGL 841b, Transatlantic Print Culture and the Early American Novel. Elizabeth Dillon.
W 1.30–3.20
An examination of the relation between the form of the novel and conditions of colonialism and postcolonialism in the Anglo-American world of the eighteenth century. Rather than reading early American novels as allegories of nation foundation, we consider these texts in relation to the transatlantic print public sphere in which they circulated, and the transatlantic economy in which many of the characters in these novels circulate as well. Readings include a range of theoretical works concerning the rise of the novel, the emergence of the print public sphere, and the development of colonialism, as well as novels from both sides of the Atlantic by Behn, C. B. Brown, W. H. Brown, Cooper, Defoe, Edgeworth, Foster, Richardson, Rowlandson, Rowson, Scott, Tenney, and Tyler. *Also AMST 841b.*

ENGL 851a, Problems in Nineteenth-Century American Literature. Wai Chee Dimock.
W 10.30–12.20
This course, a broad survey of nineteenth-century American literature, is also an introduction to the vocabularies and strategies of reading. Focusing on the phenomenal world of each text as a linguistic construct, we examine its constellation of words through a variety of critical lenses, from racial and gender politics to narrative form, semantic resonances, and literary genealogies. Works by Emerson, Melville, Stowe, Douglass, Hawthorne, Whitman, James, Twain, Wharton. Each primary text is read in conjunction with at least one critical essay. *Also AMST 663a* .

ENGL 899a, The Figure of "The Indian" in American Literature and Culture. Alan Trachtenberg.
T 10.30–12.20
The seminar examines interpretations of the native peoples of North America in writing, thought, art, and popular culture in the United States from the seventeenth to the early twentieth century. Against a background of the history of contact and conflict between European-Americans and Indians, the class considers how changing conceptions and images of native peoples have played a formative role in the making of an "American" literary tradition. Reading and discussion, and research in Beinecke collections. *Also AMST 606a.*

ENGL 903b, The Modernist and Late-Modernist Long Poem. Nigel Alderman.
W 3.30–5.20
Although the history of twentieth-century poetry is littered with monumental failures and ruins, poets continue in their attempt to construct larger poetic forms. This course begins

with the high modernist exemplars of Eliot and Pound, before examining how these forms devolved and expanded into different regions of the British archipelago. We are also concerned with twentieth-century literary theory, especially in relation to genre, to the concept of difficulty or "literariness," and to theories of modernity, modernism, and the modern. Poetry includes works by Pound, Eliot, Auden, Macdiarmid, and Braithwaite. Criticism by Shklovsky, Jakobson, Benjamin, Anderson, Jameson, and others.

ENGL 904b, Major American Poets. Harold Bloom.
TH 1.30–3.20
Emerson (prose and poetry), Whitman, Dickinson, Stevens, Frost, Hart Crane.

ENGL 908a, Elizabeth Bishop and James Merrill. Langdon Hammer.
TH 1.30–3.20
Intensive study of the lives and work of Elizabeth Bishop and James Merrill. Issues for discussion include the construction of their literary careers, their complex friendship, their relations to their contemporaries, their distinctive positions in American and international literary traditions, problems of sexual identity, the ongoing history of their critical reception, the interplay of their work in different forms (poetry, fiction, plays, letters, painting), and issues in archival research.

ENGL 913b, Empire and Its Double. Sara Suleri Goodyear.
W 1.30–3.20
A course that concentrates on readings of Empire as a "secret sharer" of nineteenth- and twentieth-century British narrative. Rather than solely focusing on images of orientalism, we examine infiltrations of alterity that lie too close for comfort. While attempting to undo the idea of exoticism, we simultaneously address what E. M. Forster calls "aspects of the novel" in order to consider the question, What does the novel want? Texts include Edmund Burke's story-telling in Parliamentary debate, Dickens, Austen, Meredith, Kipling, Forster, Salman Rushdie, Ismat Chughtai, Ahga Shahid Ali. Our examination of Conrad's trope of the secret sharer will cause us to question the singularity of imperial stories and their slippage into theories of nation.

ENGL 917b, American Theory: Cultural Criticism and Social Change in the Twentieth Century. Michael Trask.
W 10.30–12.20
Focus on the theory-function in modern U.S. culture, with particular emphasis on the decades between the Great War and Vietnam. We look at both critical and literary texts that actively take up the cause of theory, including those of Bourne, Mencken, Wilson, Rahv, Trilling, Howe, Dos Passos, Hurston, Ellison, Mailer, Friedan, Arendt, McCarthy, Bellow, Marcuse, Goffman, and Ginsberg; and at contemporary theorists of theory, including Jameson, Anderson, and Giddens. Topics include the place of "America" as an object of critical inquiry and the dominance of liberalism in American political thought. *Also AMST 842b.*

ENGL 921a, Ralph Ellison in Context. Robert Stepto.
TH 10.30–12.20
This seminar pursues close readings of Ralph Ellison's essays, short fiction, and novels, *Invisible Man* and *Juneteenth*. The "in context" component of the seminar involves working from the Benston and Sundquist volumes on Ellison to discern a portrait of the modernist African America Ellison investigated, with at least Richard Wright, James Baldwin, and Romare Bearden also in view. The texts include Ellison, *The Collected Essays, Flying Home and Other Stories, Invisible Man,* and *Juneteenth*; K. Benston, *Speaking for You*; E. Sundquist, *Cultural Contexts for Ralph Ellison's* Invisible Man; A. Nadel, *Invisible Criticism: Ralph Ellison and the American Canon. Also AFAM 563a, AMST 921a.*

ENGL 922b, Magic Realism in the Americas. Vera Kutzinski.
M 10.30–12.20
This seminar focuses on remappings of the subject within twentieth-century counterrealist writing from different parts of the Americas. Authors include Isabel Allende, Robert Antoni, Erna Brodber, Alejo Carpentier, William Faulkner, Janet Frame, Gabriel García Márquez, Toni Morrison, Wilson Harris, Pauline Melville, Juan Rulfo, and Lawrence Scott. *Also AFAM 759b, AMST 767b, CPLT 854b.*

ENGL 940a, Problems in the Study of African American Literature. Elizabeth Alexander.
W 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 595a, AMST 640a.*

ENGL 942a, Race and Representation in U.S. Literature and Culture. Sanda Lwin, Diana Paulin.
TH 3.30–5.20
A graduate seminar that introduces theories of difference through the lens of Asian American and African American literary and cultural production. We draw from theoretical readings in fields such as gender studies, performance/theater studies, postcolonial studies, and legal studies. Through this critical inquiry we consider questions about the following topics: racial/sexual minorities and the politics of inclusion/exclusion, the "imagined communities" of nationality, alliances across racial and national boundaries, history and memory. *Also AFAM 746a, AMST 672a.*

ENGL 948b[u], Autobiography in America. Robert Stepto.
M 1.30–3.20
This seminar studies at least a dozen North American autobiographies, mostly from the "American Renaissance" to the present. The selected texts enable discussion of various autobiographical forms and strategies as well as of various experiences of American selfhood and citizenship. The seminar presents an opportunity for students to begin or to continue investigations of slave narratives, spiritual autobiographies, immigrant narratives, autobiographies of childhood or adolescence, relations between autobiography and class, region, or occupation, etc. Other likely topics include institutionalizing and/or historicizing the self, literacy and identity, ethnicity and identity, the American self intentionally or unintentionally commodified via the autobiographical act. *Also AFAM 588b[u], AMST 710b[u].*

ENGL 951b, Modernity and Nineteenth-Century American Visual Culture. Bryan Wolf.
T 1.30–3.20
This course examines the relationship between "liberal culture," visuality, and modernity. It considers the privileged role played by seeing in the modern world, looking both at paintings and literary texts organized around questions of perception. In particular, the seminar focuses on the "dream of transparency," the way that seeing works ideologically to affirm the tenets of liberal belief; we examine both the construction and "deconstruction" of this dream. Topics include visuality and the public sphere; landscape and "depoliticized speech"; genre and hegemony; race and identity; managerial culture and disembodied vision. Painters examined include: Wright of Derby, Copley, Cole, Durand, Church, Mount, Bingham, Homer, Eakins. Writers include: Wheatley, Irving, Emerson, Poe, Douglass, Hawthorne, H. Wilson, Chestnutt. Methodological sessions are devoted to Barthes, Foucault, and Jameson. *Also AMST 860b.*

ENGL 953a, Word and Image from Lessing to Foucault. Thomas Otten.
TH 3.30–5.20
A study of the relations — the fictive resemblances and inevitable assimilations — of verbal and visual media in theory from Lessing's *Laocoön* to Foucault's *This Is Not a Pipe,* along with close analysis of poems and novels by Dryden, Pope, Keats, Browning, Dante Gabriel Rossetti, Hawthorne, James, Stevens, Ashbery, May Swenson, and Jorie Graham. As that list suggests, the course considers several different kinds of intersections between literature and art: the ecphrastic tradition (passages which describe painting or sculpture), the visual shapes of literary texts, the *Künstlerroman* (the novel tracing an artist's development), and the concept of portraiture. *Also CPLT 853a.*

ENGL 989b, Poetics. John Hollander.
M 1.30–3.20
The poetics of scheme and trope. This course considers questions traditionally framed as those of form and meaning, but from linguistic and rhetorical perspectives. Among matters covered are the nature of rhythm and recurrence; prosodic systems in general and those of English in particular; structures of meter and versification; speech and writing; the synchronic and diachronic analyses of form; the critique of formalism; the nature of lyric poetry; and the relation of all these to questions of metaphor and the structure of larger fictions.

ENGL 990a, The Teaching of English. Linda Peterson.
W 3.30–5.20
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; introducing students to various literary genres; formulating aims and assignments in composition classes. In addition, we pay continuing attention to important theoretical issues, e.g., how the study of literature and writing can be related to humanistic study at large; how the increasingly abstruse methodologies of current criticism can be adapted to use at more elementary levels of inquiry; what verbal and social assumptions underlie various approaches to the teaching of composition; and other topics, large and small.

Students enrolled in this course will become 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 are accepted. The size of the class is limited, with priority going to second-year students in the English department. The only grades possible are "Satisfactory" or "Unsatisfactory."

ENGL 995a/b, Directed Reading and Research. 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.

EPIDEMIOLOGY AND PUBLIC HEALTH

60 College Street, 785.2844
M.S., M.Phil., Ph.D.

Chair
Michael Merson

Director of Graduate Studies
Theodore Holford (201 LEPH, 785.2838, theodore.holford@yale.edu)

Director of Medical Studies
David Katz

Professors
Warren Andiman, Robert Baltimore, Michele Barry, Michael Bracken, Lawrence Brass, Kelly Brownell, Mark Cullen, Vincent DeVita, Arthur DuBois, Alvan Feinstein, Gerald Friedland, Theodore Holford, Ralph Horwitz, Keith Joiner, Edward Kaplan, Stanislav Kasl, David Kessler, Ilona Kickbusch, Brian Leaderer, Robert Makuch, Lawrence Marks, Ruth McCorkle, Diane McMahon-Pratt, Kathleen Merikangas, Michael Merson, I. George Miller, Alvin Novick, Curtis Patton, Robert Rosenheck, Nancy Ruddle, Peter Salovey, Eugene Shapiro, John Sinclair (*Adjunct*), John Stitt, Mary Tinetti, Daniel Zelterman

Associate Professors
Serap Aksoy, Debra Bessen, Michael Cappello, Elizabeth Claus, Linda Degutis, Louise Dembry, Loretta DiPietro, Durland Fish, Nora Groce, Pamela Hartigan (*Adjunct*), Robert Heimer, Sarah Horwitz, Jeannette Ickovics, Harlan Krumholz, Gary Mack, Susan Mayne, Scott O'Neill, A. David Paltiel, Peter Peduzzi (*Adjunct*), Anuradha Ray, Harvey Risch, Mark Russi, Mark Schlesinger, Jody Sindelar, William White, Heping Zhang, Hongyu Zhao, Tongzhang Zheng

Assistant Professors
Elizabeth Bradley, Susan Busch, Kent Buse, Benjamin Druss, Joel Dubin, Birol Emir (*Adjunct*), Rani Hoff, Akiko Iwasaki, Beth Jones, Ruth Katz, Kaveh Khoshnood, Karl Kronebusch, Douglas Leslie, Becca Levy, Haiqun Lin, Mary Olson, Alexander Ortega, Nina Stachenfeld, John Wise, Sr., Liangbiao Zheng

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, medical entomology, microbiology, parasitology, and virology). 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 listed below, 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. Ten hours/week of teaching (TF 2) or the equivalent per semester are required in years two and three. In the fourth and subsequent years, students are required to be research associates, or the equivalent.

The special course requirements of each division are:

Biostatistics — twelve courses not including seminars and colloquia;
Chronic Disease Epidemiology — twelve courses not including seminars and colloquia;
Environmental Health Sciences — twelve courses not including seminars and colloquia;
Epidemiology of Microbial Diseases — two years of course work developed with a faculty committee;
Health Policy Administration — twelve courses not including 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 if they have satisfactorily completed the first year of a program leading to the Ph.D. degree and they intend to withdraw from the Ph.D. program. 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 64). 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 EPH Admissions Office, Epidemiology and Public Health, Yale University, PO Box 208034, New Haven CT 06520-8034; e-mail, eph.doctoral@yale.edu.

Courses

BIS 505a, Introduction to Statistical Thinking. Theodore Holford.
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 linear regression. Statistical analysis using the Statistical Analysis Systems (SAS) software on the IBM PC is introduced. Prerequisite: algebra.

BIS 505b, Introduction to Statistical Thinking. Faculty.
Continuation of BIS 505a, covering multiple regression, analysis of variance, nonparametric tests, survival analysis, and an introduction to logistic regression. 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. Public health applications of GIS provide cost-effective methods for evaluating interventions and modeling future trends, and they 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 introduce a variety of applications in the field of epidemiology. Prerequisite: basic computer skills.

BIS 525a and b, Seminar in Biostatistics. Haiqun Lin, Heping Zhang.
Faculty and invited speakers present and discuss current research.

[**BIS 538b, Survey Sampling: Methods and Management.**]

BIS 540a, Fundamentals of Clinical Trials. Robert Makuch.
An overview of issues related to the design, conduct, and analysis of clinical trials: 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.

[**BIS 561b, Advanced Topics and Case Studies in Multicenter Clinical Trials.**]

BIS 623a, Applied Regression Analysis. Joel Dubin.
Linear regression, testing hypotheses in multivariate regression, regression diagnostics, analysis of variance, and adjusting for covariates. Emphasis on application of methods. Prerequisites: BIS 505a and 505b or equivalent.

BIS 625a, Categorical Data Analysis. Daniel Zelterman.
Presentation of methods for analyzing categorical data in public health, epidemiology, and medicine. Topics include measures of association, comparing distributions among groups, log-linear models, and logistic regression. Emphasis on the application of methods and the interpretation of results obtained by using these techniques. Prerequisites: BIS 505a,b.

BIS 628b, Longitudinal Data Analysis. Joel Dubin.
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). Approaches include linear, nonlinear, and generalized mixed effects models, as well as generalized estimating equations. Also covered are 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.

[**BIS 631b, Topics in Genetic Epidemiology.**]

BIS 635b, Topics in Statistical Epidemiology. Theodore Holford, Heping Zhang.
Discussion of methods of analyzing association among one or more factors with disease. Topics include the analysis of cohort studies, case control studies, and vital rates. Analysis of matched data also discussed. Emphasis on the application and interpretation of the techniques. Prerequisites: BIS 505a,b, 623a, or 625a.

[**BIS 637a, Stochastic Processes in Biology and Medicine.**]

BIS 643b, Theory of Survival Analysis and Its Applications. Haiqun Lin.
This course presents the statistical theory underlying survival analysis. It is considered a first course in survival analysis because it covers only the standard models and asymptotic arguments; the martingale approach to the statistical analysis of failure time data is introduced. The application of this theory through some exemplary data sets is also presented. Prerequisites: MATH 120, MATH 222, STAT 610.

BIS 645a, 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 heterogeneity, path analysis, and disease marker associations. Prerequisites: genetics; BIS 505a and b, or equivalent; permission of instructor.

[**BIS 646a, Nonparametric Statistical Methods and Their Applications.**]

BIS 691b, Generalized Linear Models. Haiqun Lin.
This course considers a class of statistical models that is a natural generalization of the classical linear model. An outline of the generalized linear model is developed, and particular cases are discussed including binary response data, polytomous data, log-linear models, quasi-likelihood models, and models for survival data. Prerequisites: STAT 541a, STAT 542b, BIS 623a.

CDE 508a, Principles of Epidemiology I. Gregory Tignor, Michael Bracken.
An understanding of the research methods used in infectious and chronic disease epidemiology and in microbiology, showing the similarities and differences in their approaches to diseases and other conditions. Emphasis is on methods and disease etiology, stressing the implications of research for the formulation of policy and for individual decision making. *Also EMD 508a.*

CDE 516b, Principles of Epidemiology II. Tongzhang Zheng.
An overview of the principles of epidemiology. The first part emphasizes fundamental epidemiologic principles including measures of disease frequency and association, bias, confounding, precision, and interaction. The second part 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, BIS 505a.

CDE 517a, Developing a Research Protocol. Stanislav Kasl.
The development of 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 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 MPH 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 Medical School; 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. This course is offered in odd years. Prerequisites: CDE/EMD 508a, BIS 505a and BIS 505b.

CDE 521a, The Epidemiology of Some Common Chronic Diseases. Beth Jones.
Introductory survey course covering some of the major chronic diseases, including coronary artery disease, cancer, stroke, chronic obstructive lung disease, alcoholism, HIV, and Alzheimer's disease. Two classes devoted to each disease. The first class is taught by an expert on the disease and covers its basic pathophysiology, etiology, epidemiology, risk factors, and public health importance. In the second class, an important research article about the disease is discussed. Emphasis on developing a working knowledge of chronic diseases and the capacity to read the literature critically.

CDE 523b, Measurement Issues in Chronic Disease Epidemiology. Susan Mayne.
Measurement issues in chronic disease epidemiology addressed from a practical perspective. Covers the use and limitations of currently available techniques for measuring exposure to a number of such etiologic factors as diet, alcohol, tobacco, physical activity, psychological stress, and environmental/occupational exposures. Focus on the measurement of outcome for some of the major chronic diseases. Prerequisite: CDE/EMD 508a.

CDE 532b, Epidemiology of Cancer. Patricia Moorman.
Application of 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. Focus on risk factors for cancer (including tobacco, alcohol, diet, radiation, and occupation) and on major cancer sites (including colon, breast, and prostate). Heavy emphasis on critical reading of the literature. Prerequisites: CDE/EMD 508a, CDE 516b or permission of instructor.

CDE 533b, Topics in Perinatal Epidemiology. Michael Bracken, Kathleen Belanger.
Pregnancy, delivery, and reproduction provide the course's organizing focus. The current perinatal epidemiologic literature critically reviewed from a methodological perspective. Topics 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 relations in this specialty. Implications of research findings for public health policy, individual decision making, and future studies considered.

CDE 550a, Introduction to Evidence-Based Health Care. Jody Sindelar, 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.

CDE 562a, Nutrition and Chronic Disease. Susan Mayne.
This course provides students with a scientific basis for understanding the role of nutrition and specific nutrients in the etiology, prevention, and management of chronic diseases. Nutrition and cancer are particularly emphasized. Other topics include cardiovascular diseases, osteoporosis, obesity, diabetes mellitus, and aging. Prerequisites: biology, biochemistry, and physiology helpful. Preference given to CDE majors.

CDE 619a, Advanced Epidemiologic Research Methods. Harvey Risch.
An advanced course on quantitative issues and techniques relevant to the design and analysis of observational epidemiologic studies. Starts with formal definitions of the commonly used epidemiologic parameters, assumes working knowledge of ANOVA and linear regression, 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: HP or better in BIS 505a,b; doctoral status or permission of instructor.

[**CDE 634a, Advanced Seminar in Perinatal Epidemiology.**]

EHS 502a, Physiology for Environmental Health Sciences. Gary Mack, Lawrence Marks.
Description of 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. James Douglas.
Factors that affect the toxicity of foreign substances. The absorption, distribution, excretion, and metabolism of foreign compounds. Lectures in cell biology, teratology, chemical carcinogenesis, dose-response relations, and behavioral toxicology.

EHS 507a, Environmental Epidemiology. Tongzhang Zheng.
The potentials and the limitations of environmental epidemiology 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 of interpretation of such studies as well as the consequences for the design and conduct of studies is examined. Prerequisite: CDE/EMD 508a or permission of instructor.

EHS 508a, Assessing Exposure to Environmental Stressors. Brian Leaderer.
Human exposure to environmental stressors as it applies to environmental epidemiology and risk assessment. Indirect and direct methods of assessing exposures, case studies.

EHS 509a, Environmental Toxicology. John Wise.
Survey of the basic methods and fundamental biochemical mechanisms of toxicity. Toxicity in mammalian organ systems, techniques for evaluating toxicity, mechanisms of selective toxicity, and environmental interactions. Biomonitoring of human exposure to specific environmental toxicants. Prerequisite: EHS 503b or permission of instructor.

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 of underlying environmental pollutants in water, soil, air, and specialized media. Various categories of federally regulated compounds and elements exam-

ined with respect to group characteristics, analytical techniques of choice, sampling methods, and data interpretation. Selected chemical agents studied with regard to possible transformations/decomposition in the environment. Insight into some current problems faced in applying pollutant measurements to public health, e.g., analytical precision, uncertainty, detection limits, chemical specification, and toxicological properties.

EHS 516b, Principles of Epidemiology I. Tongzhang Zheng.
An overview of the principles of epidemiology. Emphasis on fundamental epidemiologic principles including measures of disease frequency and association, bias, confounding, precision, and interaction; the design and conduct of various epidemiological studies; causal inference and disease prevention and control. Prerequisites: CDE/EMD 508a, BIS 505a.

EHS 518a, Environmental Measurement. Elan Gandsman, Thomas Ouimet, Robert Klein.
Investigation of the basic scientific principles and technologies of environmental measurements and monitoring, including boundaries on the collection, interpretation, and use of environmental data.

EHS 553b, Epidemiological Methods in Injury Control. Linda Degutis.
Application of epidemiological methods to injury surveillance, etiology of injuries, and the evaluation of the effects of injury-control programs. 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.

EHS 573b, Occupational Epidemiology. Mark Cullen.
Various approaches to the epidemiologic evaluation of health hazards in the workplace. Consideration of specific substances. Critical review of the literature. Intermediate to advanced techniques in study design and analysis of occupational epidemiologic studies included. Prerequisites: BIS 505a, CDE/EMD 508a.

EHS 575a and b, Introduction to Occupational and Environmental Medicine. Mark Cullen [F], Mark Russi [Sp].
An overview of the principles of occupational and environmental medicine. Fall term covers the major diseases of environmental origin. Spring covers the major hazards — chemical, physical, and biologic, and the settings in which they occur. Prerequisite: M.D. degree or permission of instructor.

EHS 579a and b, Advanced Laboratory Techniques in Environmental Health Sciences. John Wise.
This course is taken for two or three terms. Laboratory technique tools in environmental health. Methods in tissue culture, exposure measurement, toxicology, and molecular biology are offered. This is a hands-on course closely supervised by technically trained personnel. Since the laboratory works with biohazards, laboratory safety and use of biosafety hoods are emphasized. Prerequisites: familiarity with biosafety procedures, prior lab experience, and permission of the instructor.

EHS 611a and b, Advanced Research Laboratories. John Wise.
This course is taken for two or three terms. Offers experience in directed research and readings in selected research laboratories. The first two terms should be taken in the first year of the doctoral program; the third term is taken at a time determined after faculty consultation with the student. Prerequisite: doctoral status and permission of the instructor.

EHS 621b, Seminar in Environmental Health Risk Assessment. Jan Stolwijk.
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 655a or b, Readings in Environmental Health. Brian Leaderer.
By arrangement. Study of 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.
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 557a/657a, Public Health Issues in HIV/AIDS. Kaveh Khoshnood, Kathleen Ethier.
An introductory, broad-based survey course on the epidemiology of HIV/AIDS. Topics include virology, clinical issues, natural history of infection, laboratory testing, transmission, and prevention of HIV/AIDS. Gives a general, comprehensive understanding of HIV/AIDS issues for those 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 required.

EMD 642a, Roles of Microorganisms in the Living World. Diane McMahon-Pratt, L. Nicholas Ornston.
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 GENE 642a, MB&B 642a, MBIO 642a, MCDB 642a.*

EMD 664b, Biology of Parasitic Protozoa and Helminths. Curtis Patton, Serap Aksoy, Christian Tschudi, Michael Cappello.
Focus on developmental biology, natural history, form, function, cell and molecular biology of the major eukaryotic parasites of public health importance. Host/parasite integration, coevolution, diagnosis, pathogenesis, and control strategies emphasized. Prerequisites: one year of biology, two years of chemistry.

EMD 670a and b, 671a, Advanced Research Laboratories. Diane McMahon-Pratt.
Experience in directed research and reading in selected research laboratories. *May be taken for three terms. The first two terms must be taken in the first year of the doctoral program and the third term is taken at a time determined after faculty consultation with the student.* Prerequisite: doctoral status.

EMD 680a,b, Advanced Topics in Molecular Parasitology. Curtis Patton, Diane McMahon-Pratt, Christian Tschudi.
A broadly based seminar course on current research topics in cell and molecular parasitology, with topics chosen from the current literature. For doctoral and advanced MPH students only. *Also MBIO 680a, b.*

EMD 682a, Advanced Topics in Vector Biology. Liangbiao Zheng.
A broadly based seminar course 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. Prerequisites: doctoral status or permission of instructor.

EMD 684a, Parasitic Eukaryotes: Molecular and Cellular Processes. Diane McMahon-Pratt, Curtis Patton, Christian Tschudi.
Focus on concepts central to the nature of parasitism. In-depth descriptions and analysis of parasite paradigms for biology. Examination of cellular and molecular processes involved in initiating, regulating, and maintaining host-parasite complexes. Prerequisites: biochemistry, cell or molecular biology. *Also MBIO 684a.*

HPA 510a, Health Policy and Health Systems. Mark Schlesinger.
An introduction to the making and understanding of health policy. The various goals of policy making and the alternative means of achieving those goals examined. Health issues placed in the context of broader social goals and values. The current performance of the health care system assessed, with particular emphasis on shifting needs, rising costs, and changing institutional arrangements. An overview of the important actors in the health care and political systems and introduction 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.
The various processes by which governmental health policy is made in the United States and the substance and background of current policy debates. Primary emphasis on Congress and executive branch agencies, with attention given to both the financing and organization of health services and to public health problems like AIDS. Different policy actions or problems discussed weekly, selected for both their importance and their usefulness in illuminating important aspects of the policy process.

HPA 521a, Health Services Epidemiology. Alexander Ortega.
Epidemiologic methods and data may be used to understand and improve public health practice, health services research, and health policy. This course emphasizes methodological and conceptual issues through a research-oriented approach to health promotion and disease prevention, the measurement of health status, assessment of health needs and population-based planning, health-related behaviors and beliefs, evaluation of medical practices and health programs, and public health decision making. Prerequisite: first-term core.

HPA 529a, Policy Analysis and Health Politics. Karl Kronebusch.
Provides students with policy analytic skills and teaches students to think critically and write succinctly about health care policy. Integrates the study of policy analysis and the world of health politics as analysts must do in real life. Considers the nature of public policy and the theories of policy analysis and policy decision making, eight key components of the policy analysis process, and jointly examines the impact of major political organizations and institutions on the process of analyzing and selecting public health care policy. 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.

HPA 542a, Health of Women and Infants. Mary Alice Lee.
Focus on the health of women and infants in the United States. Epidemiology of selected health conditions presented. The utilization and financing of women's and infants' health care discussed. Existing targeted governmental and private programs identified and assessed. Major sources of data identified and compared. Students investigate a program or agency (public or private) that addresses a particular health problem of women or infants. Topics include contraceptive use, abortion, sexually transmitted diseases, substance abuse, prenatal care, low birth weight, perinatal AIDS, domestic violence, midlife health, and maternal mortality (with an international perspective). Discussion of the public health implications of these health problems provides a basis for policy analysis in later study.

HPA 544a, Public Law and Public Health: The Law, the Individual, and the State. John Culhane.
A basic orientation to the law, the legal system, and legal decision making as they relate to the public's health. Emphasis on the relation between the autonomy of the individual and the power of the state in addressing issues affecting the public's health. Topics include civil commitment, right to refuse treatment, procreation, human experimentation and clinical research, domestic violence, adoption and foster care, religious practices, and seat belt and helmet laws. Issues that must be considered in assessing the state's silence, omission, intervention, or intrusion into health matters of the person, the family, or the group discussed. Prerequisite: first-term core.

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, and 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 like preventive medicine and behavior modification, smoking, control of infectious diseases, and contraception and teen pregnancy.

HPA 547b, Law and the Management of Health Care Organizations. W. John Thomas.
A survey course of legal topics important to the management of health care organizations designed to acquaint the future health care manager with the basic legal issues that daily impact the provision of health care services. Examination of the relations among the parties involved in the delivery of health care; the law of business organizations, including that of corporations, partnerships, and professional corporations; the legal constraints that operate upon health care organizations, including state and federal regulatory laws, labor relations, and antitrust doctrines; and doctrines particularly applicable to managed care organizations. Consideration of a variety of emerging legal issues in the health care field.

HPA 560b, Issues in Health Care, Financing, and Reimbursement. 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 to consider forces for change and the implications of recent trends for policy and management.

HPA 570a, Cost-Effectiveness Analysis and Decision Making. A. David Paltiel.
Introduction to the methods of decision analysis and cost-effectiveness analysis in health-related technology assessment, resource allocation, and clinical decision making. Aims to develop technical competence in the methods used; practical skills in applying these tools to case-based studies of medical decisions and public health choices; and 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. Elizabeth Bradley.
Introduction 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 project. Prerequisite: BIS 505a.

HPA 586b, Microeconomics for Health Care Professionals. William White.
Introduction to microeconomics. Emphasis on topics of particular relevance to the health care sector. Attention paid to issues of equity and distribution, uncertainty and attitudes toward risk, and alternatives to price competition. *Designed for students with minimal previous economics.*

HPA 587b, 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, regulations, and the market for physician services are covered. Prerequisite: microeconomics or permission of the instructor.

HPA 588a, Economics of Alcohol, Drugs, and Crime. Jody Sindelar.
This course uses economics as a base discipline in studying the use and abuse of alcohol and illicit drugs and the various social problems produced by each — such as crime, lost productivity, misuse of health care, and impact on families and children. Other topics included are cost-effectiveness of treatment versus the criminal justice system, racial and gender differences, comorbidity with psychiatric problems, inner-city drug problems, problems of youth, and the history of drug use. Such policy alternatives as prevention, treatment, taxation of alcohol, legalization of illicit drugs, and the criminal justice system are analyzed.

HPA 596b, Critical Policy Issues in the AIDS Pandemic. Michael Merson.
Seminar 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 pandemic presents, as well as the sharpened skills in policy analysis that such examination necessarily fosters. Class size limited to eighteen students. Prerequisite: first-term core.

HPA 597b, Integrative Policy Analysis Seminar. Mark Schlesinger.
Seminar designed as the capstone educational experience for students concentrating in the health policy at EPH, though it is also open to students from other schools who have had previous training or experience in policy analysis. The first theme involves exploring different strategies of policy analysis and associated models of professionalism. The second theme involves the complicated prospects for policy analysis associated with the boundaries between health care defined in a clinical sense and the broader social determinants of health. These issues are studied in a series of applied areas, including substance abuse, family policy, and the community obligations of managed care plans. Prerequisite: HPA 510a or equivalent.

HPA 600a or b, Readings in Health Services Research and Policy. Faculty.
Seminar to explore current and cutting-edge topics in the broad fields of community and personal health services. Designed to familiarize students with a breadth of research opportunities. Students review existing research projects and critique recent research publications. Prerequisite: doctoral status or permission of instructor.

HPA 603b, The Ethical Conduct of Research. Susan Katz.
Seminar exposing students to both practical and theoretical issues in research ethics. Focus on real-world situations in public health research with the aim of equipping students to function

as responsible researchers. Representative areas include informed consent; research with vulnerable populations; privacy and confidentiality; the collection, 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: doctoral status or permission of instructor.

HPA 617a, Colloquium in Health Policy and Health Services Research I. Sarah Horwitz and faculty.
Seminar focusing on the analysis of current issues in health policy and on state-of-the-art methodological issues in health services research. Guest speakers and presentations by EPH and other faculty and graduate students of ongoing research projects on health services. Students participate in critical discussions of the issues that arise in both types of sessions. Prerequisite: doctoral status or permission of instructor.

HPA 617b, Colloquium in Health Policy and Health Services Research II. Rani Hoff, Sarah Horwitz.
Seminar includes in-depth discussions of major policy concerns in the health and health care of vulnerable populations like the poor, young, old, and disabled. Students present their own research. Prerequisite: doctoral status or permission of instructor.

HPA 621a, Advanced Health Services Epidemiology. Alexander Ortega.
Epidemiologic methods and data may be used to understand and improve public health practice, health services research, and health policy. Emphasis on methodological and conceptual issues through a research-oriented approach to health promotion and disease prevention, the measurement of health status, assessment of health needs and population-based planning, health-related behaviors and beliefs, evaluation of medical practices and health programs, and public health decision making. Prerequisite: doctoral status or permission of instructor.

HPA 650a, Colloquium on Mental Health Services Research I. Sarah Horwitz and faculty.
Seminar focusing on the state-of-the-art 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: doctoral status or permission of instructor; SOCY 550a.

HPA 650b, Colloquium on Mental Health Services Research II. Rani Hoff, Sarah Horwitz.
Seminar focusing on social and cultural factors in the development, diagnosis, treatment, and prevention of mental illness. Attention given to the underlying theory of and research in the social epidemiology of mental illness and the relation between stress and psychiatric status. Includes presentations of student research in mental health services. Prerequisite: doctoral status or permission of instructor.

COUNCIL ON EUROPEAN STUDIES

Luce Hall, 34 Hillhouse, 432.3423

Chair
Ivo Banac

Director of Graduate Studies
Paul Bushkovitch (245 Luce Hall, 432.3423)

Professors
Bruce Ackerman (*Law; Political Science*), Vladimir Alexandrov (*Slavic Languages & Literatures*), Ivo Banac (*History),* Paul Bracken (*Management; Political Science*), Peter Brooks (*Humanities; French*), Paul Bushkovitch (*History*), David Cameron (*Political Science*), Katerina Clark (*Slavic Languages & Literatures*), Robert Evenson (*Economics*), John Gaddis (*History*), Geoffrey Garrett (*Political Science*), Harvey Goldblatt (*Slavic Languages & Literatures*), Cyrus Hamlin (*Germanic Languages & Literatures*), Benjamin Harshav (*Comparative Literature*), Michael Holquist (*Comparative Literature*), Robert L. Jackson (*Emeritus, Slavic Languages & Literatures*), Paul Kennedy (*History*), John Merriman (*History*), William Nordhaus (*Economics*), William Odom (*Adjunct, Political Science*), Merton J. Peck (*Economics*), Susan Rose-Ackerman (*Law*), Frank Snowden (*History*), Ivan Szelenyi (*Sociology*), Frank Turner (*History*), Henry Turner (*History*), Paolo Valesio (*Italian Language & Literature*), Tomas Venclova (*Slavic Languages & Literatures*), Miroslav Volf (*Divinity*), Ruth Wedgwood (*Law*)

Associate Professors
Vladimir Golstein (*Slavic Languages & Literatures*), Jennifer Hunt (*Economics*)

Assistant Professors
Dirk Bergemann (*Economics*), Giancarlo Corsetti (*Economics*), Hilary Fink (*Slavic Languages & Literatures*), Lawrence King (*Sociology*), Pauline Jones Luong (*Political Science*)

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 beginning this year 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 2000–2001 academic year was Alejandro Herrero, Adviser to the Director General of the European Commission's Institute of Health and Consumer Protection, who taught a course on the role of scientific research in European Union policy making. During 2001–2002, the European Union Fellow will be a specialist in international trade. Also in 2001–2002, 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.F

Chair
Jon Morrow (*Molecular, Cellular, & Developmental Biology*)

Director of Graduate Studies
David Stern (785.4832, df.stern@yale.edu)

Professors
Dario Altieri, Philip Askenase (*Internal Medicine*), Darryl Carter, Young Choi, José Costa, S. Evans Downing (*Emeritus*), Stuart Flynn, Michael Kashgarian (*Molecular, Cellular, & Developmental Biology*), 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
Xin-Yuan Fu, Earl Glusac (*Dermatology*), Robert Homer, Jung Kim, Diane Krause (*Laboratory Medicine*), Lucia Languino, Paul Lizardi, Jennifer McNiff (*Dermatology*), Vinita Parkash (*Obstetrics & Gynecology*), Archibald Perkins (*Molecular, Cellular, & Developmental Biology*), Marguerite Pinto, Miguel Reyes-Mugica (*Pediatrics*), David Rimm, Marie Robert, John Sinard (*Ophthalmology*), Giovanni Tallini

Assistant Professors
Mary Chacho, Tamara Handerson (*Dermatology*), Dhanpat Jain, Rossitza Lazova (*Dermatology*), Idris Tolgay Ocal, Rebecca Wells (*Internal Medicine*)

Instructors
Larry Bernstein, Diane Kowalski

Research Scientists
Christine Howe, David Johnson

Associate Research Scientists
Yatsula Bogdan, Jan Czycyk, Debbie Dillon, Mara Fornaro, Fengzhi Li, Lisa Madge, Mark Mattie, Deepti Pradhan, Nina Rose, Thomas Tinghitella, Thomas Welte, Zhushan Zhang, Duo-Qi Zheng

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 59 – 61).

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, page 361. 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. Dario Altieri.
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, 432.0152

Co-Chairs
Dudley Andrew (*Comparative Literature; Film Studies*) (dudley.andrew@yale.edu)
Charles Musser (*American Studies; Film Studies*) (charles.musser@yale.edu)

Professors
Dudley Andrew, Hazel Carby (*African American Studies; American Studies*), Katerina Clark (*Comparative Literature*), Michael Denning (*American Studies*), John Mack Faragher (*History*), Benjamin Harshav (*Comparative Literature*), Christopher L. Miller (*French*), Charles Musser, Brigitte Peucker (*Germanic Languages & Literatures; Film Studies*), Joseph Roach (*English; Theater Studies*), Michael Roemer (*American Studies*), John Szwed (*American Studies; Anthropology*), Alan Trachtenberg (*American Studies*)

Associate Professors
Joshua Gamson (*Sociology; American Studies*), Laura Wexler (*American Studies; Women's & Gender Studies*)

Assistant Professors
John MacKay (*Slavic Languages & Literatures*), Kristin Phillips (*Italian*), Noa Steimatsky (*History of Art; Film Studies*)

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. Although there is no advanced degree in Film Studies, there is an active undergraduate program, and a number of graduate classes are offered each year. Students are welcome in undergraduate seminars, space permitting. A number of departments offer the possibility of developing Film Studies as an area of concentration for an advanced degree, including American Studies, English Language & Literature, History of Art, French, Germanic Languages & Literatures, Italian Language & Literature, and Comparative Literature. Interested students should apply directly to these departments. The directors of the Film Studies Program and the Film Studies Committee can assist graduate students in designing a balanced and coordinated curriculum.

Graduate students who wish to develop a concentration in Film Studies are urged to take the following course offered by the American Studies Program:

AMST 814a, Problems in Film History. Charles Musser.
See description under American Studies.

This alternates with the other core Film Studies graduate course, CPLT 916a, Films and Their Study, which will be next taught in fall 2002. There is no course of study in film production at the graduate level.

The Yale Film Study Center is an important resource for graduate study and research. The Film Study Center maintains an archive of 4,000 classic American and European films as well as a number of special print and video collections.

Program materials are available on request to the director of graduate studies of the department of intended specialization, or to the co-chairs, Yale Film Studies Program, 53 Wall Street, New Haven CT 06511.

FORESTRY & ENVIRONMENTAL STUDIES

205 Prospect, 432.5100
M.S., M.Phil., Ph.D.

Dean
James Gustave Speth

Directors of Doctoral Studies
John Wargo (301 Prospect, 432.5123, john.wargo@yale.edu)
Graeme Berlyn (370 Prospect, Rm 115C, 432.5142, graeme.berlyn@yale.edu)

Professors
Mark Ashton, Gaboury Benoit, Graeme Berlyn, William Burch, Michael Dove, Daniel Esty, Thomas Graedel, Timothy Gregoire, Stephen Kellert, Robert Mendelsohn, Oswald Schmitz, John Wargo

Associate Professors
Greg Arthaud, Lisa Curran, Xuhui Lee, James Saiers, Hilary Sigman, David Skelly

Assistant Professors
Benjamin Cashore, Kathleen McAfee

Non-Ladder Faculty
Shimon Anisfeld, James Bryan, Ann Camp, Carol Carpenter, Marian Chertow, Timothy Clark, Paul Draghi, Gordon Geballe, Bradford Gentry, Reid Lifset, James Lyons, Florencia Montagnini, Robert Repetto, Thomas Siccama

Joint Appointments
James Axley, Adalgisa Caccone, Michael Donoghue, Menachem Elimelech, Roger Ely, 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

Visiting Faculty, Fellows, Adjunct Faculty, and Faculty with Primary Appointments Elsewhere
Xuemei Bai, Michael Balick, Diana Balmori, Brian Boom, Edgar Brannon, Richard Burroughs, Douglas Daly, John Ehrenfeld, William Ellis, Emil Frankel, Andrew Henderson, Yolanda Kakabadse, Matthew Kelty, David Lentz, Wangari Maathai, Scott Mori, Arvid Nelson, Daniel Nepstad, John Nolon, Christine Padoch, Charles Peters, Jonathan Reuning-Scherer, Dennis Stevenson, Fred Strebeigh, Sylvia Tesh

Fields of Study

Fields include tree physiology and anatomy, forestry and natural resource economics, forest ecology and nutrient cycling, ecosystem ecology, social ecology and sociology of planning, leisure and recreation, forest history, biometry and mensuration, forest management, tropical resources, agroforestry, tropical forestry, population ecology, environmental biophysics and meteorology, silviculture, stand development, forest pathology and air pollution impact, forest soils, nitrogen fixation, forest, natural resource, and environmental economics, environmental law, human dimensions of

wildlife, environmental and resource policy, wildlife ecology, entomology, environmental chemistry, and hydrology and water resource management.

Special Admissions Requirements

Applicants should hold a bachelor's or master's degree in a field related to natural resources like forestry, or in a relevant discipline of the natural or social sciences like 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, for 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.

Master's Degrees

M.Phil. See Graduate School requirements, page 361.

M.S. (en route to the Ph.D.). Upon petition, the department will recommend for the M.S. degree any student who has completed one year of study and has maintained a better than passing record in courses, including at least one Honors grade.

Program materials are available upon request to the Director of Doctoral Studies, School of Forestry & Environmental Studies, 205 Prospect Street, New Haven CT 06511-2199.

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
Naomi Schor (*Acting* [F]) (82 – 90 Wall Street, Rm 320, 432.4902, naomi.schor@yale.edu)
Ora Avni [Sp] (82 – 90 Wall Street, Rm 322, 432.4902, ora.avni@yale.edu)

Professors
Ora Avni, Howard Bloch, Peter Brooks, Edwin Duval, Shoshana Felman, Christopher L. Miller, Naomi Schor

Associate Professors
Catherine Cusset, Françoise Jaouën, Susan Weiner

Assistant Professors
Mark Burde, Catherine Labio, Farid Laroussi, Donia Mounsef, Jean-Jacques Poucel

Fields of Study

Fields include French literature, criticism, and theory 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 language 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, in conjunction with the program in African American Studies, a combined Ph.D. in French and African American Studies. The program is most appropriate for students who intend to concentrate in and write a dissertation on the literature of the francophone Caribbean.

Students in the combined degree program are subject to all the requirements for a Ph.D. in French. In addition, they 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 the program and the department. For further details see African American Studies.

Master's Degrees

M.Phil. See Graduate School requirements, page 361. 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

FREN 610a, Old French. Howard Bloch.
W 10.30–12.20
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, *lai*, and *fabliau*.

FREN 711b, The Theatrical Body. Donia Mounsef.
W 3.30–5.20
Textual and stage representations of the body in French theater from Romanticism to the present. Questions of gestic history, eroticization, fetishization, transgression, and the abject body are investigated in works of Hugo, Dumas, Apollinaire, Cocteau, Duras, Genet, Cixous, and Koltès. Theoretical readings in Barthes, Artaud, Kristeva, Butler, and Grosz.

FREN 731b, Writing History in France. Ora Avni.
T 1.30–3.20
An examination of the practice and function of history in post-Revolutionary France, with . special attention to both the epistemological value of history and the construction of a national *imaginaire*. Reading may include Michelet, Thierry, Monod, Langlois, Maurras, Bloch, Ricoeur, Girardet, Amalvi, Nora, Veyne, and de Certeau.

[**FREN 784b, Literature and Psychoanalysis.**]

[**FREN 787a, Literature, Testimony, and Justice.**]

FREN 789a, Testimony: Crises of Witnessing in Literature, Psychoanalysis, and History. Shoshana Felman.
W 3.30–5.20
Elie Wiesel has said that our age has invented a new genre, that of testimony. 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. In English. *Also CPLT 789a.*

FREN 835a, *Les Essais* de Montaigne. Edwin Duval.
Th 10.30–12.20
Les Essais studied in the light of (1) Montaigne's project as it is represented within the book itself, (2) the problems posed by particular aspects of Montaigne's writing (self-portraiture, self-contradiction, textual accretion, open form, quotation, intertextuality), and especially (3) close readings of individual chapters taken on their own terms.

FREN 854a, Tragic Drama: Corneille, Molière, Racine. Françoise Jaouën.
M 1.30–3.20
Various forms of tragic drama studied in their historical context: *Horace, Cinna, Polyeucte, Dom Juan, Le Tartuffe, Le Misanthrope, Andromaque, Iphigénie, Phèdre.* Topics include: dramatic theory, history of theater, history, and influence on other genres.

FREN 886b, Medieval Romance. Mark Burde.
TH 1.30–3.20
Readings from representative works of medieval French romance, including several works from each of the following categories: *roman antique* (*Thebes*, *Troie*, *Eneas*, *Alexandre*), *roman breton* (*Chevalier au lion*, *Chevalier de la charrette*, *Tristan et Iseut*), *roman idyllique* (*Flore et Blanchefleur*, *Galeran de Bretagne*, *Aucassin et Nicolette*).

FREN 905a, Flaubert and Maupassant: Literary Fathers and Fictional Sons. Naomi Schor.
M 3.30–5.20
Readings of major works by Flaubert and Maupassant.

FREN 919a, Proust Scriptum. Farid Laroussi.
T 1.30–3.20
A close reading of (several volumes of) *la Recherche.* Points of study include the concept of writing oneself, a reflection on emotions (how the narrator feels through others), and on the representation and transgression of social order (classes, sexuality, arts). We also examine the Barthesian theme of initiation: literary, erotic, and autobiographical. Critical readings focus on the canon of the canon, with essays by Barthes, Bataille, Beckett, Deleuze, Doubrovsky, and Lévinas.

FREN 923a, Sartre. Susan Weiner.
T 10.30–12.20
The literary and philosophical works of Jean-Paul Sartre, along with authors with whom he entered into critical dialogue (Flaubert, Mallarmé, Genet) and the debates surrounding existentialism. Works include *La Nausée*, *Les Mots*, *La Putain respectueuse*, *Questions de méthode*, *L'Etre et le néant*, *Réflexions sur la question juive*, and *Qu'est-ce que la littérature?*

FREN 938b, L'Extrême contemporain: Late Twentieth-Century Poets. Jean-Jacques Poucel.
M 3.30–5.20
A close study of Yves Bonnefoy, Michel Deguy, Denis Roche, and Jacques Roubaud, based on poetry and theoretical writings. Emphasis on comparing changes in their textual strategies. This initiation to contemporary poetics is followed by a sampling of younger poets.

FREN 939b, The French Atlantic Triangle and the Literature of the Slave Trade. Christopher L. Miller.
TH 10.30–12.20
An analysis of the Atlantic world that was created by the slave trade, in its French version, as seen through history, philosophy, and literature from the eighteenth through the twentieth century. Readings from Voltaire, the journal of a slave-trading sailor, Rousseau, Madame de Duras, Baron Roger, Mérimée, Sue, Césaire, Sembene, T. Mandeleau. In English. *Also AFAM 854b, AFST 739b, CPLT 723b .*

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, Kenneth Kidd, Richard Lifton (*Internal Medicine; Nephrology*), Maurice Mahoney, Charles Radding, Shirleen Roeder (*Molecular, Cellular, & Developmental Biology*), Frank Ruddle (*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 (*Therapeutic Radiology*), Paula Kavathas (*Laboratory Medicine*), Barbara Pober, Mazin Qumsiyeh, Stefan Somlo (*Internal Medicine; Nephrology*), Michael Stern, Hong Sun, Joann Sweasy (*Therapeutic Radiology*), Tian Xu, Hongyu Zhao (*Epidemiology & Public Health; Biostatistics*)

Assistant Professors
Valerie Reinke, Kevin White, Hui Zhang

Fields of Study

Fields include molecular genetics, including studies of chromosome structure, genetic recombination, viral genetics, and the regulation of gene expression; genome mapping; cellular and developmental genetics, including organ and organelle biogenesis and the genetic control of membrane transport; oncogenes and tumor suppressor genes, human genetics, especially the analysis of fundamental defects in heritable diseases; 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 genetics and development track within the interdepartmental graduate program in the Biological and Biomedical Sciences (see pages 59–61).

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 with the opportunity to explore a specific area of genetics and molecular biology in depth. To satisfy the breadth requirement, each student is expected to acquire knowledge of genetics at three of the following four levels: molecular, cellular, organismal, and populational. This will normally be accomplished through formal courses, although some students may wish to propose a program of guided reading, together with a term paper or examination, in satisfaction of one or more of the breadth requirements. Students are required to pass at least six graduate level courses. A qualifying examination, consisting of a reading period and written and oral portions, is given during the second year of study. Following successful completion of course work, the qualifying examination, and submission of a dissertation prospectus, the student is admitted to candidacy for the Ph.D. degree. Dissertation research in a specific area of genetics is carried out under the supervision of a faculty adviser with the guidance of a thesis committee. There is no language requirement.

An important aspect of graduate training in genetics 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.

Honors Requirement

Students must meet the Graduate School's Honors requirement by the end of the fourth term of full-time study (see pages 359–60).

Master's Degrees

M.Phil. See Graduate School requirements, page 361.

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 Administrative Assistant, Graduate Program, Department of Genetics, Yale University, PO Box 208005, New Haven CT 06520-8005. Prospective applicants are encouraged to visit the department Web page (info.med.yale.edu/genetics/) or the BBS Web page (info.med.yale.edu/bbs/), Genetics & Development Track.

Courses

GENE 500a, Genetics in Health and Disease. Margretta Seashore.
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. The

course encompasses classical medical aspects of genetics including chromosomal abnormalities, single gene conditions, quantitative and biochemical genetics, genetic factors in common disorders, genetic screening and therapy, as well as human genomics and medical, ethical, and social issues surrounding the elucidation of the human genome.

[**GENE 520b, Scientific Integrity in Biomedical Research.**]

GENE 620, Topics in Medical Genetics. Barbara Pober.
W 9–10
A variety of topics in the fields of biochemical genetics, DNA diagnostics, cytogenetics, prenatal genetics, and general clinical genetics. Of particular interest to graduate students and medical students who wish to broaden their background in the basic principles as well as the clinical applicability of medical genetics. Prerequisite: introductory course in human genetics (e.g., GENE 500a) or permission of instructor.

GENE 625a, Basic Concepts of Genetic Analysis. Robert Lifton, Tian Xu, Michael Koelle, Shirleen Roeder, Michael Stern.
TTh 1.05–2.20
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. A brief review of undergraduate genetics is offered in two optional lectures at the beginning of the term. *Also MB&B 625a^{u}, MCDB 625a^{u}.*

GENE 642a, Roles of Microorganisms in the Living World. Diane McMahon-Pratt, L. Nicholas Ornston, Peter Tattersall.
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 675, Graduate Student Seminar. Selected faculty.
Th 4–5
Covers a variety of topics in molecular, cellular, developmental, and population genetics. Students gain experience in preparing and delivering seminars and in discussing presentations by other students. Required for all first- and second-year students in Genetics.

GENE 705a, Molecular Genetics of Prokaryotes. Nigel Grindley, Charles Radding.
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 734a, Molecular Biology of Animal Viruses. Daniel DiMaio, Peter Tattersall.
WF 9.30–10.45
Lecture course with emphasis on mechanisms of viral replication, oncogenic transformation, and virus-host cell interactions. *Also MBIO 734a.*

GENE 743b, Molecular Genetics of Eukaryotes. Anthony Koleske, Mark Hochstrasser.
TTh 11.30–12.45
Selected topics in genome structure and evolution, regulation of gene expression, signal transduction, cellular physiology, development, and carcinogenesis. Prerequisite: biochemistry or permission of instructor. *Also MB&B 743b^{u}.*

GENE 749a, Medical Impact of Basic Science. Joan Steitz, Mark Hochstrasser, Andrew Miranker.
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 placed on the fundamental principles on which these advances rely. Reading from the primary scientific and medical literature, with emphasis on developing the ability to read this literature critically. Prerequisite: rigorous undergraduate course in molecular biology or permission of the course director. *Also MB&B 749a[u]*.

GENE 777a, Mechanisms of Development. Lynn Cooley, Tian Xu, W. Zhong.
M 9.45–11, F 2.15–3.30
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 677a*.

GENE 810b, Human Molecular Genetics. Allen Bale, Cheryl Garganta.
MW 12–1
This course focuses on molecular genetics of single gene and multifactorial human traits. About one-half of the lectures cover 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, Barbara Pober.
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 b, Introduction to Research for First-Year Students. Michael Stern and staff.
A required laboratory rotation course designed to give first-year students the opportunity to do research in several different laboratories and to learn a variety of methods now being used in genetic biochemical studies.

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
Danny Rye

Director of Graduate Studies
Jacques Gauthier (203 KGL, dgs@geology.yale.edu)

Professors
David Bercovici, Robert Berner, 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

Associate Professors
Jay Ague, Mark Brandon

Assistant Professors
Ruth Blake, David Evans, 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.

Master's Degrees

M.Phil. See Graduate School requirements, page 361.
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 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.**]

G&G 501b[u], Climate Dynamics. Steven Sherwood.
MWF 9.30–10.20
An investigation of the earth's physical climate system. Topics include interaction among the following phenomena: atmospheric radiation; clouds and other atmospheric constituents; coupling between the atmosphere, the ocean, the land surface, and the cryosphere; atmospheric momentum, energy, and water-vapor budgets; convection; the general circulation.

[**G&G 504b[u], Minerals in the Biosphere: The Geochemistry of Human Health.**]

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 510a[u], Active Tectonics.**]

[**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. Adolf Seilacher.
MW 11.30–12.45, Lab HTBA
Exploration of the basic constraints and potentials that controlled adaptive radiation in the evolution of the invertebrate skeleton. Open to juniors and seniors. General knowledge about animal phyla assumed.

G&G 515a[u], Paleobotany. Leo Hickey.
TTh 9–10.15, Lab Th 1.30–3.20
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 520b[u], Kinetics of Geochemical Processes.]

[G&G 521b[u], Geophysical Fluid Dynamics.]

G&G 522b[u], Introduction to Meteorology and Climatology. Steven Sherwood.
TTh 11.30–12.45
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 525b[u], Geophysical Continuum Mechanics. David Bercovici.
TTh 9–10.15
Physics of continuous media with applications to geophysics and geology. Tensors; analysis of stress; motion and strain; conservation of mass, momentum, and energy; rheology; applications to seismology, tectonics, environmental science, and geophysical fluid dynamics.

G&G 526a[u], Introduction to Geophysics. David Bercovici.
TTh 10.30–11.45, 1 HTBA
An introduction to the physics of the solid earth; geodesy and gravity, geomagnetism, radioactive dating methods, elementary seismology, heat flow, plate tectonics, and mantle convection.

[G&G 530a[u], Large-Scale Atmospheric Motions I.]

[G&G 531b[u], Large-Scale Atmospheric Motions II.]

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.]

G&G 540a[u], Geomicrobiology: Microbial Processes in the Geologic Environment. Ruth Blake.
TTh 1–2.15
Microbial processes in geologic environments; control through microbial metabolism of the geochemistry of natural waters, sediments, and soils, with emphasis on microbe-mineral interactions. Microbially mediated cycling and transport of metals.

G&G 550a[u], Paleontology and Evolutionary Theory. Elisabeth Vrba.
TTh 11.30–12.45
Current concepts in evolutionary and systematic theory with particular reference to how they apply to the fossil record. Emphasis on use of paleontological data to study evolutionary processes.

[**G&G 555a[u], Ocean Circulation.**]

G&G 556b[u], Introduction to Seismology. Jeffrey Park.
MWF 11.30–12.20
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[u], Data Analysis in the Earth Sciences.**]

[**G&G 560a[u], Theory of Viscous Flow.**]

[**G&G 562b[u], Observing the Earth from Space.**]

[**G&G 601a, Topics in Earth Science.**]

[**G&G 611a, Advanced Stratigraphy.**]

[**G&G 615a, Advanced Petrology.**]

[**G&G 618b, Petrology of Light Stable Isotopes.**]

[**G&G 621b, Geochemistry of Heavy and Radioactive Isotopes in Rock Systems.**]

G&G 631a, Vertebrate Paleontology: Phylogeny of Vertebrates. Jacques Gauthier.
This seminar course offers a detailed look at current issues in the phylogeny, anatomy, and evolution of fossil and Recent reptiles. Introductory lectures provide a broad outline of reptile phylogeny. Participants should have a working knowledge of vertebrate anatomy as they are expected to read, analyze, and discuss relevant primary literature, lead discussions on selected papers in the field, and write a term paper.

[**G&G 655a, Extraordinary Glimpses of Past Life.**]

[**G&G 657b, 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 675b, 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.

[**G&G 705b, Advanced Seminar in Evolutionary Paleontology.**]

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.
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. Jay Ague.

Tutorial courses, offered by arrangement with individual faculty, are offered as follows:

G&G 800a or b, Tutorial in Paleobiology.

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 (305 WLH, 432.0782, ingeborg.glier@yale.edu)

Professors
Aleida Assmann (*Visiting*), Ingeborg Glier, Cyrus Hamlin, Leo Lensing (*Visiting*), Brigitte Peucker, Jeffrey Sammons

Assistant Professor
Matthias Konzett

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. 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.

Master's Degrees

M.Phil. See Graduate School requirements, page 361. 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 362.

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 550a, Kafka between Judaism and Christianity. Leo Lensing.
TTh 1–2.15
An introduction to key texts by Kafka, including two of the novels, *The Trial* and *The Castle,* and several of the most important shorter stories, *The Judgment, The Metamorphosis, In the Penal Colony, A Report to an Academy,* and *Josephine the Singer,* or *The Mouse Folk.* Our approach is to take advantage of recent scholarship on Kafka's Jewish background, in order to explore the ways in which his fiction incorporates reactions to Judaism and to his own Jewish identity. We also focus on how the famous indeterminacy of Kafka's texts, their resistance to any one interpretation and indeed occasionally to any convincing interpretation at all, derives from their assimilation of sometimes contradictory traditions and ideologies. To this end, we also investigate some examples of the "Christian subtext" that coexists uneasily in the same texts that modern scholarship has claimed for reflection of matters Jewish. Readings and discussion in English.

GMAN 576b, Wolfram von Eschenbach. Ingeborg Glier.
W 3.30–5.20
Wolfram's work is unique in narrative texture, experimentation with literary genres and traditions, reflection on contemporary reality, and last, but not least, humor. We read and discuss *Parzival, Willehalm, Titurel,* and some of the dawnsongs. We also view them against other literary achievements of the period and finally sample the role that *Parzival* in particular plays in nineteenth-century and contemporary Arthurian revivals.

GMAN 578a, Heine and His Age. Jeffrey Sammons.

M 3.30–5.20

Readings of selected works of Heine from all his genres. The career of Ludwig Börne and the emergence of Young Germany in the context of censorship; Gutzkow's *Wally die Zweiflerin* and the Federal Ban of 1835; the political poetry of *Vormärz*. The political context of the time; introduction to the role these matters have played in contemporary German literary scholarship.

GMAN 579a, Medieval German Literature: A Survey. Ingeborg Glier.

W 3.30–5.20

This course examines German literature from its "beginning" in the Carolingian Age until the time around 1500. We read and discuss representative shorter texts and selections of some larger ones (in the original and in translation). Special attention is given to the development of literary genres, the emancipation of vernacular literature from Latin culture, and the intricate relationships of authors and their audiences.

GMAN 599b, Thomas Mann's Narratives. Ingeborg Glier.

TTh 9–10.15

Die Erzählungen of Thomas Mann, written over a span of sixty years (1893–1953), read in the context of the novels and essays. Facets of Mann's poetic technique, specific current themes, and their transformations (love-art-death, the artist and society, self and reality). Conducted in German.

GMAN 616b, Freud on Culture. Matthias Konzett.

M 1.30–3.20

This course examines the legacy of Freud's writings in relation to the cultural context of Vienna. Reading seminal works by Freud, we explore those aspects of his works that reach beyond the immediate concerns of psychoanalysis and can be understood as contributions to cultural studies and criticism. Works include major canonical texts of Freud and essays on the developing cultural history of Vienna. All texts are offered in English and German. Discussion in English.

GMAN 621a, Contemporary Europe in the Novel. 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. Readings and discussion in English.

GMAN 655a, Opera in Germany: Mozart to Kurt Weill. Cyrus Hamlin.

MW 1–2.15

Survey of the development of opera in the culture of the German-speaking countries from the end of the eighteenth to the beginning of the twentieth century. Emphasis on the literary and theatrical aspects of these works, with regard to the interaction of text and music and the challenge of performance in the theater. Works considered include Mozart, *Die Zauberflöte;* Beethoven, *Fidelio;* Weber, *Der Freischütz;* Wagner, *Der Fliegende Holländer, Tannhäuser,* and *Die Meistersinger von Nürnberg;* Strauss, *Elektra, Der Rosenkavalier, Ariadne auf Naxos,* and *Die Frau ohne Schatten*; Berg, *Wozzeck;* and Weill, *Rise and Fall of the City of Mahagonny.* No knowledge of German or training in music is required. Readings in English; conducted in English. *Also CPLT 818a*[u].

GMAN 692a, Sexual Textualities in Fin-de-Siècle Vienna. Leo Lensing.
TH 3.30–5.20
An investigation of the ways in which discourses on sexuality dominated literary and artistic production within Viennese modernism. Readings and visual analysis of Altenberg, Freud, Hofmannsthal, Klimt, Kokoschka, Kraus, Schiele, Schnitzler, and others. Special attention is given to hybrid forms—Altenberg's "inscribed" photographs, Kokoschka's illustrated texts, Kraus's textual and photographic montages—and to creative and polemical interactions—Schnitzler's and Kraus's critiques of psychoanalysis, Kokoschka's and Schiele's revisions of Klimt, Hofmannsthal's responses to Freud. Readings in German, discussion in English. *Also CPLT 559a.*

GMAN 720b, 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. Readings in English; conducted in English.

GMAN 730b, Spectres of History. Aleida Assmann.
W 1.30–3.20
"The past is not dead, it is not even past." This sentence from Faulkner (which was reused by Christa Wolf as the first sentence of her autobiographical novel *Kindheitsmuster*) captures well the experience of an ongoing troubled relationship with traumatic experiences of the past. The aim of the course is to provide an introduction to theoretical approaches to trauma from the point of view of different disciplines and to read literary texts that address the impact of various traumas of history. Texts to be discussed: Shakespeare, *Hamlet*; Leslie Marmon Silko, *Ceremony*; Toni Morrison, *Beloved*; Ruth Klueger, *weiter leben*. *Also CPLT 730b.*

HISTORY

237 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, Paul Bushkovitch, Jon Butler, Nancy Cott, John Demos, Carlos Eire, John Mack Faragher, Paul Freedman, John Gaddis, Glenda Gilmore, Robert Gordon (*Law*), Timothy Guinnane (*Economics*), Valerie Hansen, Robert Harms, John Heilbron (*Visiting*), Frederic Holmes (*History of Medicine & Science*), Henry Huttenbach (*Visiting*), Paula Hyman, Matthew Jacobson, Gilbert Joseph, Donald Kagan, Paul Kennedy, Daniel Kevles, Benedict Kiernan, Ivan Marcus, John Matthews (*Classics*), William McFeely (*Visiting*), John Merriman, Edward Peters (*Visiting*), Cynthia Russett, Lamin Sanneh (*Divinity School*), Stuart Schwartz, Frank Snowden, Jonathan Spence, Harry Stout, Frank Turner, Henry Turner, John Harley Warner (*History of Medicine & Science*), Robin Winks, Jay Winter, Keith Wrightson

Associate Professors
Robert Johnston, Kevin Repp

Assistant Professors
Michael Auslin, Jennifer Baszile, Brian Cowan, Seth Fein, Joanne Freeman, Andrew Gregory (*Classics*), Mary Habeck, Jonathan Holloway, Susan Lederer, Mary Lui, Michael Mahoney, Carolyn Moehling, Stephen Pitti, Mridu Rai, Ronald Rittgers (*Divinity School*), Timothy Snyder, Steven Stoll, Rebecca Tannenbaum (*Visiting*), Anders Winroth, Keriann 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 essay to accompany the application, describing and analyzing a work of history that the applicant wishes he or she had written.

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, students take 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. The department expects students to 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 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 522a[u], The Roman Empire: History in Latin Inscriptions. John Matthews.
W 2.30–4.20
Issues in Roman political, social, religious, and legal history from the first century B.C. to the fifth century A.D., as seen through Latin inscriptions selected for their inherent interest and variety of content as well as for the explicitly epigraphic questions that may be raised. *Also LATN 744a[u].*

HIST 525b, Topics in Roman History and Culture. John Matthews, Susanna Braund.
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 650b.*

HIST 530a, Late Rome to Charles Martel: Gaul Becomes Medieval. Walter Goffart.
T 1.30–3.20
Reading and discussion of the main sources documenting Gaul from its last years in the Roman Empire down to the "Do-Nothing" kings whom the Carolingians replaced. Special atention is paid to the question of continuity from antiquity, as well as to types of source material and critical approaches to them.

HIST 532b, The Making of Monasticism. Bentley Layton.
W 1.30–3.20
The history of Christian monasteries, hermits, ascetics, and monastic institutions and values in late antiquity, with special attention to the eastern Mediterranean world. *Also NELC 736b[u], RLST 659b[u].*

HIST 545a, Peasants in the Middle Ages. Paul Freedman.
M 1.30–3.20
Considers the social history and representation of the medieval peasantry from about 800 to 1525. Topics include: the rural economy, feudal society and the seigneurial regime, social ideologies, and resistance (direct and indirect).

HIST 546a[u], Jewish-Christian Confrontations in Medieval Europe. Ivan Marcus.
TTh 11.30–12.45
A history of the major trends and turning points illustrating how medieval European Jews and Christians acted toward and imagined each other's culture from late antiquity to the Reformation. *Also RLST 770a[u].*

HIST 569a, Readings in Reformation History: Calvin and Calvinism. Carlos Eire, Serene Jones.
T 1.30–3.20
Reading and discussion. *Also RLST 678a.*

HIST 580b, Encounters: Ourselves and Others in the Early Modern World. Stuart Schwartz.
M 1.30–3.20
An examination of the encounters between Europeans and other peoples 1480–1800, with attention to the role of perception, conceptions, and events on both sides of such meetings. Both the history of such encounters as well as the theories of alternity and cultural perceptions are discussed.

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 603b, Questions of Class. Keith Wrightson.
Th 10.30–12.20
A reading seminar drawing on the extensive literature on the problem of class in the period c. 1550–1850. The core readings are on Britain, but comparative readings are introduced where possible. Particular issues include different ways of imagining the social order (estates, degrees, classes, etc.); how social identities are structured and classes made and unmade; aristocracy; the notion of gentility; middle classes; the professions; "proletarianization"; social mobility; class and gender; stability and conflict.

HIST 605b, Early Modern Media and Politics. Brian Cowan.
W 3.30–5.20
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 aural communication. Armed with this understanding of their context, we read a variety of different early modern texts including political philosophy, pictures, poetry, drama, newspapers, and diaries. While the primary focus of our readings is on early modern England, students may write a research paper in a field of their own choice.

HIST 630b, European Thought in the Era of Romanticism. Frank Turner.
Th 1.30–3.20
This seminar examines European thought from Jean-Jacques Rousseau through Friedrich Nietzsche. The general emphasis is on continental thinkers though some British writers are considered. Topics likely to be covered are romantic aesthetics, idealism, political utopianism, political conservatism, philosophy of history, the debate over civil society, the theology of feeling, nationalism, the ideas of development and evolution, and Wagner's music of the future. Among the writers likely to be read are Rousseau, Kant, Adam Smith, Goethe, Hegel, Coleridge, Constant, Heine, Chateaubriand, Schleiermacher, Newman, de Tocqueville, Carlyle, Marx, Darwin, Wagner, and Nietzsche. The course also considers the plastic and musical arts of the period. Student reports and a final paper.

HIST 634a, Cultural and Intellectual History of European Modernism. Kevin Repp.
W 1.30–3.20
Reading and discussion. Students 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 Fussell, Mark Antliff, Raymond Williams, Jürgen Habermas, Michel Foucault, and Pierre Bourdieu.

HIST 642b, Paris and London: Metropolitan Trajectories, 1815–1918. John Merriman, Jay Winter.
T 1.30–3.20
Reading and discussion seminar. Topics include the impact of large-scale economic transformation; popular protest; migration and mobility; social geography; city and country; the world of work and leisure; the experience of war; images and representation of the city; and the successes and failures of urban planning.

HIST 646b, Socialism in Europe from Babeuf to Gramsci. Frank Snowden.
T 10.30–12.20
Main currents of European socialism in their historical context. Attention is paid to utopian socialist thinkers, Marx and Engels, anarchist and libertarian thought, Russian populism, Fabian socialism, revisionism, anarcho-syndicalism, Lenin, and Gramsci.

HIST 651a, Topics in Modern German History. Henry Turner.
T 1.30–3.20
Reading and discussion course, focused on selected aspects of modern Germany's development.

HIST 652b, Research Seminar on Modern German History. Henry Turner.
W 1.30–3.20
Methods of research, historiographical case studies, independent project.

HIST 655a, Relations of the Great Powers since 1890. Paul Kennedy.
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 666b, Russia to 1725. Paul Bushkovitch.
T 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 672b, Family and Nation in East European Empires, 1848-1918. Timothy Snyder.
T 1.30–3.20
Attempts to unite the East European historiographic preoccupation with the nation with recent Western attention to local and microcultural history. Considers the question of national assimilation from the perspective of choices within families at moments of political opportunity and threat brought by reform, revolt, and war.

HIST 685a, Yugoslavia, 1918–1991. Ivo Banac.
W 3.30–5.20
Reading and discussion. Main topics in the history of two Yugoslav states. Conflicts, ideologies, dissolution. No language prerequisites.

HIST 700a, Introduction to the Historiography of the United States. Nancy Cott.
T 12.30–4
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 706a, Readings on Early National America. Joanne Freeman.
M 3.30–5.20
A discussion of recent work on the early national period, with an emphasis on cultural and political history.

HIST 708b, Readings in African American History to Emancipation. Jennifer Baszile.
W 3.30–5.20
This seminar surveys classic and recent scholarship on the African diaspora in North America. Topics include regional and temporary varieties of slavery and freedom, gender, religion, race, work, resistance, and emancipation. Attention to urban and rural communities. *Also AFAM 758b, AMST 706b.*

HIST 719a, Reconstruction, Reunion, Race, and ...Writing. William McFeely.
Th 1.30–3.20
A writing course. The subject: race relations from the Civil War through the 1930s. We examine the writing in works by C. Vann Woodward, Eric Foner, David W. Blight, and James

Goodman, then experiment with our own. Frequent short exercises and one longer assignment. The goal is to write readable history.

HIST 723a, Intellectual Life in Twentieth-Century America. Cynthia Russett.
W 1.30–3.20
This course focuses on selected topics in the intellectual history of modern America from the turn of the century until the 1980s. Readings emphasize primary sources rather than modern scholarship. Writers include Malcolm Cowley, James Agee, Ralph Ellison, Christopher Lasch, and Cornel West. Reading and discussion.

HIST 735a, Readings in Twentieth-Century American Political and Social History. Glenda Gilmore.
Th 10.30–12.20
Recent trends in American political history from the 1800s, with an emphasis on the social analysis of mass politics and reform. *Also AFAM 706a, AMST 714a.*

HIST 736b, Research in Twentieth-Century American Political and Social History. Glenda Gilmore.
W 10.30–12.20
Projects chosen from the post-Civil War period, with emphasis on twentieth-century social and political history, broadly defined. Research seminar. *Also AFAM 709b, AMST 709b.*

HIST 738a, Reading and Research in Western and Frontier History. John Mack Faragher.
W 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 738a.*

HIST 750a, Religion and Modernity in Europe and America, 1850-2000. Jon Butler.
T 10.30–12.20
Examines confrontation of religion with the modern in both Europe and America from the mid-nineteenth century to the present. Readings concentrate on the meaning of modernity for religious belief and practice and on the implications of urbanization, industrialization, and the rise of technocratic society for sustaining religious faith. Among issues concerned are the fate of miracles, religion and modern politics, ethnicity, gender, "therapeutic" religion, and religion's apparent persistence despite the advance of secularization, at least in America, and its potential to assess the alleged uniqueness of "modernity." *Also AMST 704a, RLST 523a.*

HIST 751a, Race and Races in American Studies. Matthew Jacobson.
F 1.30–3.20
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 semester gives students a chance to explore in depth the themes, periods, and methods which most interest them. *Also AFAM 687a, AMST 701a.*

HIST 756b, The International/Transnational History of the United States in the Americas. Seth Fein.
Th 3.30–5.20
This reading seminar analyzes recent approaches to the study of sociocultural, economic, and political history across national and disciplinary boundaries. It examines how international and transnational encounters, in different cases, stabilize as well as destabilize "national" power, political structures, and cultural forms. Empirically, it focuses on interactions (and noninteractions) between the United States and other nations of the Americas during the twentieth century. Other geocultural and temporal situations are engaged for methodological and empirical comparison.

HIST 760b, American Legal History, 1880-1980. Robert Gordon.
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 LAW 21063.*

HIST 765b[u], Jews in America, 1654 to the Present. Paula Hyman.
TTh 10.30–11.20
A survey of the development of American Jewry from the colonial period to the present, with special attention to social, cultural, political, and religious issues. *Also RLST 764b[u].*

HIST 766a[u], Jewish Immigration and American Society. Paula Hyman.
W 1.30–3.20
An exploration of the Jewish immigration experience in America in the context of American immigrant history. Topics include economic issues, gender and identity, political activism, religious adaptation, and cultural participation in American society. *Also RLST 766a[u].*

HIST 790b, 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 AMST 790b.*

HIST 793b, Power: Historical and Theoretical Approaches. Jean-Christophe Agnew.
Th 10.30–12.20
An introduction to the widely different ways in which power and its correlative concepts (domination, coercion, oppression, authority, legitimacy, hegemony, resistance, etc.) have been treated by historians, sociologists, anthropologists, and political theorists. Case studies test the various approaches in different contexts. *Also AMST 793b.*

HIST 800b, Teaching World History. Valerie Hansen.
Th 1.30–3.20
An introduction to the different definitions of and approaches to the topic as now taught to undergraduates. Thematic focus on the movement of peoples (free and unfree), trade items, and religious beliefs among different world areas. Restricted to History Ph.D. students.

HIST 807b, Resistance, Rebellion, and Survival Strategies in Rural 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. *Also ANTH 510b.*

HIST 820a, Modern Mexican History. Gilbert Joseph.

F 1.30–3.20

The course examines new approaches to the political and cultural history of Mexico in the nineteenth and twentieth centuries. Particular emphasis is given to the coming and process of the Mexican revolution, the durable nation-state that emerged from it, Mexico's multi-stranded encounter with the United States, and the development of social movements and mass culture in the postrevolutionary period.

HIST 831a, Political Theory and Practice in Modern Islamic Historical Texts and Contexts. Abbas Amanat.

Th 3.30–5.20

Close reading, content analysis, and contextual study of mostly modern Iranian historical writings, "mirrors" and critical literature, memoirs, and selective documents in translation as well as major studies on the themes of power, morality and violence; Islam and politics; modernity, reform, and contested identities. No prerequisites.

HIST 834b, Readings in Modern Middle Eastern History. Abbas Amanat.

W 3.30–5.20

This reading course examines major themes in the history of the modern Middle East (nineteenth and twentieth centuries) to include the Ottoman Empire and Turkey, Iran, and the Arab world. Topics include state and societal transformations, Western impact and colonialism, reform and modernity, religion, gender, nationalism, and revolutions.

HIST 839b, Environmental History of Africa. Robert Harms.

W 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 844a, Memory and Orality in African History. Michael Mahoney.

Th 1.30–3.20

This graduate seminar introduces the student to oral research methodology, as well as to particular debates about that methodology within African historiography. We also discuss memory and popular historical understandings, and how this non-guild historiography interacts with what academics do. Though the focus is on Africa, we cover the material in a sufficiently general manner so that the course may be of interest to non-Africanists. In addition, the final project requires practical oral research, and this may very well be non-Africanist in nature, since so few African respondents are available in the area. *Also AFST 844a.*

HIST 851a, The Wars in Vietnam since 1920. Benedict Kiernan.

W 3.30–5.20

The changes imposed by French colonialism up to 1945, and Vietnamese cultural and political responses, set the background to the First, Second, and Third Indochina Wars, 1945–1993. The Japanese occupation in World War II, the 1945 August Revolution, the French attempt to recolonize Vietnam, and the similarly fated U.S. intervention of 1955–1975 are the main topics. The wars with China and Democratic Kampuchea are also studied. Reading and discussion.

HIST 859b, Topics in Ch'ing Intellectual History. Annping Chin.

Th 3.30–5.20

The course focuses on the Ch'ing scholars — how they gathered evidence about the past, why they worked in the way they did, and what they hoped to accomplish. It also explores the major themes in Ch'ing intellectual history — why, for instance, the reform-thinking scholars of the nineteenth century would look to the writings of the early Ch'ing for insights and inspiration. Chinese not required.

HIST 865a, Qing and Republican China. Jonathan Spence.
W 3.30–5.20
An exploration of some of the main themes in the history of modern China. Topics include Qing political and social history, foreign imperialism, dynastic decline, intellectual explorations, the rise of the communist party, and the impact of Japan. Reading and discussion. Chinese not required.

HIST 868a, Qing Communications, Archives, Official Historical Writing, and Reading Documents. Beatrice Bartlett.
F 1.30–3.20
Qing document and communications systems (including the institutional background to understanding them), the use of primary sources and archives in particular, and reading Qing documents. Prerequisite: advanced Chinese, with at least one course in literary Chinese.

HIST 869b[u], Research Bibliography for Qing and Modern Chinese History, 1600–1937. Beatrice Bartlett.
F 1.30–3.20
Introduction to the research bibliography for late imperial and early-twentieth-century Chinese history (1600–1937). Research seminar. Prerequisite: advanced Chinese, with at least one course in literary Chinese.

HIST 870b, Historians on Modern China. Beatrice Bartlett.
W 1.30–3.20
Some of the problems historians have faced in writing about modern China. Questions of historical truth, types and uses of sources, objectivity and bias, conflicting evidence. Works to be read include translations of writers of various nationalities (Chinese, Russian, Japanese).

HIST 872a[u], Taiwan History, 1600 to the Present. Beatrice Bartlett.
T 1.30–3.20
Taiwan history from the first immigrations to the present. Topics include Koxinga and the Dutch, Qing pioneers and rebels, Taiwan as a Qing province, the Japanese colonial experience (1895–1945), Nationalist rule, the modern economic miracle, foreign relations, and democratization since the 1960s. Problems of conflicting historical interpretations. Reading and discussion.

HIST 891a, Subaltern Studies: Before, During, and After. Mridu Rai.
This course evaluates the Subaltern Studies project, one of the most influential interventions in history to emerge from South Asia, whose impact has been felt in Latin American, Irish, and African studies, where it shares common ground in a broader "postcolonial" critique. The course traces the history of this "school of historiography," beginning with an examination of its original problematic, in providing a "history from below" challenging nationalist elite writings, surveying the changing nature of the project, and probing the critiques leveled against it.

HIST 930a, Introduction to the History of Medicine and Science. Daniel Kevles, Frederic Holmes, Susan Lederer, John Warner.
W 2.30–4.20
Part one of a two-semester linked sequence. An examination of significant works in the history of science and history of medicine from the seventeenth through the twentieth century. Discussions emphasize themes, methods, and controversies that have shaped these fields during the last three decades. Topics include the history and historiography of medicine, public health, the physical sciences, chemistry, and the life sciences. *Also HSHM 601a.*

HIST 931b, Introduction to the History of Medicine and Science, Part II. Daniel Kevles, Frederic Holmes, Susan Lederer, John Warner.
W 1.30–3.20
Part two of two-semester linked sequence. *Also HSHM 602b.*

HIST 933b, Seminar in Science and Technology in the Twentieth Century. Daniel Kevles, John Heilbron.
An examination of the development of the scientific and technological enterprise in Europe and the United States, including its major intellectual achievements, academic and industrial institutions, relationship to war and the state, and standing in general culture. Among topics that might be considered are atomic, nuclear, and particle physics, genetics and molecular biology, microelectronics and computers. *Also HSHM 714b.*

HIST 951b[u], Memory, Memoirs, and Modern Jewish History. Paula Hyman.
Th 1.30–3.20
An exploration of the representation of Jewish historical experience from the seventeenth to the twentieth century through a selection of memoirs. Focus on the construction of identity, with special attention to the interaction of minority status, gender, and class in a variety of historical contexts. *Also RLST 762b[u].*

HIST 963b, Modern Empires and Imperialisms: Research on Colonial and Imperial Issues. Robin Winks.
W 1.30–3.20
This is a research seminar, with some initial emphasis on reading and discussion, into the rapidly growing and changing historical literature on comparative imperial studies. While emphasis is placed on the largest of the modern empires, Britain, within that empire there is some focus on Canada, Australia and New Zealand, West Africa, and Malaysia/Singapore, and students are free to develop topics on any imperial subjects post-1763.

HIST 965a. Agrarian Societies: Culture, Society, History, and Development. Robert Harms, James Scott, Michael Dove, Linda Rebhun.
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, PLSC 779a.*

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 979a[u], Historical Perspectives in the Study of the Holocaust. Paula Hyman.
MW 10.30–11.20
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 985b, Studies in Grand Strategy, Part I. John Gaddis, Charles Hill, Paul Kennedy, Paul Bracken.
M 1.30–3.20
This two-semester 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. Written reports are presented and critically examined early in the fall term. Students must take both semesters, fulfill the summer research/internship,

and attend additional lectures to be scheduled throughout the spring and fall terms. Admission is by competitive application only; forms are available at International Security Studies. *Also MGT 984b, PLSC 716b.*

HIST 986a, Genocide in Comparative Historical Perspective. Henry Huttenbach.
Th 10.30–12.20
Genocidal practices have characterized much of the past century; yet only recently has the international community recognized the urgency of understanding genocide as a potentially dangerous, destabilizing threat that calls for policies of prediction and prevention. Much about genocide is unknown, from its causes to its consequences. Even the definitions of genocide are disputed. Open debates rage as to who is accountable and how to address the problems of justice and compensation. Students in the course read widely on a variety of issues associated with genocide, as well as on specific cases of genocide. A balance is encouraged between theoretical discussions and detailed knowledge of specific genocides. The term grade is based on class participation, familiarity with material, and a substantial research paper. *Also INRL 540a.*

HIST 995a/b, Prospectus Tutorial. Faculty.

HIST 998a/b, Directed Reading. 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
Christopher Wood (202 OAG, christopher.wood@yale.edu)

Professors
Brian Allen (*Adjunct*), Walter Cahn, Judith Colton, Edward Cooke, Jr., Diana Kleiner, Mary Miller, Alexander Nemerov, Jock Reynolds (*Adjunct*), Vincent Scully (*Emeritus*), Robert Thompson, Christopher Wood, Mimi Yiengpruksawan

Associate Professors
Christy Anderson, Maria Georgopoulou

Assistant Professors
Judith Barringer, Timothy Barringer, Anne Dunlop, Björn Ewald, Sandy Isenstadt, Kellie Jones, Christine Mehring, Noa Steimatsky

Lecturers
Mark Aronson, Theresa Fairbanks, Karen Foster, Pamela Franks, Alice Hyland (*Visiting*), Julia Marciari-Alexander, Joachim Pissarro, Kishwar Rizvi (*Visiting*)

Fields of Study

Fields include Greek and Roman; Medieval and Byzantine; Renaissance; Baroque; eighteenth-, nineteenth-, and twentieth-century European; 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. 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. Students receive one course credit as Teaching Fellows when they lead a discussion session. 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 examination. 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 com-

pletion of all predissertation requirements, including the prospectus and qualifying examination. Admission to candidacy must take place by the end of the third year of study, unless prior, noncumulative registration has been granted.

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, page 361. 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. Christine Mehring.
TH 1.30–3.20
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 504b, Aspects of Connoisseurship and Conservation. Theresa Fairbanks, Catherine Sease.
Combines four-week internships in curatorial departments with seminars to address the history of museums, current trends, and future challenges. Enrollment limited to ten.

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 574b, Greek Vase Painting. Judith Barringer.
W 2.30–4.20
A detailed study of Greek vases — their fabric, ornament, artisans, market, function, and social context — from the Geometric through the late Classical period, c. 750–340 B.C. Although the focus is on Attic vases, i.e., those produced in Athens, the course also examines vessels from elsewhere in the Greek world. Using both traditional and more theoretical methods, the course considers such issues as the relationships between image, shape, and context; variations in depicting the same myth or scene; the meaning and function of "genre" scenes and their relationship to myth; the use of repetition on a given vase; the relationship between Greek vase painting and other ancient media, including metalware and monumental wall painting; the impact of the portability and the three-dimensional nature of vases on their imagery; the relationship between artist and patron; and how vase painting can illuminate our knowledge of Greek religion, gender roles and sexuality, social hierarchy, and politics. Readings include both ancient authors and modern scholarship. The course draws heavily on the Yale University Art Gallery's collection, and field trips are scheduled to the Museum of Fine Arts, Boston and the Metropolitan Museum of Art. *Also CLSS 806b.*

HSAR 578a, Death in Rome: Myths and Monuments, Rituals and Viewers. Björn Ewald.
M 3.30–5.20
An introduction to Roman funerary art from Republican times to c. 300 A.D., in a broad cultural and anthropological context. Topics include burial customs and grave rituals, funerary speeches and inscriptions, as well as the spatial contexts in which the monuments were seen. Special emphasis on Roman sarcophagi, perhaps the most significant body of images from the Roman world. *Also CLSS 835a.*

HSAR 579b, Contested Identities: The Making of Architecture in the Modern (Islamic) World. Kishwar Rizvi.
T 2.30–4.20
This course studies the ideas and concepts that inform the making and reception of architecture in Islamic Asia, with a focus on Turkey, Iran, and Pakistan. The encounter with Western powers has now been sublimated to the degree of global theories of design; nonetheless these countries are in search of an indigenous aesthetic expression. In the Islamic world, new fun-

damentalisms and shifting religious trends have created an environment in which each country must renegotiate its part and reconsider its collective future. Whether through suppressing their Islamic roots, as in the case of Republican Turkey, or through reinventing them, as in the case of Pakistan, these countries create their national image. And it is through their public architecture that they convey their political and religious ideology. This course analyzes cases of colonial and nationalist architecture in Islamic countries, by situating them in the context of their social and religious history.

HSAR 585b, The Art and Culture of the Crusades. Maria Georgopoulou.
Th 1.30–3.20
Study of the architecture of the crusaders based on archaeological material, museum objects, and medieval chronicles. Special emphasis is placed on cross-cultural encounters and artistic exchanges.

HSAR 589b, Romanesque Sculpture. Walter Cahn.
T 1.30–3.20
Sculpture of medieval Europe from the eleventh to the end of the twelfth century, its sources, development, and significance. Emphasis on issues and open questions. General knowledge of medieval art desirable.

HSAR 594a, Medieval and Renaissance Book Illumination. Walter Cahn.
Th 10.30–12.20
Introduction to the study of illuminated manuscripts of the Middle Ages and the Renaissance with practical exercises in various aspects of the art of the book, making use of the holdings of the Beinecke Library and other collections nearby.

HSAR 595a, Mediterranean Cities in the Middle Ages. Maria Georgopoulou.
F 10.30–12.20
Investigation and assessment of the existing models for the study of cities through the eyes (and the concerns) of art historians. Focusing on the architecture and urban planning of specific cities (Constantinople, Jerusalem, Cairo, Rome, Venice), the course asks how meaning is generated in the urban environment, how space is sanctified, and how the urban fabric embodies varied social relationships.

HSAR 601a, Replication Technology and Renaissance Art. Christopher Wood.
W 1.30–3.20
Investigation of the new technologies of the mechanical replication of images, in two and three dimensions, that emerged in fifteenth- and sixteenth-century Europe. The powerful impact of the invention of movable type in the mid-fifteenth century is generally acknowledged, but the replication of images is usually dealt with as a secondary topic even within the discipline of art history. This course tries to take the measure of the technological revolution that brought pictures into every European home. The course also looks at the history of Renaissance art from the point of view of replication technology and media theory. The premise of the course is that the mechanical multiplication of forms was a crucial factor in the shaping of the modern concepts of the work of art, the artist-as-author, and the beholder. The seminar involves close work with woodcuts and engravings, books and book illustration, cast sculpture, medals and coins, and copies of paintings, at the Art Gallery and other museums.

HSAR 630b, Gender and the Construction of Italian Renaissance Art. Anne Dunlop.
Th 3.30–5.20
This seminar focuses on recent work on gender issues in Italian Renaissance art history. Topics to be covered include: the distinction between sex and gender, if any; the links between theories of creation and procreation; identity and the portrait; and the problem of defining the erotic in images of this period.

HSAR 641b, Poussin and the French Royal Academy of Painting. Judith Colton.
W 1.30–3.20
Topics of interest in Poussin's painting, including his early interpretation of mythological subject matter, his treatment of history and allegory, his attitude toward religion, and his treatment of landscape. Equal attention is paid to the uses to which Poussin's art was put by the Academicians of the later seventeenth century and their successors.

HSAR 648a, Baroque Art and Its Critical Fortune. Judith Colton.
T 1.30–3.20
The seminar begins with an overview of Italian Baroque art, using as its point of departure the recent treatment of it in such major exhibitions as "The Genius of Rome," held in London and Rome in 2001. This is followed by selected studies in the reception, especially the rejection, of the Baroque from the seventeenth century to our own day. Students interested, for example, in Neoclassicism, in Pugin and the Gothic Revival, in Ruskin and such American "Ruskinians" as James Jackson Jarves and Charles Eliot Norton, or in Italian neorealist cinema, will be encouraged to look at ways in which these movements or individuals reacted to the Seicento in general, or to individual artists of the Seicento (e.g., Caravaggio, Salvator Rosa, Bernini).

HSAR 649a, British Art and Its Critical Fortune. Timothy Barringer.
W 3.30–5.20
The seminar examines aspects of the diverse visual culture of the British Empire, utilizing recent developments in critical theory and imperial history. Special emphasis on representations of colonial landscape and the body of the colonial subject; empire and material culture; the display of colonial objects; Orientalism in British art; imperial pageantry and invented traditions.

HSAR 680a, Impressionism: Painters, Writers, and Critics. Joachim Pissarro.
Th 3.30–5.20
This course examines the relationships between the artistic production of the Impressionist group and the art criticism generated by "art critics" who were better known in the literary world as writers of fiction or poetry. Examples of literary and critical texts by Baudelaire, Zola, Mallarmé, Huysmans, Mirbeau, Laforgue, and Verhaeren are studied *in relation* to works by the Impressionists.

HSAR 695b, Abstraction. Christine Mehring.
W 3.30–5.20
This seminar considers the abstract art produced in Western art in the course of the twentieth century. Guided by three major themes — Why Abstraction?, Modernism's Nightmares, and Beyond Modernism — the class explores different models for understanding abstract painting and sculpture. Such models include political utopias, phenomenology, decoration, the ready-made, appropriation, and iconographies of form. Artists discussed include El Lissitzky, Piet Mondrian, Wassily Kandinsky, Jackson Pollock, Eva Hesse, and Damien Hirst. Prerequisite: familiarity with twentieth-century art.

HSAR 696b, Issues in Performance Art. Kellie Jones.
T 1.30–3.20
Wedged between the rudiments of theater and the gestures of visual art, performance art came to prominence at the end of the twentieth century. This course concentrates on artists and practices after 1960. However, we also consider the roots of this form in the first part of the twentieth century as well as in earlier periods. Central to our investigations are discussions surrounding performance as catalytic process, as temporal art, and issues of the body as form. African-American performance art is the focus for this semester. *Also AFAM 768b.*

HSAR 697b, Material Vision. Sandy Isenstadt.
TH 2.30–4.20
This course focuses on recent theories regarding the visual construction of meaningful artifacts. Sustained reference is made to architecture as an irreducibly material practice in the context of a society increasingly oriented toward visual experience.

HSAR 723b, Language and Landscape: Rhetorics of American Painting 1848–1870. Alexander Nemerov.
TH 1.30–3.20
In the middle of the nineteenth century, American landscape painters sublimated the dark energies of earlier artists, notably Thomas Cole. They also helped make landscape a "national" art ostensibly more expressive of the country than, say, the genre painting of the late 1830s and 1840s. This sublimated imagery—of smooth fields, sunny days, and distant mountains—grew in tandem with the era's bourgeois art criticism, and more broadly with the middle-class American novel in these years. This course studies not just the interrelation between landscape and language in mid-nineteenth-century American painting—the role of Ruskin, of *The Crayon*, and of art criticism generally—but more precisely whether or not the era's paintings may be felt to be "written" or "spoken." Did mid-century landscape painters understand the structures of their paintings in terms of the era's smooth, polished, and unperturbed prose? Did they see painting mountains instead of saloons or pumpkin patches as an avoidance of "dialect" in favor of polite middle-class speech? If so, what to make of paintings that speak in both tongues, that use the language both of the cabin and the grand sublimatory view out the cabin's window? *Also AMST 723b.*

HSAR 730a, The Home Front: American Visual Culture 1941–1945. Alexander Nemerov.
W 3.30–5.20
During the war years, Hollywood made many propaganda films, and painters made many pictures aiming to benefit the war effort; in this seminar, however, we examine films and paintings which manifestly have little to do with the war—films such as *Meet Me in St. Louis, Shadow of a Doubt, The Ghost Ship, The Curse of the Cat People,* and *The Body Snatcher;* paintings such as Gorky's *Liver is the Cock's Comb* and *One Year the Milkweed*—in order to understand something of a "home front culture": a culture of diversions and distractions that is yet haunted by a pathos, a deep awareness, of the bloodshed all around. *Also AMST 730a.*

HSAR 740b, Pre-Columbian Art in the Yale University Art Gallery. Mary Miller.
MW 1.30–3.20
Recent Pre-Columbian acquisitions of the Yale University Art Gallery. Preparation of essays for the *YUAG Bulletin.*

HSAR 746a, Mexican Art of the Sixteenth Century. Mary Miller, Jaime Lara.
MW 1:30–3:20
Works from both Aztec and Christian traditions are explored, with special attention to the patronage by Franciscans, Augustinians, and Dominicans of indigenous artists. The seminar considers the monumental building programs of the religious, as well as manuscripts, paintings, and sculpture. Issues of survival, resistance, acceptance, and syncretism are all examined. *Also REL 846a.*

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].*

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 or b.*

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.

HSAR 804b, Art and Aristocracy in Kyoto 1000–1200. Mimi Yiengpruksawan.
The eleventh and twelfth centuries in Japan saw the emergence of stylistic and technical innovations in the visual arts that were generated in a matrix of aristocratic patronage and palace politics and in effect established a set of norms for what came to be understood as "Japanese" art. These innovations have been instrumental in the definition and analysis of what is Japanese about Japanese art. They include the *yamato* style in painting, the Jocho mode in statuary, and architectural practices such as *shinden-zukuri*. This seminar critically examines both the context in which these innovations occurred and their broader ramifications for the study of premodern Japan. Participants in the seminar study visual materials, literary and historical resources, and critical theoretical readings where appropriate. Particular emphasis on the artistic and intellectual circles that emerged around Fujiwara no Michinaga in the early eleventh century and around the retired emperors Shirakawa and Toba in the early twelfth century.

HSAR 805b, The Literary and the Visual in Taisho Japan. Mimi Yiengpruksawan, John Whittier Treat.
W 3.30–5.20
The Taisho period (1912–1926) was one of intense ferment for both Japanese writers and painters, many of whom closely collaborated. This seminar examines prominent figures of the day who contributed significantly to Taisho Modernism in either the plastic or the literary arts or both. These figures include the White Birch School (Shirakabaha) writers and painters; "I-novel" practioners such as Chikamatsu Shuko; masters of oil self-portraiture such as Kishida Ryusei; and high modernists such as Kawabata Yasunari and Akutagawa Ryunosuke. Guest lecturers address special topics throughout the semester. Prerequisites: fluent reading ability in modern Japanese and basic familiarity with the history of modern Japanese art; or the permission of the instructors. *Also JAPN 870b.*

HISTORY OF MEDICINE AND SCIENCE

L-132 Sterling Hall of Medicine, 785.4338
M.A., M.Phil., Ph.D.

Chair and Director of Graduate Studies
Frederic Holmes (frederic.holmes@yale.edu)

Faculty
John Heilbron (*Visiting, History*), Frederic Holmes, Daniel Kevles (*History*), Martin Klein (*Emeritus, Physics*), Susan Lederer, David Musto (*Child Study*), William Summers (*Molecular Biophysics & Biochemistry*), John Harley Warner

Affiliated Faculty
Robert Gordon (*Geophysics & Applied Mechanics*), Dimitri Gutas (*Near Eastern Languages & Civilizations*), Cynthia Russett (*History*), Frank Snowden (*History*), Frank Turner (*History*)

Fields of Study

Fields of study can be pursued in all periods and areas of the history of medicine and science. Special fields of interest of the core and affiliated faculty include history of medical ethics, Arabic science and medicine, American medicine, disease, therapeutics, psychiatry, alcohol and drug abuse, women in science and medicine, science and medicine in Asia, history of physics, chemistry, physiology, biochemistry, microbiology, molecular biology, and neurobiology.

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 normally 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 graduate seminar HSHM 601a/602b (Introduction to the History of Medicine and Science), four additional graduate seminars in history of science or medicine, and one graduate seminar 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.

Students who enter having previously completed graduate work may negotiate some reduction in the total course requirement at Yale, the amount being contingent on the extent and nature of the previous work and its fit with intended future work.

All students are expected to demonstrate, prior to entering on their dissertation work, a general command of two of the three fields of: (1) history of the life sciences; (2) history of medicine; (3) history of the physical sciences. This competence may be acquired through a combination of course work take at Yale or elsewhere and preparation for the oral examination.

Students will normally spend the summer following their second year preparing for the oral qualifying exam to be taken soon after the beginning of the third year. The student will be examined in four fields:

1. One broadly based field, to be chosen from areas such as the following:
   History of the life sciences before 1800
   History of the life sciences since 1800
   History of medicine before 1800
   History of medicine since 1800
   History of the physical sciences before 1800
   History of the physical sciences since 1800
   History of a major science, such as chemistry, geology, astronomy, or physiology, without period
   History of science or medicine in a major geographic region, such as the history of medicine in America

2 & 3. Two fields with content and boundaries to be established by agreement with the adviser for each field. If the broadly based field (no. 1, above) is in history of science, at least one of these fields must fall within the history of medicine, and vice versa. One of these two fields may be in an area of history outside of medicine or science.

4. One field in an area of history outside of history of science or medicine.

Master's Degrees

M.Phil. and M.A. See Graduate School requirements, pages 361–62.

Master's Degree Program

The 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 208015, New Haven CT 06520-8015.

Courses

HSHM 601a[u]/602b[u], Introduction to the History of Medicine and Science. John Harley Warner, Daniel Kevles, Frederic Holmes, Susan Lederer.
W 2.30–4.20 [F], W 1.30–3.20 [Sp]
Part one of a two-semester linked sequence. An examination of significant works in the history of science and history of medicine from the seventeenth through the twentieth century. Discussions emphasize themes, methods, and controversies that have shaped these fields during the last three decades. Topics include the history and historiography of medicine, public health, the physical sciences, chemistry, and the life sciences. *Also HIST 930a, 931b.*

HSHM 620b[u], Gender, Science, and Sexuality. William Summers.
Primary and secondary source readings in the history of the scientific study of sexuality with particular attention to how these texts both reflect and construct norms of gender and sexuality.

HSHM 622b[u], Introduction to the History of Life Sciences. William Summers, Frederic Holmes.
A study of landmark investigations in the history of the life sciences, from antiquity to the mid-twentieth century.

HSHM 625a[u], Women and Medicine. Naomi Rogers.
T 9.30–11.20

HSHM 628a[u], Issues and Literature in the History of Science and Medicine. Frederic Holmes.
A seminar intended to acquaint students majoring in history of science and medicine with representative recent literature in the field, historiographic issues, and methods used in historical writing. The subject this year is the writings of and historical interpretations of the work of William Harvey, Antoine Lavoisier, and Charles Darwin.

HSHM 631a[u], Culture of Western Medicine. John Harley Warner.
MW 10.30–11.20

HSHM 637b[u], Race and Medicine in America 1800–2000. Susan Lederer.
T 1.30–3.20
An examination of the history of race and medicine in the United States, 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. William Summers.
M 1.30–3.20

HSHM 643a[u], Nuclear America. Daniel Kevles.
A history of the nuclear enterprise from its pre-World War II origins to recent times, covering its military and civilian uses and its impact on scientific research and on the environment, regional economies, and American politics and culture.

[**HSHM 645b[u], Medical Ethics in America since 1847.**]

HSHM 677b[u], Biology and Society in the Twentieth Century. Daniel Kevles.
An exploration of issues in the understanding, engineering, and control of life, focusing on the history of genetics, molecular biology, and biotechnology and their interaction with politics, economics, law, and culture, mainly in the United States.

HSHM 711a, Experimentation in the History of Life Sciences. Frederic Holmes.
M 1.30–3.20

HSHM 714b, Seminar in Science and Technology in the Twentieth Century. Daniel Kevles, John Heilbron.
An examination of the development of the scientific and technological enterprise in Europe and the United States, including its major intellectual achievements, academic and industrial institutions, relationship to war and the state, and standing in general culture. Among topics that might be considered are atomic, nuclear, and particle physics, genetics and molecular biology, microelectronics and computers. *Also HIST 933b.*

[**HSHM 912a, Reading Seminar in the History of Disease and Public Health in America.**]

HSHM 913b, Reading Seminar in the History of Life Sciences. Frederic Holmes.
Close reading and discussion of recent historical writings and primary sources in selected topics within the history of the life sciences. This term's topic is the history of experimentation in the 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. John Harley Warner.
An exploration of research methods and the craft of writing in the history of science and medicine. Participants are expected to produce full-length research papers, and these individual research programs are the central focus of the group's discussions.

HSHM 920a or b, Independent Reading.
By arrangement with faculty.

HSHM 930a or b, Independent Research.
By arrangement with faculty.

IMMUNOBIOLOGY

409 Lauder Hall, 785.3857
M.S., Ph.D.

Chair
Richard Flavell

Director of Graduate Studies
Peter Cresswell (*Acting*) (TE 404, 785.3857, bbs.immunol@yale.edu)

Professors
Kim Bottomly, Joseph Craft (*Internal Medicine*), Peter Cresswell, Richard Flavell, Sankar Ghosh, Charles Janeway, Jr., Ira Mellman (*Cell Biology*), Jordan Pober, Nancy Ruddle (*Epidemiology & Public Health*), David Schatz, Robert Tigelaar (*Dermatology*)

Associate Professors
Jeffrey Bender (*Internal Medicine*), Alfred Bothwell, Paula Kavathas (*Laboratory Medicine*), Mark Shlomchik (*Laboratory Medicine*)

Assistant Professor
Ruslan Medzhitov

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 59–61).

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.

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.

Program materials are available upon request to the Director of Graduate Studies, Section of Immunobiology, Yale University, PO Box 208011, FMB 410, New Haven CT 06520-8011.

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 539b, Advanced Immunology Seminar: Functions of the Major Histocompatibility Complex. Peter Cresswell, Ira Mellman, Akiko Iwasaki.
This seminar course consists of a brief introductory session followed by detailed critical views of key papers in the field. We consider the genetics of the MHC, structures of MHC class I and class II molecules and homologs, and the mechanisms governing their assembly with peptides. We also cover the cell biology of antigen processing in various types of antigen presenting cells, including B-cells and dendritic cells. Enrollment limited to fifteen. *Also MCDB 539b.*

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.
TH 5

INTERNATIONAL AND DEVELOPMENT ECONOMICS

27 Hillhouse, 432.3626
M.A.

Director
Robert Evenson

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 the developing countries. Most students in the program have experience 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 a few highly qualified students whose career plans, prior training, and/or performance in the first year indicate more course work is advisable.

Joint program options for study with the School of Management and the School of Forestry & Environmental Studies are also available. 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 Director, International and Development Economics Program, Yale University, PO Box 208269, New Haven CT 06520-8269.

INTERNATIONAL RELATIONS

International Affairs Council
Yale Center for International and Area Studies
210 Luce Hall, 34 Hillhouse, 432.3418
M.A.

Chair
William Foltz (*Political Science*)

Associate Chair and Director of Graduate Studies
Cheryl Doss (*Economics*) (214 Luce Hall, 432.9395, cheryl.doss@yale.edu)

Professors
Abbas Amanat (*History*), Ivo Banac (*History*), Michele Barry (*Medicine*), Frank Bia (*Medicine*), Paul Bracken (*Management*), William Burch, Jr. (*Forestry & Environmental Studies*), Paul Bushkovitch (*History*), David Cameron (*Political Science*), James Crowley (*History*), Deborah Davis (*Sociology*), Michael Dove (*Forestry & Environmental Studies*), Eduardo Engel (*Economics*), J. Joseph Errington (*Anthropology*), Daniel Esty (*Forestry & Environmental Studies; Law*), Robert Evenson (*Economics*), William Foltz (*Political Science*), John Gaddis (*History*), Geoffrey Garrett (*Political Science*), Penelope Goldberg (*Economics*), Timothy Guinnane (*Economics*), Koichi Hamada (*Economics*), Valerie Hansen (*History*), Robert Harms (*History*), Gilbert Joseph (*History*), Stephen Kellert (*Forestry & Environmental Studies*), William Kelly (*Anthropology*), Paul Kennedy (*History*), Ilona Kickbusch (*Epidemiology & Public Health*), Benedict Kiernan (*History*), Lawrence King (*Sociology*), 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*), Curtis Patton (*Epidemiology & Public Health*), Merton Peck (*Economics*), Gustav Ranis (*Economics*), W. Michael Reisman (*Law*), Susan Rose-Ackerman (*Political Science, Law*), Frances McCall Rosenbluth (*Political Science*), Bruce Russett (*Political Science*), Lamin Sanneh (*Divinity; History*), T. Paul Schultz (*Economics*), Stuart Schwartz (*History*), James Scott (*Political Science*), Martin Shubik (*Management*), Helen Siu (*Anthropology*), Gaddis Smith (*History*), Frank Snowden (*History*), Jonathan Spence (*History*), T. N. Srinivasan (*Economics*), Ivan Szelenyi (*Sociology*), Frank Turner (*History*), Christopher Udry (*Economics*), John Wargo (*Forestry & Environmental Studies*), Ruth Wedgwood (*Law*), Robin Winks (*History*), Jay Winter (*History*)

Associate Professors
Nora Groce (*Epidemiology & Public Health*), Jean Lanjouw (*Economics*), Philip Levy (*Economics*), K. Geert Rouwenhorst (*Management*), Shaoguang Wang (*Political Science*)

Assistant Professors
Arun Agrawal (*Political Science*), Jennifer Bair (*Sociology*), Lynne Bennett (*Forestry & Environmental Studies*), Kent Buse (*Epidemiology & Public Health*), Jose Cheibub (*Political Science*), Brian Cowan (*History*), Keith Darden (*Political Science*), Seth Fein (*History*), Kavesh Koshnood (*Epidemiology & Public Health*), Pierre Landry (*Political Science*), Richard Lindsey (*Management*), Pauline Jones Luong (*Political Science*), Ellen Lust-Okar (*Political Science*), M. Victoria Murillo (*Political Science*), Mridu Rai (*History*), 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*), Marian Chertow (*Forestry & Environmental Studies*), Giancarlo Corsetti (*Economics*), Cheryl Doss (*Economics*), Debbie Humphries (*Epidemiology & Public Health*), Jean Krasno (*Political Science*), Eric Mood (*Epidemiology & Public Health*), Nancy L. Ruther (*Political Science*), James Sutterlin (*Political Science*)

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 School 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. The course record must include 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 relevant additional courses 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 enrichment 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 540a, Genocide in Comparative Historical Perspective. Henry Huttenbach.
Th 10.30–12.20

Genocidal practices have characterized much of the past century; yet only recently has the international community recognized the urgency of understanding genocide as a potentially dangerous, destabilizing threat that calls for policies of prediction and prevention. Much

about genocide is unknown, from its causes to its consequences. Even the definitions of genocide are disputed. Open debates rage as to who is accountable and how to address the problems of justice and compensation. Students in the course read widely on a variety of issues associated with genocide, as well as on specific cases of genocide. A balance is encouraged between theoretical discussions and detailed knowledge of specific genocides. The term grade is based on class participation, familiarity with material, and a substantial research paper. *Also HIST 986a.*

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. Cheryl Doss.
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 593b, United Nations Peacekeeping and International Security. Jean Krasno.
T 1.30–3.20
An exploration of the causes of violent ethnic conflict and ways that these conflicts may be resolved. The course focuses on civil war, with an attempt at developing policy insights on how to prevent, manage, or resolve ethnic civil war using a rigorous analytical framework and drawing lessons from different wars over the past forty years.

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. International Affairs Fellow Minh Luong will participate in the course. For first-year IR students.

INRL 730a[u], The United Nations and the Maintenance of International Security. James Sutterlin.
M 1.30–3.20
Consideration of the role of the U.N. in preventive 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 900a or b, Directed Reading.
By arrangement with faculty.

INVESTIGATIVE MEDICINE

Department of Medicine
808 Laboratory of Clinical Investigation, 785.6842
Ph.D.

Director of Graduate Studies
Keith Joiner (*Internal Medicine*) (LCI 808, invmed@info.med.yale.edu)

Deputy Director
Sharon Inouye (*Internal Medicine*)

Associate Director
Theodore Holford (*Epidemiology & Public Health*)

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, along with a well-defined evaluative process to assure doctoral-level experience.

Students enter the program with a broad range of experience and interest. Some are most interested in exploring the molecular basis for a disease from the laboratory standpoint; others are oriented toward research that explores the biochemical, physiologic, and genetic basis for clinical disease in the setting of a Clinical Research Center; and another group are most interested in research that critically evaluates diagnostic and therapeutic interventions for clinical disease using modern concepts in quantitative methods and clinical study design.

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. Individuals with an M.D. degree and a shorter duration of postgraduate clinical training will also be eligible if, in the opinion of the admissions committee, the applicants have demonstrated broad knowledge of the clinical basis of disease.

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 Investiga-

tive 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 post-graduate clinical training. Prospective students 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, depending on subspecialty).

Successful candidates will need evidence of high academic achievement in undergraduate and medical-school courses and completion of residency training. Test scores from the USMLE, and (if available) the American Board of Internal Medicine, Pediatrics, Neurology, or other relevant subspecialty disciplines will be requested.

Special Requirements for the Ph.D. Degree

The overall requirements for the doctorate program are seven courses. These consist of three required one-term core courses: Principles of Clinical Research, Principles of Translational Research, and Practical and Ethical Issues in Clinical Investigation; a required year-long seminar course: either Seminars in Clinical Investigation or Seminars in Molecular Medicine; one of two intensive practical courses: Modern Strategies in Cell and Molecular Biology or Quantitative Clinical Epidemiology; and other electives. Course work will extend over three sequential terms. The first term will commence in July of each year. Students must enroll in a minimum of two courses each term, for three terms. Course work requirements may be completed by the end of a full year (twelve months) of study, or additional courses may be taken depending on individual needs. At the end of the first year, students submit their thesis prospectus and undertake a qualifying exam in which the broad general area of their research will be presented to a qualifying committee. In order to be admitted to candidacy, students must complete the course requirement, achieving the grade of Honors in one full-year course, or in two full-semester courses, submit an approved prospectus, and pass the qualifying examination. The remaining degree requirements include completion of a dissertation project, the writing of the dissertation, and its oral defense.

Courses

IMED 610a, Modern Strategies in Cell and Molecular Biology. Elisabetta Ullu.
Intensive lecture and laboratory course, given in July of each year. This course lasts two weeks and provides an overview of current concepts and laboratory methodologies used in modern molecular and cellular biology. Lectures begin the day and are followed by laboratory work. Emphasis is on performing experiments and on problem solving. Consent of instructor required. Two weeks, early July.

IMED 620a, Principles of Translational Research. Keith Joiner and staff.
Core course focusing on the general principles of translating recent scientific advances to the diagnosis and management of human disease. Lecturers emphasize how the knowledge base available in the biological sciences is being applied to human medicine, including topics in genomics, gene therapy, stem cell and organ transplantation, molecular therapeutics, immunotherapy, vaccine development, and metabolism. Lecturers and discussion leaders provide insights into the future promise and recognized limitations of these methodologies. Each session consists of a lecture followed by group discussion of a paper relevant to the topic.

Students prepare a research paper in conjunction with one of the faculty. Consent of instructor required. Two weeks, late July – early August.

IMED 625a, Principles of Clinical Research. Sharon Inouye and staff.
Core course providing 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; challenges in using statistics in clinical research; causal inference; decision analysis. Sessions include didactic presentations and discussion of readings distributed in advance. Students prepare a research paper in conjunction with one of the faculty. Consent of instructor required. Two weeks, mid-August.

IMED 630a, Practical and Ethical Issues in Clinical Investigation. Henry Binder and staff.
Core course addressing topics that are central to the conduct of clinical investigation, including biomedical ethics, medicolegal aspects of clinical investigation, and proper scientific conduct. Other topics include grant writing, scientific presentations, the NIH peer review process, informatics, technology transfer, and drug discovery and development.This course provides a framework for the clinical investigator to write, obtain funding for, conduct, and present a clinical study. Classes consist of a lecture followed by a group discussion. Consent of instructor required. Fall semester.

IMED 635b, Directed Reading in Investigative Medicine. Keith Joiner and staff.
A one-semester directed reading course of independent study for first-year students in the Investigative Medicine program. Topics are chosen by the student, and reading lists provided by faculty, for weekly meetings to discuss articles. Spring semester.

IMED 640a,b, Seminars in Molecular Medicine. Keith Joiner and staff.
Core course focusing on the details of basic investigation of the biochemistry, cell biology, genetics, immunology, and molecular biology of human disease from a sophisticated perspective. At each session, students review recent seminal articles on the basic laboratory investigation of a disease or disease process (which is well understood at the molecular level), which are selected by the faculty and discussed in advance with the student. The student presents a brief overview on the interface between the clinical and basic aspects of the disease or disease process, followed by discussion of the articles in a seminar format. Consent of instructor required. Fall and spring semesters.

IMED 650a,b, Seminars in Clinical Investigation. Sharon Inouye and staff.
Core course exploring the interface between clinical strategies and the methodologic issues that are central to investigating these topics. Seminal articles on the investigation of a particular topic are selected by the faculty and distributed to the students in advance. A student is assigned to review each article, and discusses the paper in advance with the faculty member(s) responsible for the session. The student presents a brief overview on the interface between the clinical aspects of the disease and the methodologic approach of the research, followed by discussion of the articles in a seminar format. Consent of instructor required. Fall and spring semesters.

ITALIAN LANGUAGE AND LITERATURE

82 – 90 Wall Street, 432.0595
M.A., M.Phil., Ph.D.

Chair
Giuseppe Mazzotta

Director of Graduate Studies
Giuseppe Mazzotta [F] (82 – 90 Wall, Rm 404, 432.0598, giuseppe.mazzotta@yale.edu)
Olivia Holmes [Sp] (Silliman 1837, 432.8299, olivia.holmes@yale.edu)

Professors
Giuseppe Mazzotta, Salvatore Nigro (*Visiting* [F]), Paolo Valesio

Assistant Professors
Francesca Cadel, Olivia Holmes, Kristin Phillips

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, like 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, in order to determine the extent to which an adequate background has been acquired. Applicants who have had little or no experience in Italy are generally urged to do a year's work abroad during the course of their graduate program. During this year they remain registered as graduate students. For all students of Italian, a reading knowledge 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 other than Italian. 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, and in any case no later than the seventh term, 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 must take place by the end of the seventh term.

Teaching is considered to be an important component of the doctoral program in Italian. The department expects students to teach, usually 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 AFRICAN AMERICAN STUDIES

The Department of Italian also offers, in conjunction with the Program in African American Studies, a combined Ph.D. in Italian and African American Studies. For further details, see African American Studies.

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 361–62). 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 501b[u], The Poetry of the Troubadours. Olivia Holmes.
M 4–5.50
An introduction to the grammar of Old Occitan (or Old Provençal) through reading, translating, and discussing the poetry of the troubadours. The texts are considered not only as printed poetry, but also as song and hand-written artifact, and within the general historical setting of the cultural shift in the late Middle Ages from orality to writing. Special attention to the impact of these texts on the Italian literary tradition.

ITAL 533a[u], Boccaccio: The World at Play. Giuseppe Mazzotta.
T 3.30–5.20
This course examines a number of texts from Boccaccio's early experiments (*Filostrato*, *Ninfale fiesolano*, *Elegia di Madonna Fiammetta*) to his mature works (*Decameron*, *Geneology of the Gentile Gods*, and *Commentary on Dante*). Its aim is to show the radical innovations of his art in terms of form, redefinition of moral values, and general sense of medieval traditions of Provençal poetry (conventions of ethics, nature, and love, the place of women, etc.).

ITAL 635a, Italian Renaissance Theater. Kristin Phillips.
W 3.30–5.20
Development, modes, and structures in Italian Renaissance theater. Analyses of language, prototypes, modes, and structures that invest the erudite theatrical text, sacred theater, erudite and improvised theater in relation to history, politics, visual art, individual performance, and spectacle; court society and "self-fashioning"; scenography and perspective, with an eye to aesthetic debates surrounding the theatrical text that disrupt the notion of a singular "semiotics" of theater.

ITAL 700b[u], The New Map of the World: Vico's Poetic Philosophy. Giuseppe Mazzotta.
T 3.30–5.20
Examination of Vico's thought globally and in the historical context of the late Renaissance and the Baroque. Starting with Vico's *Autobiography*, working to his University Inaugural Orations, *On the Study of Methods of Our Time*, the seminar delves into his juridical-political texts and submits the second *New Science* (1744) to a detailed analysis. Some attention is given to Vico's poetic production and the encomia he wrote. The overarching idea of the seminar is the definition of Vico's new discourse for the modern age. To this end, discussion deals prominently with issues such as Baroque encyclopedic representations, the heroic imagination, the senses of "discovery," the redefinition of "science," reversal of neo-Aristotelian and neo-Platonic poetics, the crisis of the Renaissance, and the role of the myth. *Also CPLT 706b[u].*

ITAL 751a, The Illustrated Novel in the Eighteenth and Nineteenth Centuries, and the Case of Manzoni. Salvatore Nigro.
M 3.30–5.20
Manzoni, after writing *The Betrothed*, started work on a stage version of his own novel. The course illustrates the "dialogue" between the tradition of European "illustrations" and Manzoni's "visual writing."

ITAL 765b, Jewish Italy in Literature and Film. Risa Sodi.

W 3.30–5.20

An examination of Jewish identity in nineteenth- and twentieth-century Italy: Jewish self-identification and expression as well as explorations by non-Jewish Italian figures. Various media are considered, including writing by Italian Jewish authors and non-Jews (with significant Jewish themes); interviews; films and documentaries; and survivor testimonies. Significant attention to representations of the Holocaust in Italian literature and film. Readings include work by Bassani, Ginzburg, Levi, Saba, and others. Films may include *Life is Beautiful*, *Jonah Who Lived in the Whale*, *Seven Beauties*, *The Garden of the Finzi-Continis*, and the documentaries *Il coraggio e la pietà* and *The Righteous Enemy*.

JUDAIC STUDIES

320 Temple, 432.0843

Chair
Paula Hyman (*History; Religious Studies*)

Professors
Steven Fraade (*Religious Studies*), Isaiah Gafni (*Visiting, Religious Studies*), Nurith Gertz (*Visiting, Film Studies*), Benjamin Harshav (*Comparative Literature*), David Marcus (*Visiting, Religious Studies*), Ivan Marcus (*History; Religious Studies*)

Associate Professors
Christine Hayes (*Religious Studies*), Adiel Schremer (*Visiting, Religious Studies*)

Lecturers
Beth Berkowitz (*Religious Studies*), Jenna Joselit (*American Studies*)

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*), Richard Burger (*Anthropology*), Hazel Carby (*African American Studies; American Studies*), Carlos Eire (*History*), Roberto González Echevarría (*Spanish & Portuguese*), K. David Jackson (*Spanish & Portuguese*), Gilbert Joseph (*History*), Paul Kennedy (*History*), Vera Kutzinski (*American Studies; African American Studies; English*), Joseph LaPalombara (*Political Science*), Juan Linz (*Political Science; Sociology*), Josefina Ludmer (*Spanish & Portuguese*), Enrique Mayer (*Anthropology*), Mary Miller (*History of Art*), Gustav Ranis (*Economics*), T. Paul Schultz (*Economics*), Stuart Schwartz (*History*), James Scott (*Political Science*), Robert Thompson (*History of Art*), Bryan Wolf (*American Studies; English*)

Associate Professors
Philip Levy (*Economics*), Patricia Pessar (*Adjunct, American Studies*)

Assistant Professors
Jose Cheibub (*Political Science*), Guillermo Irizarry (*Spanish & Portuguese*), Kellie Jones (*History of Art*), Jaime Lara (*Divinity*), Cristina Moreiras Menor (*Spanish & Portuguese*), M. Victoria Murillo (*Political Science*), Stephen Pitti (*History*), Linda-Anne Rebhun (*Anthropology*), Lidia Santos (*Spanish & Portuguese*)

Lecturers
Antonio Ladeira (*Spanish & Portuguese*), Jordano Quaglia (*Spanish & Portuguese*), Thomas Siccama (*Forestry & Environmental Studies*)

There is no advanced degree in Latin American Studies at Yale, but students may draw upon resources of many departments of the University to make Latin America a field of concentration while working toward the Ph.D. in a conventional discipline. 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 and other lectures by visiting speakers, with screenings of Latin American films, and by organizing conferences on 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 itself.

The Latin American Collection of the University Library has approximately 435,000 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.

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

318 Hall of Graduate Studies, 432.2450
M.A., M.Phil., Ph.D.

Chair
Stephen Anderson

Director of Graduate Studies
Louis Goldstein (320 HGS, 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

Assistant Professors
Maria Babyonyshev, Dianne Jonas, Darya Kavitskaya, Maria Piñango, Charles Yang

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. Two years of intensive study or equivalent are required for the Japanese linguistics program.

Special Requirements for the Ph.D. Degree

Language requirements: Students must demonstrate a reading knowledge of two research languages by passing translation examinations, one by the end of the first year and the other by the end of the second year. Students must also satisfy a non-Indo-European language requirement by taking a language description course, a field methods course or one-term course in the structure of a non-I-E language. Predissertation requirements include (1) the submission and oral defense of two qualifying research papers and (2) the submission and oral defense of a dissertation prospectus. Students must fulfill these requirements by the end of their seventh term. At that time they will be

admitted to candidacy for the Ph.D. Students are expected to complete their dissertations by the end of their sixth year of study. Course requirements: sixteen term courses at graduate level, depending on undergraduate background. Detailed requirements for different programs are given in the departmental brochure. At the end of the first year of study, students must take a preliminary comprehensive examination to demonstrate a basic grounding in phonetics, phonology, morphology, syntax/semantics, and historical linguistics. Satisfactory performance on the exam and in the first-year courses is necessary for continuation in the doctoral program. Defense of dissertation required after submission.

Master's Degrees

M.Phil. See Graduate School requirements, page 361.

M.A. (en route to the Ph.D.). Students in the doctoral program who successfully complete one year of course work and pass the preliminary examination and one research language exam may petition for an M.A. degree.

Program materials are available upon request to the Department of Linguistics, Yale University, PO Box 208236, New Haven CT 06520-8236.

Courses

LING 510b[u], Introduction to Linguistics. Darya Kavitskaya.
MWF 10.30–11.20
The goals and methods of linguistics. The relation of linguistics to psychology, logic, and other disciplines. Basic concepts in phonology, morphology, syntax, and semantics. Techniques of linguistic analysis and construction of linguistic models. Trends in modern linguistics.

LING 512b[u], Historical Linguistics. Dianne Jonas.
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. Stanley Insler.
T 1.30–3.20
Location in space and time of the major branches of Indo-European; history of Indo-European studies, especially the development of methodology; sketch of the phonology, morphology, syntax, and lexicon of proto-Indo-European, with main developments of these in the daughter languages.

[**LING 515[u], Elementary Sanskrit.**]

LING 516b[u], Elementary Hittite. Stanley Insler.
T 1.30–3.20
Introduction to the Hittite language. Explanation of grammar, with readings in transcription from old, middle, and new Hittite texts representing different literary genres. No knowledge of cuneiform is necessary, but familiarity with an inflected language (Latin, Greek, German, Russian) is essential.

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. 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 1–2.15
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 524a[u], Formal Foundations of Linguistic Theories. Charles Yang.
MW 11.30–12.45
Mathematical methods in linguistics. Topics include: set theory, logic and formal systems, model theory, lambda calculus, formal language theory, elementary statistics, and probability. No prerequisites.

LING 532a[u], Introduction to Phonological Analysis. Darya Kavitskaya.
TTh 4–5.15
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. Stephen Anderson.
MW 2.30–3.45
Advanced topics in current phonological theory. Reading and discussion of recent papers in nonlinear phonology. Topics include feature theory, feature geometry, constraints on representations, cyclicity, harmony systems, syllable structure, stress systems, the interaction of morphology and phonology, lexical phonology.

LING 541b[u], Language and Computation. Charles Yang.
TTh 1–2.15
The computational study of natural language and the use of linguistic theories in applied problems. Topics include finite state tools, computational morphology and phonology, grammar and parsing, discourse models, machine translation, and language learning in children and machines. Prerequisite: LING 524 or CPSC 201a/b.

LING 542b[u], Statistical Natural Language Processing. Charles Yang.
TTh 9–10.15
Application of statistical techniques in natural language processing, with an emphasis on speech recognition and probabilistic language modeling. Topics include introductory statistics, information theory, signal representation, acoustic modeling, stochastic algorithms for speech recognition, computational processing of linguistic corpora, and stochastic grammars. Prerequisite: LING 524 or CPSC 201a/b.

[**LING 546b[u], Language, Sex, and Gender.**]

LING 553a[u], Syntax I: Introduction to Transformational Grammar. Dianne Jonas.
MW 2.30–3.45, 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 1–2.15
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 565b[u], Development of Phonology. Louis Goldstein.
MW 11.30–12.45
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. Prerequisite: permission of instructor.

LING 580b[u], Morphology. Maria Piñango.
MW 9–10.15
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 582a[u], Introduction to Old Norse. Dianne Jonas.
MW 11.30–12.45
Introduction to Old Norse through a close study of Old Icelandic. Emphasis on all aspects of the grammar of Old Icelandic: phonology, morphology, and syntax. Focus on the development of reading proficiency through a close reading of *Hrafnkel's Saga.*

LING 583b[u], Readings in Old Norse Poetry and Prose: Chronicles of the Vikings. Roberta Frank.
MW 11.30–12.45
An introduction to the literature of earliest Norway and Iceland. Texts (to be read in the original) include runic inscriptions left behind by the Vikings, verse of their official skalds, the sometimes irreverent mythological poetry of the Edda, and the sagas telling of the Norse discovery of America. Prerequisite: LING 582a or permission of the instructor. *Also ENGL 505b[u].*

LING 590a[u], Topics in the History of Linguistics. Stephen Anderson.
TTh 4–5.15
Topics in the history of the science of language. Focus and prerequisites may vary from one offering to another. Development may vary from one offering to another. Topic for fall 2001: development of twentieth-century phonological theory from deSaussure and Baudouin de Courtenay to contemporary work.

[**LING 593a[u], Historical Morphology.**]

[**LING 621b[u], The Relation of Speech to Language.**]

[**LING 622b[u], Topics in Phonetics.**]

[**LING 623b, Research Methods in Psycholinguistics.**]

LING 625, Second-Year Sanskrit. Stanley Insler.
W 3.30–5.20
Introduction to the hymns and language of the *Rigveda*. Concentration on a study of the language of this text as an ancient but developing system whose growth reaches its high point in the later Vedic texts. Extensive discussion of the techniques of composition of the individual hymns through internal comparison.

LING 627, Sanskrit Legal Texts. Stanley Insler.
Close reading and comparison of Sanskrit legal texts representing various literary sources.

LING 630a, Speech Production. Louis Goldstein.
TH 1.30–3.20
When we speak, the vocal tract articulators engage in a smooth and intricate dance that carries the linguistic information of our utterances. In this seminar, we review current research that attempts to isolate the principles that underlie the form of this dance and its information-bearing function. Topics include: analysis of the dance into informational units (gestures), general theories of coordinated movement, self-organization in complex systems, cognitive processes that select the appropriate dance for an intended lexical item.

LING 631b[u], Neurolinguistics. Maria Piñango.
MW 1–2.15
Linguistic analyses of language impairment. Historical development of views of aphasia. The role of linguistic theory in understanding language loss.

LING 640b[u], Topics in Phonology: Phonetic and Phonological Components of Syllable Weight. Darya Kavitskaya.
TH 9.30–11.20
Phonetic and phonological components of syllable weight. Issues of phonological representation vs. phonetic duration. Prosodic phenomena sensitive to weight, compensatory lengthening, minimal word requirements, stress and metrical theory.

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 654b[u], Syntax II. Maria Babyonyshev.
TTH 2.30–3.45
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.
TTH 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 relations (theta-roles). Grammatical relations in typological and historical perspectives.

LING 660a[u], Topics in Syntax: The Mental Lexicon. Maria Piñango.
T 2.30–4.20
The seminar discusses 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, and lesion and imaging studies.

LING 661b[u], Topics in Syntax: Minimalism. Dianne Jonas.
T 9.30–11.20
Introduction to minimalist syntax and comparison with earlier theories. Topics include grammatical operations, clause structure, and close study of recent minimalist analyses. Prerequisite: two courses in syntax or permission of the instructor.

LING 662a[u], Topics in Syntax: Discourse-Motivated Movement. Maria Babyonyshev.
TH 3.30–5.20
The properties and distribution of topicalized and focused elements. Optional movement operations and the problems they pose for syntactic theory. Recent treatments of discourse-motivated movement. Focus on Slavic and East Asian languages. Prerequisites: two courses in syntax or permission of instructor.

LING 663b[u], Semantics. Thomas 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 relation between semantics and pragmatics, and between semantics and syntax.

[**LING 675a[u], Pragmatics.**]

LING 676b[u], Implicature and Pragmatic Theory. Laurence Horn.
M 1.30–3.20
Approaches to nonlogical inference and its interaction with propositional content. What is said vs. what is implicated: neo-Gricean vs. post-Gricean (Relevance Theory) traditions. Relation of implicature to truth conditions, syntax, and the lexicon. Implicature, abductive reasoning, and nonmonotonic logics. Prerequisite: one course in semantics or pragmatics, or permission of instructor.

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 690b[u], Negation and Polarity.**]

LING 720b[u], Basics of Digital Signal Processing and Speech Acoustics. Louis Goldstein.
W 3.30–5.20
A gentle introduction to concepts of digital signal processing for those without strong mathematics, engineering, or programming backgrounds. Application to techniques for acoustic analysis and synthesis of speech. Vocal tract acoustics. Course is taught through regular programming exercises in MATLAB, but no prior programming experience is assumed.

[**LING 730a, Topics in Slavic Linguistics.**]

[**LING 740a, Articulatory Phonology.**]

[**INDC 751b, Indian Grammarians.**]

[**LING 760b, Informatics Seminar.**]

LING 770a, Learnability and Development. Charles Yang.
T 9.30–11.20
An interdisciplinary investigation of child language from an integrated perspective of computational learning and quantitative language development. Topics include: formal learnability, development of prosody, the past tense debate, bootstrapping in lexical acquisition, variations in child syntax, language change, and language evolution. Prerequisite: permission of the instructor.

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 515[u], Elementary Hindi. Staff.
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 530[u], Intermediate and Advanced Hindi. Staff.
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 115 or satisfactory placement test.

HNDI 557b[u], Modern Hindi Literature and Popular Culture. Staff.
An advanced language course designed to further develop the student's overall language skills through exposure to selected modern Hindi literature and popular culture. Focus on the works of Premchand, Manto, and Chugtai; various art forms including theater and film; debates informing the political, social, and cultural dimensions of the parent and related cultures as found in newspaper articles and television news reports. After HNDI 130 or satisfactory placement test.

The following courses are also of particular value to students in Linguistics:

ANTH 513a[u], Language, Culture, and Ideology. J. Joseph Errington.
See description under Anthropology.

[**ANTH 533a[u], Bilingualism in Social Context.**]

[**ANTH 669a[u], Language, Nationalism, and Ideology.**]

PHIL 643b[u], Formal Semantics. Sun-Joo Shin.
See description under Philosophy.

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, Lode Li, Florencio Lopez-de-Silanes, Paul MacAvoy, Theodore Marmor, Barry Nalebuff, Sharon Oster, Benjamin Polak, Douglas Rae, K. Geert Rouwenhorst, Martin Shubik, Matthew Spiegel, Shyam Sunder, Arthur Swersey, Victor Vroom, Ivo Welch, Dick Wittink

Associate Professors
Sigal Barsade, Albert Ha, Christopher McCusker, Fiona Scott-Morton

Participating Faculty from the School of Management
Arturo Bris, Meghan Busse, Stanley Garstka, Roger Ibbotson, Andrew Jeffrey, Nathaniel Keohane, Jonathan Koppell, Harry Mamaysky, Dina Mayzlin, Ganapathi Narayanamoorthy, Nathan Novemsky, Rodney Parker, Peter Schott, Sandra Spataro, Werner Stanzl, K. Sudhir

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 pages 360–61), 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 usually 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 mid-November 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, Ganapathi Narayanamoorthy, Shyam Sunder.
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 710b, Mathematical Models for Management. Susana Mondschein.
Students learn how to formulate and solve optimization problems, both in deterministic and stochastic environments. Topics covered include linear and integer programming, nonlinear optimization, and stochastic optimization. Many real problems from various areas in management are covered throughout the course.

MGMT 740a, Financial Economics I. Jonathan Ingersoll.
Theory of single-period financial models. Risk aversion, stochastic dominance, the canonical portfolio problem, the fundamental theorem of asset pricing, mean-variance analysis and its uses, mutual fund separation theory, arbitrage pricing theory, asset pricing in complete markets, and selected empirical topics. *Also ECON 670a.*

MGMT 741b, Financial Economics II. 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 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 743b, Empirical Workshop in Accounting and Financial Economics. William Goetzmann, Jacob Thomas.
This is a doctoral-level course in the empirical analysis of financial data. The course reviews the historical development of empirical accounting and finance, beginning with the early development and tests of the efficient market paradigm and extending through modern evidence on market efficiency, trading profits, and information-based arbitrage. Reading of three to five research papers per week, regular presentations and discussion, and an empirical study of financial data.

MGMT 750b, Seminar in Marketing I. Subrata Sen.
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.

MGMT 753a, Behavioral Decision Making. Ravi Dhar.
This seminar examines research on the psychology of judgment and choice. Although the normative issue of how decisions should be made is relevant, the main focus is on the descriptive issue of how decisions are made. Topics of discussion include choice, judgment heuristics and biases, decision framing, prospect theory, mental accounting, context effects, task effects, and regret. The goal of the seminar is threefold: to foster a critical appreciation of existing knowledge in behavioral decision theory, to develop the students' skills in identifying and testing interesting research ideas, and to explore research opportunities for adding to that knowledge. *Also PSYC 658a.*

MGMT 780a and b, Ph.D. Student Research Workshop.

MGMT 781a and b, Accounting/Finance Workshop.

MGMT 791a or b, Independent Reading and Research.
By arrangement with faculty.

MGMT 792a or b, Predissertation Research.
By arrangement with faculty.

MATHEMATICS

10 Hillhouse, 432.4172
M.S., M.Phil., Ph.D.

Chair
Gregory Margulis

Director of Graduate Studies
Gregg Zuckerman (423 DL, 432.4198, zuckerman-gregg@yale.edu)

Professors
Richard Beals, Donald Brown (*Economics*), Andrew Casson, Ronald Coifman, Walter Feit, Michael Frame, Igor Frenkel, Howard Garland, Roger Howe, Peter Jones, Ravidran Kannan (*Computer Science*), Serge Lang, Ronnie Lee, Douglas Lind (*Visiting*), Benoit Mandelbrot, Gregory Margulis, Vincent Moncrief (*Physics*), Gregory Moore (*Physics*), Steven Orszag, Ilya Piatetski-Shapiro, David Pollard (*Statistics*), Vladimir Rokhlin (*Computer Science*), Katepalli Sreenivasan (*Mechanical Engineering*), Efim Zelmanov, Gregg Zuckerman

Gibbs Instructors
David Fisher, Greg Friedman, Aleksei Kazarnovskii-Krol, Irina Kogan, Anna Mazzucato, Gabriel Rosenberg, Olivier Schiffmann, Agata Smoktunowicz, Jeb Willenbring, Catalin Zara

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 359–60).

Master's Degrees

M.Phil. In addition to the Graduate School requirements (see page 361), 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. Agata Smoktunowicz.
MWF 1.30–2.20

MATH 501b[u], Modern Algebra II. Walter Feit.
MW 1–2.15

MATH 515b[u], Intermediate Complex Analysis. Gregg Zuckerman.
TTh 11.30–12.45

MATH 520a[u], Measure Theory and Integration. Gabriel Rosenberg.
TTh 1–2.15

MATH 525b[u], Introduction to Functional Analysis. Staff.
TTh 1–2.15

MATH 544a, Introduction to Algebraic Topology. Staff.
MWF 10.30–11.20

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
Robert Apfel, Ira Bernstein, Boa-Teh Chu, Juan Fernández de la Mora, Alessandro Gomez, Robert Gordon, Amable Liñan-Martinez (*Adjunct*), Marshall Long, Lisa Pfefferle, Daniel Rosner, Ronald Smith, Mitchell Smooke, Katepalli Sreenivasan, George Veronis, Peter Wegener (*Emeritus*), Forman Williams (*Adjunct*)

Associate Professor
Wei Tong

Assistant Professors
Jerzy Blawzdziewicz, David Wu, Bjong Yeigh (*Adjunct*)

Lecturers
Beth Anne Bennett, Natalie Jeremijenko, Kailasnath Purushothaman, Glenn Weston-Murphy

FIELDS OF STUDY

Mechanics of Fluids: Acoustics and bioeffects of ultrasound; bulk and surface properties of liquids (including metastable liquids, radiation-induced bubble formation, and surfactant-induced effects); dynamics and stability of drops and bubbles; 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. Examples of projects include 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; and transient nucleation in multicomponent systems.

For admissions and degree requirements, and for course listings, see Engineering and Applied Science, pages 120–32.

MEDIEVAL STUDIES

53 Wall, Rm 324, 432.0672
M.A., M.Phil., Ph.D.

Chair and Director of Graduate Studies
Lee Patterson

Professors
Marilyn McCord Adams, R. Howard Bloch, Gerhard Böwering, Walter Cahn, Carlos Eire, Margot Fassler, Roberta Frank, Paul Freedman, Ingeborg Glier, Walter Goffart, Harvey Goldblatt, Dimitri Gutas, Traugott Lawler, Bentley Layton, Ivan Marcus, John Matthews, Giuseppe Mazzotta, María Rosa Menocal, Lee Patterson, Paolo Valesio, Craig Wright

Assistant Professors
Jessica Brantley, Mark Burde, Maria Georgopoulou, Matthew Giancarlo, Beatrice Gruendler, Olivia Holmes, Dianne Jonas, William Whobrey, Anders Winroth

Lecturer
Robert Babcock

Fields of Study

Fields in this interdisciplinary program include history, history of art, history of music, religious studies, language and literature, and philosophy.

Special Admissions Requirements

Both the General and the Subject Tests (in the student's strongest field) of the GRE are 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. 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.

Master's Degrees

M.Phil. See Graduate School requirements, page 361. 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 (one of these courses must be one term of MDVL 551a or b, Seminar in Medieval Studies); (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.

Program materials are available upon request to the Director of Graduate Studies, Department of Medieval Studies, Yale University, PO Box 208313, New Haven CT 06520-8313.

Courses

MDVL 550a or b, Directed Reading.
By arrangement with faculty.

MDVL 551a, Christian Mysticism from Augustine to John of the Cross: Theories of Ascent through Scripture, Music, and Practice. Margot Fassler.
M 3.30–5.20
Also MUSI 815a.

MICROBIOLOGY

354 Boyer Center for Molecular Medicine, 737.2404
M.Phil., Ph.D.

Director of Graduate Studies
Peter Tattersall

Professors
Sidney Altman (*Molecular, Cellular & Developmental Biology*), Norma Andrews (*Microbial Pathogenesis*), Kim Bottomly (*Immunobiology*), Yung-chi Cheng (*Pharmacology*), Donald Crothers (*Chemistry*), Daniel DiMaio (*Genetics*), Richard Flavell (*Immunobiology*), Jorge Galán (*Microbial Pathogenesis*), Nigel Grindley (*Molecular Biophysics & Biochemistry*), Margaret Hostetter (*Pediatrics*), Charles Janeway, Jr. (*Immunobiology*), 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*), Frank Richards (*Internal Medicine*), John Rose (*Pathology*), Nancy Ruddle (*Epidemiology & Public Health*), W. Dean Rupp (*Therapeutic Radiology*), Clifford Slayman (*Cellular & Molecular Physiology*), William Summers (*Therapeutic Radiology*), Peter Tattersall (*Laboratory 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*), Elisabetta Ullu (*Internal Medicine*)

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*), 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 and 671a), 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, page 361. 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.
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 670a,b, Laboratory Rotation. Peter Tattersall.
Rotation in three laboratories. Required for all first-year graduate students.

MBIO 680a,b, Advanced Topics in Molecular Parasitology. Diane McMahon-Pratt, Curtis Patton.
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 684a, Parasitic Eukaryotes: Molecular and Cellular Processes. Diane McMahon-Pratt, Curtis Patton.
Focuses on concepts central to the nature of parasitism. In-depth descriptions and analysis of parasite paradigms for biology. Examination of cellular and molecular processes involved in initiating, regulating, and maintaining host-parasite complexes. Prerequisites: biochemistry, cell or molecular biology. *Also EMD 684a.*

MBIO 685b, Molecular Mechanisms of Microbial Pathogenesis. Craig Roy, Jorge Galán, Norma Andrews.
Course focuses on current topics related to host pathogens 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 734a, Molecular Biology of Animal Viruses. Daniel DiMaio, Peter Tattersall.
WF 9.30–10.45
Lecture course with emphasis on mechanisms of viral replication, oncogenic transformation, and virus-host cell interactions. *Also GENE 734a.*

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 Collins (*Divinity*), Menachem Elimelech (*Environmental Engineering & Chemical Engineering*), Benjamin Foster (*Near Eastern Languages & Civilizations*), Steven Fraade (*Religious Studies*), John Gaddis (*History*), Sara Suleri Goodyear (*English*), Dimitri Gutas (*Near Eastern Languages & Civilizations*), William Hallo (*Near Eastern Languages & Civilizations*), Frank Hole (*Anthropology*), Stanley Insler (*Linguistics*), Bentley Layton (*Religious Studies*), Ivan Marcus (*History*), María Rosa Menocal (*Spanish*), 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*), Beatrice Gruendler (*Near Eastern Languages & Civilizations*), Christine Hayes (*Religious Studies*), Pauline Jones Luong (*Political Science*), Kaveh Khoshnood (*Epidemiology & Public Health*), Ellen Lust-Okar (*Political Science*)

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
Thomas Steitz

Director of Graduate Studies
Nigel Grindley (301 JWG, 432.5662, mbb.grad@yale.edu)

Professors
Donald Crothers (*Chemistry*), Jennifer Doudna, 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*), Simon Mochrie (*Physics; Applied Physics*), Peter Moore (*Chemistry*), Charles Radding (*Genetics*), Lynne Regan, Frederic Richards (*Emeritus*), Gaston Schmir (*Emeritus*), Robert Shulman, Sofia Simmonds (*Emeritus*), Michael Snyder (*Molecular, Cellular, & Developmental Biology*), Dieter Söll, Joan Steitz, Thomas Steitz, Scott Strobel, Julian Sturtevant (*Emeritus*), William Summers (*Therapeutic Radiology*), David Ward (*Genetics*), Kenneth Williams (*Adjunct, Research*), Harold Wyckoff (*Emeritus*)

Associate Professors
Mark Gerstein, Michael Koelle, Mark Solomon, Sandra Wolin (*Cell Biology*)

Assistant Professors
João Cabral, Enrique De La Cruz, Lise Heginbotham, Anthony Koleske, Andrew Miranker, 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 59–61).

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 359–60).

Master's Degree

M.Phil. See Graduate School requirements, page 361. 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. Michael Koelle, Donald Engelman.
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, physical processes in biochemistry, and carbohydrate, lipid, and amino acid metabolism.

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 625a[u], Basic Concepts of Genetic Analysis. Tian Xu, Michael Koelle, Richard Lifton, Shirleen Roeder, Michael Stern.
TTh 1.05–2.20
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. A brief review of undergraduate genetics is offered in two optional lectures at the beginning of the term. *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. Donald Crothers.
TTh 2–3.30
An advanced treatment of the fundamental physical properties that dictate the behavior of biological molecules. Taught with participation of a number of biophysics faculty and extends to their current research specialties. *Also CHEM 558a.*

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. Mark Solomon or Lynne Regan 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. *Also CBIO 676b.*

MB&B 700b[u], Properties of Macromolecules. Lynne Regan, Vinzenz Unger, Mark Gerstein.

MW 11.30–12.45

Solution properties of macromolecules and current topics in biophysics, including electrostatics, hydrodynamics, enzyme kinetics, molecular dynamics, and multiple equilibria. Prerequisites: physical chemistry; biochemistry.

MB&B 701b3[u], Diffraction Methods. João Cabral, Jennifer Doudna, 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. Jennifer Doudna, Thomas Steitz.

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. Mark Hochstrasser, Anthony Koleske.
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. *Also GENE 743b.*

[**MB&B 746a1, Advanced Biochemical Control.**]

MB&B 749a[u], Medical Impact of Basic Science. Joan Steitz, Mark Hochstrasser, Andrew Miranker, 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 at seniors and first-year graduate students. Prerequisite: MB&B 600a[u]/601b[u] or the equivalent or permission of the instructor. *Also GENE 749a.*

MB&B 750a2, Biological Membranes. Vinzenz Unger (in charge), João Cabral, Donald Engelman, Lise Heginbotham.
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 module serves as a brief 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, 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, comparative genomics, geometric analysis of protein structure, and macromolecular simulation. Prerequisite: EEB 122b and MATH 115, or permission of the instructor. *Also MCDB 752a[u].*

[**MB&B 760b4[u], Principles of Macromolecular Crystallography.**]

MB&B 775b, Advanced Seminar in Genetics:

MB&B 800a, Molecular Mechanisms of Disease. Robert Shulman, William Konigsberg, Andrew Miranker, Dieter Söll.
The course describes selected medical applications of recent findings in the biochemical properties of biomolecules and their interactions.

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, Timothy 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, Frank Ruddle, Alanna Schepartz (*Chemistry*), Steven Segal (*Physiology*), Michael Snyder, Robert Wyman

Associate Professors
Ronald Breaker, Craig Crews, Paul Forscher, Vivian Irish, Junhyong Kim (*Ecology & Evolutionary Biology*), Archibald Perkins (*Pathology*), William Segraves

Assistant Professors
Savithramma Dinesh-Kumar, Christine Jacobs, Frank Slack, 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, 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.

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. 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 359–60).

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, Catherine Joyce.
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 539b, Advanced Immunology Seminar: Functions of the Major Histocompatibility Complex. Peter Cresswell, Ira Mellman, Akiko Iwasaki.
This seminar course consists of a brief introductory session followed by detailed critical reviews of key papers in the field. We consider the genetics of the MHC, structures of MHC class I and class II molecules and homologs, and the mechanisms governing their assembly with peptides. We also cover the cell biology of antigen processing in various types of antigen-presenting cells, including B-cells and dendritic cells. Enrollment limited to fifteen. *Also IBIO 539b.*

MCDB 550a[u], Physiological Systems. Steven Segal and staff.
MWF 9.30–10.20
Regulation and control in the human body, emphasizing principles of feedback and the maintenance of homeostasis. Biophysical properties of cells, tissues, and organs are presented in light of the structural basis of physiological control. *Also C&MP 550a, ENAS 550a[u].*

MCDB 555b[u], Molecular Basis of Development. Xing-Wang Deng, Douglas Kankel, and staff.
MW 9–10.15
Study of current understanding of the molecular mechanism of cell signaling and development in multicellular organisms. Topics include the basics of cell signaling and experimental model organisms, cell proliferation and death, cell specification and determination, cell migration, hormonal regulation, and environmental regulation.

MCDB 570b[u], Biotechnology. Michael Snyder, Ronald Breaker, Kenneth Nelson, Joseph Wolenski.
MW 11.30–12.45
The cellular, molecular, and chemical techniques in biology that advance biotechnology. Topics include tools and strategies used to increase understanding of biological processes and adapting biological and chemical compounds for use as medical treatments, industrial agents, or for the further study of biological systems. Design and implementation of drug development and approval.

MCDB 600La, Advanced Biological Laboratory. Mike Snyder, Ronald Breaker, Xing-Wang Deng, Kenneth Nelson, Joseph Wolenski, David Austin, Frank Ruddle.
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 615b[u], Genetics and Molecular Biology of Plant Development. Timothy Nelson and staff.

M 2.30–4.20

Genetic and molecular analyses of plant embryogenesis, organogenesis, and other topics in plant development.

MCDB 625a[u], Basic Concepts of Genetic Analysis. Tian Xu, Michael Koelle, Richard Lifton, Shirleen Roeder, Michael Stern.

TTh 1.05–2.20

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 642a, Roles of Microorganisms in the Living World. L. Nicholas Ornston and staff.

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, 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

Topics to be decided.

MCDB 677a, Mechanisms of Development. Lynn Cooley and staff.

M 9.45–11, F 2.15–3.30

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 777a.*

[**MCDB 680b, Genetic Dissection of Cell Signaling and Development.**]

MCDB 692a, Advanced Seminar in Cell Biology: Mechanisms of Signal Transduction. Craig Crews.

M 7–10

Discussion/seminar course with special emphasis on the molecular signal transduction mechanisms of mitogenesis and cell division.

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, Stephen Senft.
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], Brain Development and Plasticity. Weimin Zhong, David Wells.
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.

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 MB&B 752a[u].*

[**MCDB 861b[u], Global Problems of Population Growth.**]

MCDB 900a and 901b, First-Year Introduction to Research and Rotations. Ronald Breaker.
TH 5

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
Allen Forte, Michael Friedmann (*Adjunct*), James Hepokoski, Patrick McCreless, Robert Morgan, Leon Plantinga, Ellen Rosand, Craig Wright

Associate Professor
Richard Lalli (*Adjunct*)

Assistant Professors
Kathryn Alexander, David Clampitt, John Halle, Robert Holzer, Kristina Muxfeldt, Michael Veal

Lecturers
Eric Drott, Matthew Suttor

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, compositions, 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 theory of music program must pass examinations in two foreign languages: German and normally French, Latin, or Italian. For students in the history of music, German and two other languages are required. Language examinations, partly with dictionary and partly without, are administered at the beginning of each term. A Practicum Exam (ear training, keyboard, and basic theory and analysis) is given to all entering students and must be passed before admission to candidacy. 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, practicum, 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.

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, page 361.

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 701a, Theory and Aesthetics: Antiquity and Medieval. Craig Wright.
W 10–12

MUSI 705b, Theory and Aesthetics: The Nineteenth Century. Leon Plantinga.
Th 1.30–3.30

MUSI 801b, Chant and Liturgy. Craig Wright.
M 1.30–3.30
An introduction to the chant and liturgy of the Western Latin church from the Middle Ages to the Council of Trent. The course gives the student a firm understanding of the structure of the medieval liturgy that can be applied to the study of the sacred music of all periods.

MUSI 807a, The Italian Madrigal: Criticism and Historiography. Ellen Rosand.
W 1.30–3.30
As an unusually circumscribed genre that has attracted attention as such from the earliest days of musicological inquiry, the Italian madrigal provides not only a rich and varied repertoire of poetic and musical styles but also an ideal framework for viewing the development of musicology as a discipline. In the course of examining the varying relationships between poetry and music displayed in madrigals from different periods and geographical areas (Florence, Rome, Venice), the seminar will consider the ways in which the understanding of the genre has changed over the course of the twentieth century.

MUSI 815a, Christian Mysticism from Augustine to John of the Cross: Theories of Ascent through Scripture, Music, and Practice. Margot Fassler.
M 3.30–5.20
Exploration of major theories of mystical ascent to God, from the early church through the later Middle Ages. A different writer is assigned each week, with considerations of: scriptural precedents, music as metaphor for the mystical union, the roles of public prayer and sacramental action, various modes of constructing "ascent machines." Enrollment limited to fifteen. Permission of instructor required. *Also MDVL 551a.*

MUSI 816a, Approaches to *Pierrot lunaire*. Robert Holzer.
M 1.30–3
A wide-ranging historical and critical examination of Arnold Schoenberg's 1912 work. Issues to be considered include: Pierrot in nineteenth-century theater, verse, and music; Albert Giraud's cycle of poems and their translation by Erich Hartleben; musical settings prior to Schoenberg; the commissioning and composition of the work; atonality and expressionism; parody; reception and influence.

MUSI 850b, Sonata Theory. James Hepokoski.
T 1.30–3.30
A genre-based approach to analyzing sonata form and the multimovement sonata, c. 1770–1800. Hierarchies of compositional options and principles of deviation. Intersections with other analytical methodologies in current usage. Issues in sonata hermeneutics.

MUSI 876b, Social and Reception Histories of Eighteenth- and Nineteenth-Century Music. Kristina Muxfeldt.
W 1.30–3.30
A consideration of studies emphasizing the social and reception histories of individual works and their composers. Our focus is on "close readings," whose explanatory power has been enhanced by these perspectives and the analytical directions that they make possible.

MUSI 901a, Tonal Analysis I. Robert Morgan.
T 1.30–3.30

MUSI 901b, Tonal Analysis II. Allen Forte.
T 9–11

MUSI 903a[u], Advanced Studies in Analysis and Composition. Patrick McCreless.
TTh 11.30–12.45
Advanced studies in the theory, analysis, and composition of the music of the late nineteenth and early twentieth centuries.

MUSI 910b, Rhetoric, Structure, Gesture. Patrick McCreless.
W 10–12
The course uses notions of rhetoric and gesture as metaphors that inflect our understanding of musical structure. The focus of the course is less on historical theories of musical rhetoric — although these are considered — than on using the rhetorical and gestural as analytical tools. Repertoire to be covered ranges from the eighteenth to the twentieth century.

MUSI 915a, Music, Multimedia, Technology, and Research. Kathryn Alexander.
F 10–12
A study of the creative interaction between music, multimedia, and technology and the research, performance, and pedagogical impact of that focus. The seminar examines hardware and software and their integration, overviews authoring languages, and considers hypertext and hypermedia issues in software design, development, and use.

MUSI 998a, Prospectus Workshop. Robert Morgan.
M 4–5.30

MUSI 999b, Dissertation Colloquium. James Hepokoski.
M 4–5.30

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
Beatrice Gruendler [F] (2703 HGS, 432.7522, beatrice.gruendler@yale.edu)
Benjamin Foster [Sp] (315 HGS, 432.2944, benjamin.foster@yale.edu)

Professors
Jan Assmann (*Visiting* [Sp]), Benjamin Foster, Dimitri Gutas, William Hallo, Bentley Layton, William Simpson, Harvey Weiss

Assistant Professors
John Darnell, Beatrice Gruendler

Lecturers
Karen Foster, Karen Nemet-Nejat, Pongratz-Leisten, David Reisman

Senior Lectors
Fereshteh Amanat-Kowssar, Ayala Dvoretzky, Bassam Frangieh

Lector
Neta Stahl

Fields of Study

Fields include Arabic and Islamic studies (also with interdisciplinary minor), Greco-Arabic studies, Archaeology of the Ancient Near East, Assyriology, Egyptology, and Coptic 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 two term courses or one year course with Honors.

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; *Coptic and Egyptology:* Coptic, Egyptian, Greek, Arabic, Latin, and one other Christian oriental language. 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: 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 within one month after 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, page 361. 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.
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

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. Benjamin Foster.

NELC 510a[u], Conflicts that Shaped Pharaonic Egypt. John Darnell.
An overview of the history of ancient Egypt, from the predynastic period, c. 4500 B.C.E., to the end of Byzantine rule on the Nile. Focus on periods of internal social and political fragmentation; examination of the struggles and mechanisms that led to the establishment and renewal of central authority on the Nile.

[**NELC 511b[u], Ancient Egypt from the Ramesside to the Ptolemaic Periods.**]

NELC 517a[u], Survey of Cuneiform Literature. William Hallo.
MW 11.30–12.45
The canonical literature of ancient Mesopotamia is studied in translation, with emphasis on religious and learned texts in Akkadian or in bilingual Sumero-Akkadian form.

[**NELC 520, Beginning Sumerian.**]

NELC 521b, Intermediate Sumerian. Staff.

[**NELC 527a, The Texts from Ebla.**]

NELC 528a or b, Advanced Sumerian. Beate Pongratz-Leisten [F], Benjamin Foster [Sp].

NELC 539a or b, Directed Readings: Sumerian. William Hallo.

[**NELC 540[u], Elementary Akkadian.**]

NELC 541b, Advanced Akkadian. Benjamin Foster.

NELC 545b, Neo-Babylonian. Karen Nemet-Nejat.

NELC 546a, The Assyrian Dialect. William Hallo.
Reading of selected texts — monumental, archival, and canonical — of Old, Middle, and Neo-Assyrian date.

NELC 559a or b, Directed Readings: Assyriology.

NELC 560[u], Introduction to Classical Hieroglyphic Egyptian. Cara Sargent.
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.

NELC 564a, Egyptian Historical Texts: Old and Middle Kingdom. William Simpson.

NELC 564b, Egyptian Historical Texts: New Kingdom and Later. William Simpson.

NELC 565a, Egyptian Literary Texts: Old and Middle Kingdom. William Simpson.

NELC 565b, Egyptian Literary Texts: New Kingdom and Later.

[**NELC 566a, Late Period Historical Texts: Napatan Historical Inscriptions.**]

[**NELC 566b, Literary Texts in Late Egyptian.**]

NELC 567a, Egyptian Religious Texts.

NELC 568, Selected Egyptian Literary Texts. William Simpson.

[**NELC 569b, Ptolemaic and Roman Hieroglyphic Texts.**]

NELC 571a or b, Selected Egyptian Wisdom Texts.

NELC 572b, Ramesside Texts. John Darnell.
Readings of Ramesside monumental inscriptions, mostly of historical significance. Focus on inscriptions from the reigns of Sety I, Ramesses II, and Merneptah, including the Wadi Mia Temple inscriptions of Sety I, the stela of Sety I for Ramesses I; the *Inscription dédicatoire* of Ramesses II for Sety I at Abydos, the Kom el-Ahmar Stela and the Kadesh texts of Ramesses II; the Amada Stela, Triumph Stela, and other monuments of Merneptah. Discussions of late Middle Egyptian grammar and orthography, historical significance, etc.

NELC 573b, Introduction to Demotic. John Darnell.

NELC 576a, Ancient Egyptian Epistlography. John Darnell.
Reading (in hieroglyphic and hieratic scripts) of Egyptian letters, from the Old Kingdom through the Third Intermediate Period, including the Letters to the Dead, Kahun Letters, and Late Ramesside Letters.

NELC 577b, Ancient Egyptian Cosmographic Texts. John Darnell.
Close reading of Egyptian cosmographic books, including the King as Solar Priest, the Book of the Creation of the Solar Disk, the Book of Nut, the Book of the Day and the Night, the Enigmatic Netherworld Books of the Solar-Osirian Unity.

[**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.**]

NELC 590a, Coffin Texts. John Darnell.
Readings of the religious texts found on the inner surfaces of Middle Kingdom coffins. The course focuses on creation accounts, the Shu texts, spells of transformation, the Book of the Two Ways, etc. Readings in both normalized hieroglyphic transcription and original cursive hieroglyphic writing.

NELC 591b, Ancient Egyptian Love Poetry. John Darnell.
MW 3–5
Egyptian love poetry, concentrating on the major documents. Most readings in hieratic, with discussions of the grammar of literary Late Egyptian, its relationship to non-literary Late Egyptian and late Middle Egyptian.

NELC 592b, Death and Afterlife in Ancient Egypt. Jan Assmann.

NELC 595a, Ancient Egyptian Art and Archaeology. William Simpson.

NELC 661[u], Elementary Modern Hebrew. Ayala Dvoretzky, Neta Stahl.
MWF 11.30–1, *drill* 1 HTBA
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.

NELC 662[u], Modern Hebrew II. Ayala Dvoretzky, Neta Stahl.
MWF 10.30–11.20, *drill* 1 HTBA
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.

NELC 665a[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.

NELC 666b[u], Introduction to Modern Israeli Literature. Ayala Dvoretzky.
MW 1.30–2.45
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.

NELC 726a[u], Introduction to the History of Christianity in the Ancient World: Jesus to Augustine. Bentley Layton.
MW 10.30–11.20, 1 HTBA
The rise of Christianity and the development of Western culture into the Middle Ages, including the creation of Christian orthodoxy; religious, political, social, gender, literary, and theological history of Christian religion in many forms. No previous background assumed. *Also RLST 651a[u].*

[**NELC 735b[u], Gnostic Religion and Literature.**]

NELC 736b[u], The Making of Monasticism. Bentley Layton.
W 1.30–3.20
The history of Christian monasteries, hermits, ascetics, and monastic institutions and values in late antiquity, with special attention to the eastern Mediterranean world. *Also HIST 532b, RLST 659b[u].*

NELC 740[u], Biblical Coptic: Elementary Course. Andrew Crislip.
MWF 1.30–2.20

[**NELC 741b[u], Introduction to Gnostic Texts in Coptic.**]

[**NELC 745a[u], Egyptian Monastic Literature in Coptic.**]

[**NELC 746a, Early Ascetism and Monasticism in Egypt (Patristic Seminar).**]

[**NELC 748a, The White Monastery of Atripe: Study of Canons 1–5 of Shenoute.**]

[**NELC 749b, The White Monastery of Atripe: Reconstruction of the Disciplinary Code.**]

[**NELC 770[u], Elementary Syriac.**]

NELC 772a, Classical Syriac Historiography.

NELC 773b, Theological and Literary Texts in Syriac.

[**NELC 802a[u], The History of the Islamic Near East from Mohammad to the Mongol Invasion.**]

NELC 805b[u], Greek into Arabic into Latin: Foundations of Western Culture. Dimitri Gutas.
TTh 10.30–11.20, 1 HTBA

[**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. Beatrice Gruendler.
MW 11.30–12.45'
Readings from classical Arabic literature from the seventh to the fifteenth century. Selections comprised of poetry, prose, and mixtures of both, including women's dirge, brigand poetry, advice literature, literary sessions, *faraj ba'da l-shidda* story, *magama,* shadow play, biography, and travelogue. Consideration in light of various ways in which memory and fiction are combined in the creative process. All readings in translation.

[**NELC 812b, Abbasid Poetry in Context.**]

[**NELC 818b[u], Early Arabic Philosophy.**]

NELC 821[u], Elementary Modern Standard Arabic. Bassam Frangieh.
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.

NELC 822[u], Spoken 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.

NELC 824u, Intermediate Standard Arabic. Bassam Frangieh.
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.

NELC 825u, Advanced Modern Standard Arabic. Ahmed Al-Rahim.
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.

NELC 829b, History of the Arabic Language. Beatrice Gruendler.
W 2.30–4.20

NELC 830au or bu, Arabic Seminar. Beatrice Gruendler [F], Dimitri Gutas [Sp].
T 2.30–4.20
Study and interpretation of classical Arabic texts for advanced students.

[**NELC 831a, Greco-Arabic Seminar.**]

NELC 832b, Introduction to Medieval Arabic Literary Criticism. Beatrice Gruendler.
Practical and theoretical criticism of Arabic poetry considered in the light of its communicative and cultural roles in a multi-ethnic medieval society. Themes include the classification of poetry, composition, form and content, influence vs. originality, talent vs. craft, lie and truth, theory of imagery, rhetorics, the literary challenge of the Koran, and the dynamics of poetry and prose.

[**NELC 834b, Arab Historical Writing.**]

NELC 836b, Classical Arabic Biography. Eerik Dickinson.
M 1.30–3.20
Biography as a literary genre and historical source. The course examines the origin and development of biographical writing in Islam.

[**NELC 844b, Arabic Palaeography and Textual Criticism.**]

[**NELC 845b, Plato's *Laws* in Arabic.**]

NELC 846a, Seminar in the Philosophy of Avicenna: The Commentary on Aristotle's *De Anima*. Dimitri Gutas.
An organizational meeting will be held for all interested students on Tuesday, September 4 at 4.00 p.m., 316 HGS.

[**NELC 847a, Medieval Islamic Ethics.**]

NELC 848a, Seminar in Islamic Theology: Ibn Taymiyya on Divine Attributes. David Reisman.
M 2.30–4.20

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.

NELC 851u, 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.

NELC 852u, 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.

NELC 859a or b, Directed Readings: Persian.

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 Waxman

Associate Professors
Meenakshi Alreja, Amy Arnsten, Charles Bruce, Nihal de Lanerolle, Tamas Horvath, Thomas Hughes, Bita Moghaddam, Marina Picciotto, Michael Schwartz, Stephen Strittmatter

Assistant Professors
Wei Chen, Maria Donoghue Velleca, Reiko Maki Fitzsimonds, Vincent Pieribone, Anna Roe, Ning Tian, Flora Vaccarino, 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 inter-

ests. 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 59–61).

Master's Degrees

M.Phil. See Graduate School requirements, page 361. 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 eight 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 will be 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. Stephen Strittmatter, Stephen Waxman.

MW 4–5.30

Molecular and cellular neuroscience has recently developed many novel and powerful techniques for understanding nervous system function. The course focuses on how these basic science advances have been translated into breakthroughs in clinical neurology. Lectures illustrate the connection of modern laboratory studies to our understanding of pathophysiologic mechanisms, to the development of diagnostic tests, and to the use of novel modalities. *Also NSCI 507b.*

NBIO 509b, Synaptic Organization of the Nervous System. Gordon Shepherd, Anne Williamson, Michael Hines.

Introduction to principles of neural circuit organization at the cellular level (morphology, physiology, and pharmacology). Emphasis is on mammalian systems and comparisons with lower vertebrates and invertebrates. Permission of instructor required. *Also NSCI 539b.*

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 immunoperoxidase methodology. Choice of techniques and hours to be arranged with individual faculty or staff members of the section 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 section of Neurobiology.

NBIO 520a, Vision: Cellular and Network Dynamics of the Cerebral Cortex. Anna Roe and faculty.

This class explores the mechanisms of cerebral cortical function through the eyes of the visual cortex. The course covers the cellular and synaptic properties of cortical neurons and circuits and the theoretical and experimental mechanism by which cortical neurons analyze the visual scene, including higher-order visual processes such as the analysis of color, contours, depth, motion, and mechanisms of attention and visual memory.

NBIO 524a, The Regulation of Cell Fate during CNS Development. Flora Vaccarino.

TTh 9–10.30

This course is intended to discuss the general mechanisms that regulate cell fate during the development of the central nervous system. It focuses on the progressive specialization of cellular function beginning with the establishment of CNS polary, the acquisition of regional identity, and the determination of the fate of neural cells within the CNS. The interactions between evolutionary conserved genes and intercellular signaling systems are emphasized. The course meets twice a week for one hour each time. Each week covers one topic as detailed in the syllabus. On Wednesday, general concepts are reviewed in a seminar format, led by the course director, faculty participants, or invited speakers. On Fridays, one or two papers presented by students are discussed in detail. All class members are invited to participate in the paper presentation and discussion. *Also NSCI 514a.*

NBIO 530b, Neurobiology of Schizophrenia. Bita Moghaddam.
Schizophrenia is a debilitating disorder of thought and affect with unknown etiology. In this course, research findings from basic and clinical venues are discussed to provide an overview of the current state of our knowledge about the pathophysiology of this disease and treatment strategies. The course consists of didactic lectures and student-led discussion of key research papers that focus on morphological, developmental, and genetic abnormalities that are suspected to occur in schizophrenia, as well as the utility of various animal models for improving clinical treatment. *Also NSCI 530b.*

NBIO 601, Topics in Olfactory Physiology. Gordon Shepherd.
Advanced seminar 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.
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*), Thomas Brown (*Psychology; 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*), Timothy Goldsmith (*Molecular, Cellular, & Developmental Biology*), John Gore (*Diagnostic Radiology; Applied Physics*), Charles Greer (*Neurosurgery, Neurobiology*), Gabriel Haddad (*Pediatrics; Cellular & Molecular Physiology*), Susan Hockfield (*Neurobiology*), Marcia Johnson (*Psychology*), Leonard Kaczmarek (*Pharmacology; Cellular & Molecular Physiology*), Douglas Kankel (*Molecular, Cellular, & Developmental Biology*), 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*), Edward Moczydlowski (*Pharmacology; Cellular & Molecular Physiology*), 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*), Joseph Santos-Sacchi (*Surgery; Neurobiology*), Ilsa Schwartz (*Surgery; Neurobiology*), Steven Segal (*Epidemiology; Cellular & Molecular Physiology*), Gordon Shepherd (*Neurobiology*), Frederick Sigworth (*Cellular & Molecular Physiology*), 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*), Catherine Berlot (*Cellular & Molecular Physiology*), Charles Bruce (*Neurobiology*), Nihal de Lanerolle (*Neurosurgery; Neurobiology*), Paul Forscher (*Molecular, Cellular, & Developmental Biology*), James Howe (*Pharmacology*), Thomas Hughes (*Ophthalmology & Visual*

Science; Neurobiology), Robert Kalb (*Neurology; Pharmacology*), Bita Moghaddam (*Psychiatry; Neurobiology*), Marina Picciotto (*Psychiatry; Pharmacology; Neurobiology*), George Richerson (*Neurology; Cellular & Molecular Physiology*), Michael Schwartz (*Neurobiology*), Stephen Strittmatter (*Neurology; Neurobiology*), Flora Vaccarino (*Child Study Center; Neurobiology*),Tian Xu (*Genetics*)

Assistant Professors
Hal Blumenfeld (*Neurology; Neurobiology*), Angélique Bordey (*Neurobiology*), 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*), Jeansok Kim (*Psychology*), Anthony Koleske (*Molecular Biophysics & Biochemistry*), Gerard Marek (*Psychiatry*), Christy Marshuetz (*Psychology*), Mark Packard (*Psychology*), Vincent Pieribone (*Cellular & Molecular Physiology*), Maria Mercedes Piñango (*Linguistics*), Anna Roe (*Neurobiology*), Ning Tian (*Opthamology & Visual Science*), David Wells (*Molecular, Cellular, & Developmental Biology*), Michael Westerveld (*Neurosurgery*), Mark Yeckel (*Neurobiology*), 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 59 – 61).

Special Requirements for the Ph.D. Degree

Each entering student is assigned a faculty advisory committee to provide guidance relevant to the student's stated field of interest. 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 upon a model curriculum beginning with three core courses 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. A series of at least two laboratory rotations during the first two years of the program also ensures that degree candidates obtain a solid background in systems, cellular, and molecular approaches to neuroscience. The Graduate School requires two term grades of Honors during the first two years of study. Admission to candidacy requires passing a qualifying examination normally given at the end of the second year, and submission of a dissertation prospectus prior to the start of the fourth 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.

Master's Degrees

M.Phil. See Graduate School requirements, page 361.

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, 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 NBIO 501a.*

[**NSCI 502b, Cell Biology of the Nerve Cell.**]

[**NSCI 503b, Molecular Neurobiology.**]

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.*

[**NSCI 505b, Sensory Systems.**]

NSCI 506b, Introduction to Brain and Behavior. Jeansok Kim.
T 4–6
Introduction to basic principles of brain function, including fundamentals of synaptic transmission, organization of the CNS, sensory and motor integration, and higher processes such as the neurobiology of language, learning, and memory. *Also PSYC 506b.*

NSCI 507b, Cellular and Molecular Mechanisms of Neurological Disease. Stephen Strittmatter, Stephen Waxman.
MW 4–5.30
Focuses on those diseases in which modern neuroscience has advanced mechanistic explanations for clinical conditions. The application of pathophysiologic understanding to therapeutics is considered. *Also NBIO 507b.*

[**NSCI 508a, Functional Properties of Cortical Neurons and Circuits.**]

[**NSCI 509, Neuroimmunology: Neural and Immune Cell Adhesion Molecules.**]

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 511b, Neurobiology of Drug Addiction.**]

[**NSCI 512a, Genes and Behavior.**]

NSCI 514a, The Regulation of Cell Fate during CNS Development. Flora Vaccarino.
TTh 9–10.30
An overview of the mechanisms that regulate cell fate during the development of the central nervous system, mainly intended for graduate students. We focus on the progressive specialization of cellular function beginning with the establishment of CNS polarity, the acquisition of regional identity, and the determination of the fate of individual neural cells within the CNS. The interactions between evolutionary conserved genetic and intercellular signaling systems are discussed. *Also NBIO 524a.*

NSCI 519a/b, Tutorial.
By arrangement with faculty and approval of the director of graduate studies.

NSCI 529b, Introduction to Computational Neuroscience. Nicholas Carnevale.
This is an introduction to the use of empirically based modeling as a means for understanding the functional consequences of the anatomical, biophysical, and pharmacological properties of neurons and neural circuits involved in perception, motor control, and learning. Students construct and use models for homework assignments and targeted investigations of current research topics. In addition, each graduate student is expected to identify a research question of particular interest and develop a model that addresses it. Designed for advanced undergraduates and beginning graduate students. *Also PSYC 677b*[u].

NSCI 530b, Neurobiology of Schizophrenia. Bita Moghaddam.
Schizophrenia is a debilitating disorder of thought and affect with unknown etiology. In this course, research findings from basic and clinical venues are discussed to provide an overview of the current state of our knowledge about the pathophysiology of this disease and treatment strategies. The course consists of didactic lectures and student-led discussion of key research papers that focus on morphological, developmental, and genetic abnormalities that are suspected to occur in schizophrenia, as well as the utility of various animal models for improving clinical treatment. *Also NSCI 530b.*

NSCI 539b, Synaptic Organization of the Nervous System. Gordon Shepherd, Anne Williamson, Michael Hines.
M 10–12
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. *Also NBIO 509b.*

NSCI 540a, Introduction to Statistics in Psychology. Thomas Brown, Joseph Chang.
This introductory statistics course is designed for psychology or neuroscience students. It covers descriptive statistics; probability; correlation; linear regression; the t-test; one- and two-way analysis of variance; non-parametric statistics; and power, effect size, and confidence intervals. A user-friendly statistics package allows greater emphasis on concepts, principles, and applications versus computation. *Also STAT 504a*[u].

NSCI 600a, Experimental Methods in Neuroscience. R. Todd Constable.
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 610b, Neurophysiology: Theory and Practice.**]

[**NSCI 611b, Neurophysiology.**]

[**NSCI 614a, Neurobiology of Learning and Memory.**]

[**NSCI 634b, Behavioral Neuroendocrinology.**]

[**NSCI 645a, Foundations of Behavioral Neuroscience.**]

[**NSCI 646a, Cellular Analysis of Learning I. Invertebrate Systems.**]

[**NSCI 647b, Cellular Analysis of Learning: In Vitro.**]

[**NSCI 648b, Cellular Analysis of Learning: Vertebrate Model Systems.**]

[**NSCI 666b, From Neurons to Behavior.**]

[**NSCI 674b, Psychopharmacology.**]

NSCI 720a, Neurobiology. Haig Keshishian, Paul Forscher.
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
J. Murdoch Ritchie

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*), Robert Innis, Reinhard Jahn (*Adjunct*), Leonard Kaczmarek, Edward Moczdlowski, Perry Molinoff (*Adjunct*), William Prusoff (*Emeritus*), J. Murdoch Ritchie, Sara Rockwell, Robert Roth, Gary Rudnick, Alan Sartorelli, William Sessa, Joseph Schlessinger, John Tallman (*Adjunct*), Stephen Waxman

Associate Professors
Edward Chu, Valentin Gribkoff (*Adjunct*), Robert Heimer, James Howe, Robert Kalb, Elias Lolis, Guiseppe Pizzorno, Tod Verdoorn (*Adjunct*)

Assistant Professors
Anton Bennett, Michael DiGiovanna, Marina Picciotto

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 59–61).

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.

Master's Degrees

M.Phil. See Graduate School requirements, page 361.

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. Priscilla Dannies and staff.
MW 10.30–12
Lectures covering antibiotics, immunotherapy, and chemotherapy.

PHAR 506a and b, Methods in Pharmacological Research (Rotations).
Priscilla Dannies.
Students work in laboratories of faculty of their choice. The period spent in each laboratory is one term.

PHAR 508b, Neuropharmacology. J. Murdoch Ritchie.
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 520a, Principles of Research Methodologies: Methods behind the Madness.
W. C. Sessa, Priscilla Dannies.
T 4–6
A course designed for first-year students to illustrate basic principles of contemporary techniques commonly used in many research laboratories. The class is taught by senior students in the Pharmacology department along with faculty. The class meets for two hours weekly in the fall semester. Grades are based on class attendance, participation, and a take-home examination.

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 Resonance Spectroscopy (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
Keith DeRose (*Acting* [F])

Director of Graduate Studies
Karsten Harries (107 Connecticut Hall, 432.1682, karsten.harries@yale.edu)

Professors
Marilyn McCord Adams, Robert Adams, Seyla Benhabib, Jules Coleman, Michael Della Rocca, Keith DeRose, Karsten Harries, Shelly Kagan, Nicholas Wolterstorff

Associate Professors
Tad Brennan, Sun-Joo Shin (*Visiting*)

Assistant Professors
Katalin Balog, James Kreines, Gabriel Richardson, Mathias Risse, Michael Weber

Lecturers
Paul Hovda, Ruth Marcus, Ori Simchen, John Smith

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. 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, page 361.

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 503b[u], Opacity, Essentialism, and Propositional Attitudes. Ori Simchen.
TTh 4–5.15
A study of referential opacity, that is, of cases in which substituting an expression for a co-referring expression in a given statement tends to alter the truth-value of the whole. Exploration of some important implications of this issue for metaphysics and epistemology. Authors include Frege, Russell, Quine, Marcus, Kaplan, Kripke, Parsons, and Linsky.

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.
MW 1–2.15
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 565b[u], Kant's *Critique of Pure Reason*. James Kreines.
TTh 11.30–12.45
An examination of the metaphysical and epistemological doctrines of Kant's *Critique of Pure Reason*.

PHIL 610b[u], Plato's *Timaeus*. Tad Brennan.
M 3.30–5.20
A philosophical examination of Plato's dialogue about the construction of the cosmos and the creatures in it. Some consideration of Plato's other dialogues, of earlier cosmological theories, and of the impact of the *Timaeus* on later views, e.g., the Stoics.

PHIL 611a[u], Plato and Aristotle on Art. Gabriel Richardson.
M 1.30–3.20
An examination of Plato's and Aristotle's theories of narrative art and its relation to ethical and political life. Reading of all or parts of Plato's *Republic* and *Philebus* and Aristotle's *Poetics* and *Politics*.

PHIL 612a[u], Greek Philosophical Texts: Aristotle's *De Anima*. Tad Brennan, Gabriel Richardson.
F 1.30–3.20
An introduction to the techniques of philosophical exegesis used in the study of Ancient Greek texts. Students acquire and practice interpretive skills by applying them to the philosophical analysis of the text selected for this year, Aristotle's *De Anima*. Some reading knowledge of Greek required. *Also GREK 732a[u].*

PHIL 613a[u], The Philosophical Theology of St. Anselm of Canterbury. Marilyn McCord Adams.

W 1.30–3.20

Reading, seminar presentations, and discussion of selected topics from Anselm's works, with emphasis on primary sources. *Also REL 760a, RLST 912a.*

PHIL 614b[u], The Philosophical Theology of Aquinas. Marilyn McCord Adams.

W 1.30–3.20

An examination of the principal philosophical and theological ideas in the works of St. Thomas Aquinas. *Also REL 763b, RLST 904b.*

PHIL 615b[u], Schleiermacher. Robert Adams.

W 3.30–5.20

A philosophical examination of the thought of Friedrich Schleiermacher, with principal attention to *On Religion* and *The Christian Faith*. Discussion of his views about the nature and basis of religion and religious doctrine and about such issues as the problem of evil and the relation of religion to history and community.

PHIL 616b[u], Hegel's *Philosophy of Right*. James Kreines.

W 1.30–3.20

A detailed investigation of Hegel's major work on social, ethical, and political theory, *Elements of the Philosophy of Right*. Examination of Hegel's attempt to develop a social account of freedom, and to use this account to ground his views on property, morality, marriage, civil society, and the state. Attention to Hegel's relation to his predecessors and to recent secondary literature.

PHIL 640a[u], Consciousness—Philosophical Issues. Katalin Balog.

T 1.30–3.20

The problem of consciousness is considered by most philosophers of mind the "hard problem," that is, the hard part of the mind-body problem. Arguments against physicalism — the view that everything is, or is composed of, physical stuff — often take consciousness as their starting point. We discuss these arguments as well as physicalist proposals for a theory of consciousness.

PHIL 641b[u], Persistence and Possibility. Michael Della Rocca.

M 1.30–3.20

An examination of what it is for an object to persist through time and to have certain properties necessarily or contingently. Attention to the application of these issues to the identity of persons. Other topics to be covered include temporal parts vs. spatial parts, the identity of indiscernibles. haecceitism, the nature of time, counterpart theory, and essentialism. Readings drawn from classical sources (particularly Leibniz and Hume) and from contemporary sources including Kripke, Lewis, Parfit, van Inwagen, Noonan, Adams, Thomson.

PHIL 642a[u], Philosophy of Religion. Keith DeRose.

M 1.30–3.20

A study of two related topics. First, the relation between God's knowledge and human freedom including questions of what God knows about which free actions we will perform or would have performed and when He knows it. Second, the problem of evil and the question of how there could be evil if an omnipotent, omniscient, perfectly good God exists.

PHIL 643b[u], Formal Semantics. Sun-Joo Shin.

M 3.30–5.20

This course aims to examine the analysis of meaning by applying logical theories to natural language. Starting with extensional semantics, we move on to intentional semantics and type

theory. After that, we take up Montague Semantics as an intentional theory of types. If time permits, we will touch on generalized quantifier theory and discourse representation theory.

PHIL 645a[u], Philosophy of Lanaguage: The First Person. Ori Simchen.
T 3.30–5.20
The possibility of thinking self-consciously about oneself gives rise to issues in the philosophy of language with far-reaching epistemological implications. An exploration of some of the vexing questions surrounding the semantics and the pragmatics of "I" thoughts. Readings may include works by Frege, Wittgenstein, Anscombe, Castañeda, Kaplan, Evans, and Perry. No prior knowledge of philosophy of language assumed.

PHIL 646b[u], The Metaphysics of Vagueness and Indeterminacy. Paul Hovda.
W 3.30–5.20
An examination of some of the ontological and other metaphysical issues raised by vague language. Chief among these is the question whether or not the vagueness of language corresponds to some kind of indeterminacy in the world. As a supplement we also study, at an elementary level, the logical issues raised by vague language.

PHIL 657b[u], Civic Republicanism. Michael Weber.
W 1.30–3.20
This course examines the republican criticism of and alternative to liberalism, where the latter is understood broadly so as to include any political ideal that emphasizes individual freedom and individual rights, thus incorporating both what are popularly described as liberals and conservatives (Democrats, Republicans, and Libertarians). We examine the contemporary debate, focusing on the liberalism of John Rawls (*A Theory of Justice* and *Political Liberalism*) and the republicanism of Michael Sandel (*Democracy's Discontent*).

PHIL 658a[u], Ethical Theory and the Virtues. Robert Adams.
W 3.30–5.20
Examination of questions about what it is to be a virtuous, or morally good, person; the relation of virtues and vices (good and bad traits of character) to good and bad motives, to right and wrong actions, and to social, political, and religious contexts. Readings mainly from contemporary authors.

PHIL 659a[u], Rawls. Mathias Risse.
M 7–8.50
John Rawls's *A Theory of Justice* is one of the most important works of philosophy in the twentieth century. Nevertheless, serious objections have been raised against Rawls's project, which make its very status as a milestone in twentieth-century philosophy questionable. The goal of the class is to come to an evaluation of the significance of *A Theory of Justice*.

PHIL 660b[u], The Right to Private Property. Mathias Risse.
M 7–8.50
The legitimacy of private property is one of the central and most fascinating questions of political philosophy. We consider views on this question by Locke, Marx, and Hegel, but we also pay attention to contemporary (left- and right-) libertarians (Nozick, Narveson, Steiner, Vallentyne, etc.) and their egalitarian critics (Cohen, Roemer, etc.).

PHIL 661b[u], Sidgwick's *Methods of Ethics*. Shelly Kagan.
T 1.30–3.20
Henry Sidgwick's *The Methods of Ethics* is one of the greatest works of moral philosophy of the nineteenth century. A systematic and extremely careful study of three basic approaches to ethics — egoism, utilitarianism, and intuitionism (roughly, commonsense deontological morality) — the *Methods* is a masterpiece that is widely praised (at least, by philosophers!) but much less frequently read, since it is a long and demanding book. We devote the semester to studying it.

PHIL 700a, Heidegger: *The Origin of the Work of Art*. Karsten Harries.
T 10.30–12.20
A critical reading of this central text. Special emphasis is placed on its relationship to Hegel's *Lectures on Aesthetics*. *Also CPLT 700a*.

PHIL 701b, Kant: *The Critique of Judgment*. Karsten Harries.
T 10.30–12.20
Also CPLT 701b.

PHIL 702b[u], Political Philosophy and Political Membership. Seyla Benhabib.
T 1.30–3.20
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.

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
Michael Schmidt (35 SPL, 432.3607, graduatephysics@yale.edu)

Professors
Yoram Alhassid, Thomas Appelquist, Charles Baltay, Ira Bernstein (*Mechanical Engineering*), D. Allan Bromley, Richard Casten, Richard Chang (*Applied Physics*), Moshe Gai (*Adjunct*), Robert Grober (*Applied Physics*), Martin Gutzwiller (*Adjunct*), John Harris, Victor Henrich (*Applied Physics*), Jay Hirshfield (*Adjunct*), Pierre Hohenberg (*Adjunct*), Francesco Iachello, Mark Kasevich, Martin Klein, Samuel MacDowell, William Marciano (*Adjunct*), Simon Mochrie, Vincent Moncrief, Peter Parker, Daniel Prober (*Applied Physics*), Nicholas Read, Subir Sachdev, Jack Sandweiss, Michael Schmidt, Ramamurti Shankar, Charles Sommerfield, Katepalli Sreenivasan (*Mechanical Engineering*), Douglas Stone (*Applied Physics*), John Tully (*Chemistry*), C. Megan Urry, Werner Wolf (*Applied Physics*), Michael Zeller

Associate Professors
Sean Barrett, Cornelius Beausang, Paolo Coppi (*Astronomy*), Samson Shatashvili

Assistant Professors
David DeMille, Colin Gay, Gerd Kunde, Reiner Kruecken, Homer Neal, Robert Schoelkopf (*Applied Physics*), Jeffrey Snyder, Tilo Wettig

Senior Research Scientists
Robert Adair, Satish Dhawan, Vernon Hughes, Richard Majka, A. Jean Slaughter, Andrew Szymkowiak, N. Victor Zamfir

Lecturer
Henry Kasha

Fields of Study

Fields include experimental atomic physics; theoretical and experimental nuclear, particle, condensed-matter physics; astrophysics; and mathematical physics.

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, 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, page 361.

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. Yoram Alhassid.
TTh 10.30–12
Newtonian dynamics and kinematics, Lagrangian dynamics, small oscillations, Hamiltonian dynamics and transformation theory, completely integrable systems, regular and chaotic motion of Hamiltonian systems, mechanics of continuous systems: strings and 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. Simon Mochrie and staff.
A laboratory course with experiments in atomic, 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. Charles Sommerfield.
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. John Harris.
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. Mark Kasevich.
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.
TTh 10.30–12
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.

PHYS 526a, Introduction to Elementary Particle Physics. Michael Schmidt.
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 & II. Victor Henrich [F], Charles Ahn [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 600b, Cosmology. Priya Natarajan.
The large-scale contents and structure of the universe and the origin of galaxies. *Also ASTR 600b.*

[**PHYS 602a, Classical Field Theory.**]

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. Samson Shatashvili.
TTh 2–3
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. Subir Sachdev.
MW 9–10.30
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 624a, Group Theory.**]

[**PHYS 628b, Statistical Physics II.**]

PHYS 630b, Relativistic Field Theory II. William Marciano.
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 650a and 651b, Theory of Solids I and II. Simon Mochrie [F], Nicholas Read [Sp].
MW 9–10.30 [F], MTh 1–2.30 [Sp]
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 and 857b.*

SPECIAL TOPICS COURSES

[**PHYS 662a, Special Topics in Particle Physics.**]

[**PHYS 663b, Special Topics in Cosmology and Particle Physics.**]

PHYS 664b, Special Topics in Nuclear Physics. Richard Casten.
TTh 10.30–12
Emphasis is on nuclear structure. The approach stresses physical ideas, leading to an understanding of a number of advanced nuclear models and to practical case studies with them.

[**PHYS 667b, Special Topics in Condensed Matter Physics.**]

[**PHYS 668b, Special Topics in Geometry and Modern Field Theory.**]

[**PHYS 671b, Special Topics in Experimental 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.**]

POLITICAL SCIENCE

124 Prospect, 432.5241
M.A., M.Phil., Ph.D.

Chair
Ian Shapiro

Director of Graduate Studies
Frances Rosenbluth

Professors
Bruce Ackerman, Seylah Benhabib, Paul Bracken (*Management*), David Cameron, Cathy Cohen, William Foltz, Geoffrey Garrett, Donald Green, Ilona Kickbusch (*Epidemiology*), Theodore Marmor (*Management*), David Mayhew, Barry Nalebuff (*Management*), William Odom (*Adjunct*), Douglas Rae, John Roemer, Susan Rose-Ackerman, Frances Rosenbluth, Bruce Russett, James Scott, Ian Shapiro, Stephen Skowronek, Steven Smith, Ivan Szelenyi (*Sociology*)

Professor in the Field
Strobe Talbott

Associate Professors
Arun Agrawal, Alan Gerber, Alastair Smith, Norma Thompson, Leonard Wantchekon, John Wargo (*Forestry & Environmental Studies*)

Assistant Professors
Jose Cheibub, Keith Darden, Anna Grzymala-Busse, Gregory Huber, Anastassios Kalandrakis, Pauline Jones Luong, Pierre-François Landry, John Lapinski, Ellen Lust-Okar, John McCormick, Fiona McGillivray, M. Victoria Murillo, Jennifer Pitts, 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 of them. 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. 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 first term is conducted as an individual tutorial; the second term 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 also required to take a one-term course in statistical methods, successful completion of which satisfies the statistics requirement. Students may alternatively satisfy this requirement by completing an equivalent course, or by displaying requisite proficiency in statistical analysis. All students are 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. A student may also fulfill the language requirement by taking a graduate-level course in statistics offered in the department, or in another department at Yale, in addition to the required course in statistical methods. In the fall term of the student's third year, each student must take the Dissertation Prospectus seminar. Upon submission of a dissertation prospectus that is approved by the seminar instructor and the student's dissertation adviser, the student is given a grade of either satisfactory or unsatisfactory for the seminar. The prospectus is judged by both readers for the following standard: The dissertation prospectus should present a summary of the nature and scope of the dissertation research. The prospectus should make clear the significance of the topic and should go into enough detail about research methods and plans to give the reader a clear idea of the research and persuade him or her of its feasibility. The prospectus must not exceed six double-spaced typewritten pages. If a satisfactory grade is not obtained, the student will be required to write a prospectus that is approved by three members of the faculty by May 1 of the student's third year. If three members of the faculty approve a student's prospectus prior to the start of the fall term of the third year, the requirement to participate in the prospectus seminar may be waived by the director of graduate studies.

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 teaching. 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. However, students are encouraged, and provided opportunities, to serve as teaching fellows in undergraduate courses in their third and fourth years.

A combined Ph.D. degree is available with African American Studies. 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. Anastassios Kalandrakis.
MW 9–10.30
An introduction to basic statistical theory and techniques for Political Science graduate students. The first part of the course covers probability theory, while the second — larger — part is devoted to estimation and inference, including extensive treatment of 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 are considered on a variety of political science problems, such as turnout, crime, elections, party systems, etc.

PLSC 504b, Advanced Quantitative Methods. Donald Green.
The use of statistical evidence in the study of politics. Students learn about the techniques of quantitative analysis and research design — including descriptive statistics, sample surveys, data graphics, multiple regression, and hypothesis testing. The purpose is to develop good judgment in evaluating statistical studies done in political science. *Also PSYC 530b, SOCY 579b.*

PLSC 506a[u], Game Theory and Politics. Alastair Smith.
M 1.30–3.20
This course introduces students to equilibrium concepts of game theory and their applications to voting behavior, multiparty competition, government and coalition formation in parliamentary systems, comparative institutional analysis, and rational choice models of democratization.

PLSC 514a, Creativity and Method in Comparative Research James Scott, Arun Agrawal.
T 10–12
How do scholars generate insights, turn them into research questions, and persuade others of the compelling force of their arguments? An examination of the wide range of techniques and practices available to social scientists exploring comparative questions. Promotes an appreciation of the plurality of genres and approaches by considering exemplary historical, interpretive, statistical, and conceptual works.

PLSC 540a, 541b, Research and Writing I and II. David Cameron, David Mayhew.
Six weeks in beginning of fall term; six weeks in beginning of spring term. A required course for all second-year students. 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 discussing drafts of student papers. The work of the spring semester includes criticism of the organization, arguments, data evaluation, and writing in each student's paper by the instructors and the other students. Using this criticism, 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-semester meeting and a complete draft of the paper at the first meeting in the spring.

PLSC 545a, Prospectus Seminar. Ian Shapiro.
W 1.30–3.20
This seminar is for third-year students without an approved prospectus. Students present drafts of their prospectuses for discussion by fellow students and faculty.

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 580b, Political Philosophy and Political Membership. Seyla Benhabib.
T 1.30–3.20
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 595a, Theories of Distributive Justice. John Roemer.
W 9–12
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).

PLSC 596b, Workshop on Distributive Justice. John Roemer.
W 10–12
Contemporary research on egalitarianism, conducted by social scientists and philosophers. In even-numbered weeks, an outside speaker presents his/her current work. In the week prior to a speaker, there is a warm-up session on the upcoming paper, in which students are assigned to orient the workshop's participants to the main issues in the paper.

POLITICAL PHILOSOPHY

PLSC 607a, Reading Max Weber. Ivan Szelenyi.

M 1–3

A close textual analysis of some of Weber's work, with particular emphasis on *Economy and Society*. *Also SOCY 545a.*

PLSC 639a[u], Political Philosophies of the Enlightenment. Jennifer Pitts.

T 3.30–5.20

An examination of key eighteenth-century thinkers including Montesquieu, Rousseau, Smith, Hume, Burke, Bentham, Godwin, Kant, and Herder, as well as more recent critical and interpretive debates. Was there an "Enlightenment project"? Themes include moral and political autonomy; theories of history, progress, and modernization; and international relations and commerce.

PLSC 640b[u], Political Philosophy of Modernity. Steven Smith.

M 3.30–5.20

This course deals with the foundations of modernity as both a philosophical and political problem. Philosophically, modernity defined itself as a reaction to or a repudiation of antiquity. The famous "quarrel between the ancients and the moderns" initiated a full-scale assault on ancient and medieval forms of authority and claims to wisdom. Politically, modernity has been defined by the creation of the secular sovereign state as the guarantor of toleration, rights, and freedom. The early modern period — roughly the sixteenth and seventeenth centuries — is the crucible in which was formed a whole range of ideas regarding the secular basis of political authority, religious toleration, skepticism of received authority, and a new kind of individualism.

PLSC 646a[u], German Political Philosophy from Kant to Nietzsche. Steven Smith.

M 3.30–5.20

It was in this particular national and intellectual tradition, from Kant to Nietzsche, that the characteristically modern aspirations for freedom, idealism, and utopia came to a dramatic crescendo. The high point of the course focuses on a reading of Hegel's *Philosophy of Right,* the last great work of systematic political philosophy to be written in any language. Themes to be considered include the idea of the Enlightenment and human autonomy; civil society and the state; alienation and the dialectics of labor; and the historical critique of reason. Readings include selections from Kant's *What is Enlightenment?,* Fichte's *Addresses to the German Nation,* Humboldt's *Limits of State Action,* Hegel's *Philosophy of Right,* Marx's *Paris Manuscripts,* and Nietzsche's *Untimely Meditations.*

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 653b, Models of International Processes. Alastair Smith.

M 1.30–3.20

This course examines a variety of formal and game-theoretic models that seek to explain why international conflict and war occur.

PLSC 656a[u], U.S. National Security. William Odom.

M 3.30–5.20

The course examines the institutions and processes for making U.S. national security strategy and policy; reflects critically on inherent tensions in the way Americans view the nature of war, the use of force, the aims of diplomacy, and America's role in the world; and addresses several contemporary challenges facing the U.S. national security policy making.

PLSC 663a[u], The United Nations and the Maintenance of International Security. Bruce Russett, James Sutterlin.

T 1.30–3.20

Consideration of the evolution of the United Nations and its role in a post-Cold War international system both in preventive diplomacy, with its use of force for peace keeping and peace enforcement, and in peace building.

PLSC 671a, Introduction to International Health. Ilona Kickbusch.

T 1–4.20

Students gain an understanding of the key players and organizations in the field of international health. An initial analysis of the evolution of development concepts, from colonization to globalization, provides the background necessary to critically examine the current forces that play a role in the public and private realms of health development. A series of outside lecturers expose students to a regional and intersectoral perspective on programming prioritization and strategy building. At the end of the course, participants should be able to use distinct criteria to evaluate a key actor in the international health arena. *Also EPH 551a.*

PLSC 674a[u], Africa in the International Arena. William Foltz.

W 1.30–3.20

This research seminar investigates the roles Africa and individual African states play and have played in world affairs. Emphasis is placed on the post-World War II era, and particularly the period since 1960, but students may center their research on earlier times if that would help illuminate recent trends. Broad topics include relations among African states; regional and subregional organization; conflict and peace keeping; policies of outside powers toward Africa; the Cold War and its aftermath. *Also AFST 674a[u].*

PLSC 679b[u], Theories, Methods, and Approaches in the Study of International Relations. Keith Darden.

W 1.30–3.20

This course deals with theories of international relations, comparing them in terms of categories developed in the philosophy of science (ontology, epistemology, conceptual categories, notions of causality). The course presents the traditional framework of "levels of analysis" used to parse theories of international relations, but also presents an alternative system for categorizing the different theories. Particular attention is devoted to the presentation of different ways of thinking about causality and human agency, with examples given both from readings in philosophy and from the discipline of international relations.

PLSC 682a, Advances in the Study of Civil War. Nicholas Sambanis.

This seminar explores the causes of violent civil conflict, reviews the relevant literature, discusses conceptual issues, and analyzes methods used to study the determinants of civil violence with the focus on war—the most violent expression of civil violence—and distinguishes between war onset, duration, and post-conflict peace building, identifying the key determinants of each of these processes.

PLSC 686b[u], Case Studies of Civil War: Onset, Duration, Resolution. Nicholas Sambanis.

T 1.30–3.20

This seminar/workshop reviews the methodological literature on designing and conducting comparative case-studies and develops and applies a unified analytical framework to the study of six cases of civil war.

COMPARATIVE POLITICS

PLSC 702b[u], South African Democracy in Comparative Perspective. Ian Shapiro, Jeremy Seekings.

T 3.30–5.20

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 ones 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.

PLSC 704a[u], Brazil in Comparative Perspective. Jose Cheibub.

T 3.30–5.20

This course examines three central issues in comparative politics taking Brazil as a point of reference: the breakdown of democratic regimes, the transition from authoritarianism to democracy, and the impact of institutions on the operation of democratic regimes.

PLSC 710a,b, Analytic Comparative Politics. Arun Agrawal [F], Frances Rosenbluth [Sp].

TH 10–12 [F], M 10–12 [Sp]

This course supplements the more traditional approaches to comparative politics with contemporary research on social forces and institutions. The goal is to give students the tools to evaluate and produce systematic and generalizable arguments about comparative politics. The course emphasizes causes and consequences of political institutions, including electoral rules, forms of government, legislatures, and state institutions such as the judiciary, the bureaucracy, and the central bank.

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. Particular focus on the impact of corruption on development. *Also LAW 20098.*

PLSC 716b, Studies in Grand Strategy, Part I. John Gaddis, Charles Hill, Paul Kennedy, Paul Bracken.

M 1.30–3.20

Starting as PLSC 716b in spring 2002, this course continues in fall 2002 as PLSC 715a. It 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 semesters, 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 semesters 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 14 weekly sessions. Admission is by competitive application only; forms are available at International Security Studies. *Also HIST 985b, MGT 984b.*

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 721a[u], Regimes and Development. Jose Cheibub.

M 3.30–5.20

This seminar examines the different ways in which political regimes are related to economic development, broadly understood. Focus on economic growth, income inequality, political instability, and other indicators of development.

PLSC 723a[u], Comparative Political Institutions. Anastassios Kalandrakis.

W 3.30–5.20

The seminar covers in turn basic modern democratic institutions including: electoral systems, political parties, party systems, parliamentary government, government formation, presidential institutions, courts and judicial power, bicameralism, legislative committees, federalism, etc.

PLSC 725b[u], Political Transitions in Africa and the Middle East. Ellen Lust-Okar.

T 3.30–5.20

Following the dramatic economic crises and fall of the Soviet Union in the late 1980s, states in Africa and the Middle East began a series of experiments with political liberalization. This course focuses on the development of new political institutions in Africa and the Middle East. It begins with a general, theoretical overview of the role that institutions play in initiating and sustaining political reform and a discussion of how institutional arrangements may influence the initiation of political reform. The remainder, and majority, of the class will examine the development of new political systems in Africa and the Middle East.

PLSC 732b[u], Markets and States in Comparative Perspective. Victoria Murillo.
T 3.30–5.20
This course examines the interplay of politics, institutions, and markets to analyze these new challenges to the state's role in the economy as well as how policy makers react to them, focusing in particular on the dynamics of economic development and market reforms.

PLSC 734a,b, Comparative Research Workshop. Hannah Brueckner.
M 5–7
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 semester they are enrolled for credit. *Also SOCY 560a,b.*

PLSC 740b, Topics in Comparative Political Behavior. Kenneth Scheve.
T 1.30–3.20
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.

PLSC 744a[u], Dynamics of Russian Politics. William Odom.
T 1.30–3.20
Issues of political stability, constitutionalism, and institutions for political participation and governing are examined in light of contemporary events as well as the legacy of the Soviet period. Concepts from political development literature are used to devise alternative interpretations of the most critical determinants of Russian political change and stability, today and in the future. Huntington's *Political Order in Changing Societies,* Dahl's *Polyarchy*, Barrington Moore's *The Social Origins of Dictatorship and Democracy*, as well as selected journal articles on transitions to democracy, provide the analytic tools for analysis. Students write a short midterm essay on concepts for analysis, and they choose a research paper topic in one of the main issue areas, basing their research on the contemporary Russian press and other available sources on Russian affairs since 1985.

PLSC 748a[u], Political Economy, Governance, and Development. Leonard Wantchekon.
W 1.30–3.20
The link between government structure, on the one hand, and economic growth and development, on the other, is contested, and the empirical evidence is inconclusive. For some, the problem with democracy is that the median voter will not support policies that require sacrifice in the present in order to produce growth in the longer term. For others, democracy is necessary for growth because it assures that the policies adopted will benefit the majority who then become supporters of growth.

PLSC 749a[u], Democracy after Civil War? Leonard Wantchekon.
T 1.30–3.20
This seminar examines theoretical arguments and empirical evidence on the conditions under which democracy arises from civil war.The main topics include theories of warlord democratization, nature of first post-civil-war elections, the role of foreign interventions, and institutional engineering. The main theoretical readings include Hobbes, Machiavelli, Schumpeter, Tilly, and Levy. Empirical readings include Wod, Walter, and Doyle.

PLSC 755a[u], European Politics. David Cameron.
W 1.30–3.20
A comprehensive survey of politics in Europe. Attention is concentrated upon the development of the European Union as a supranational organization—including recent develop-

ments associated with economic, monetary, and political union, and the developments that have occurred throughout Eastern Europe since 1989.

PLSC 758a[u], The Comparative Political Economy of Womanhood. Frances Rosenbluth.

W 1.30–3.20

This course considers how women experience their life cycles across time (in historical perspective) and place (in Asia, Africa, Europe, and the Americas). We employ three analytical lenses to help us interpret what we see: biology, markets, and power. These lenses help us understand how issues specific to women relate to debates in mainstream political economy.

PLSC 779a, Agrarian Societies: Culture, Society, History, and Development. James Scott, Michael Dove, Robert Harms, Linda Rebhun.

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 780a[u], Institutions and Transitions of Democracy. Ellen Lust-Okar.

T 1.30–3.20

An examination of the institutional choices of regime transitions and their implications. Consideration of why some states create presidential systems and others parliamentary ones; the choices of various electoral rules; and political implications of these institutions for future regime change.

PLSC 783b[u], Seminar on the IMF. James Vreeland.

M 1.30–3.20

The International Monetary Fund is at a crossroads. Originally intended to provide exchange rate stability, the IMF has gradually become involved in the economic policies of most countries in the world. Since the East Asian financial crisis, however, the IMF has come under closer scrutiny than ever before. For the first time, calls for its reform and even its dissolution come from across the political spectrum.

PLSC 784a[u], Africa and the Disciplines. William Foltz, Christopher L. Miller.

T 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 764a[u].*

PLSC 793a, Chinese Politics. Pierre Landry.

T 3.30–5.20

This seminar examines key theoretical and empirical approaches to the study of Chinese politics and political economy in the post-Mao era. Readings and seminar discussions are intended to familiarize students with the core literature in Chinese politics but also help them formulate an original research design, due at the end of the semester. In addition, participants are expected to write four analytical essays, each critiquing a set of weekly readings.

POLITICAL ECONOMY

PLSC 712a,b, Political Economy. Frances Rosenbluth [F], Fiona McGillivray [Sp].
M 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, deregulations, environment, regional integration, federalism and corruption.

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.

PLSC 820a, Executive Politics and the Presidency. Stephen Skowronek.
W 3.30–5.20
An examination of the structure and operations of the American presidency. Topics include the political development of the presidential office, the politics of leadership, relations with Congress and the Court, and the exercise of political power within the EOP. *Also AMST 827a.*

PLSC 827b, Political Advertising. John Lapinski.
This course evaluates the degree to which Americans' political opinions and actions are influenced by the mass media, particularly television. Specific topics include campaign communication and candidate strategy, how television affects the manner in which public officials govern, and the general role of the mass media in the democratic process.

PLSC 828b, American Political Development. Stephen Skowronek.
W 3.30–5.20
An examination of patterns of political change and institutional development in the United States.The course considers patterns of reform, the political construction of interests and movements, problems of political culture, party building, and state building. *Also AMST 828b.*

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, 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.

PLSC 857a[u], The Future of American Cities. Douglas Rae.
A comparative study of American metropolitan region — Atlanta, Los Angeles, Chicago, New York, Boston, Minneapolis, Seattle — considering the best strategies for dealing with their future development. Issues include governmental fragmentation, racial segregation, failing school systems, inefficient transportation, and uneven tax resources. *Also MGMT 578a.*

PLSC 871a, Health, Law, and Policy. Theodore Marmor, Robert Gordon.
Law and medicine are among the oldest professions, traditionally defined as occupations that collectively set and enforce standards of education, apprenticeship, and the quality of ethics and practice; that grant individual members a large autonomous discretion to determine how to apply those standards in practice in caring for the interests of clients, patients, and the public interest in justice and health; and that in return for adherence to such professional standards are protected from the competition of nonprofessionals and accorded high social status and the chance to earn a comfortable living. In the last twenty years both law and medicine have been undergoing massive structural changes in the organization and financing of their services, in large part driven by intense pressures (in law, chiefly from corporate clients; in medicine, from insurers and the federal government) to cut escalating costs. In both, the result of changes has been significantly to erode the authority and autonomy of professionals to control their markets and the terms on which their services will be rendered; both lawyers and doctors increasingly find that their decisions regarding service and treatment are subject to the direction, supervision, and second-guessing of outside monitors, bureaucratic hierarchies, and regulators. These developments (often coupled with new forms of competition from inside and outside the professions) have given rise to much protest and debate — with traditional lawyers and physicians claiming that new pressures toward standardization and regulation and increased competition are seriously compromising professional values of quality and care for clients/patients; and proponents countering that the new structures promote superior as well as more cost-effective service. This seminar aims to examine and compare the structural changes occurring in law and medicine and to assess their effects on professional values. *Also LAW 20130, MGMT 985a.*

PLSC 990a,b, Directed Reading. Faculty.

PSYCHOLOGY

2 Hillhouse, 432.4518
M.S., M.Phil., Ph.D.

Chair
Peter Salovey

Director of Graduate Studies
Kelly Brownell (432.4518, kelly.brownell@yale.edu)

Professors
J. Truett Allison (*Veterans Administration Medical Center*), Mahzarin Banaji, Linda Bartoshuk (*Surgery, Otolaryngology*), Sidney Blatt (*Psychiatry*), Paul Bloom, Thomas Brown, Kelly Brownell, Donald Cohen (*Child Study Center; Psychiatry; Pediatrics*), James Dittes (*Religious Studies*), Carol Fowler (*Haskins Laboratories*), Patricia Goldman-Rakic (*Neurobiology*), Louis Goldstein (*Linguistics*), Donald Green (*Political Science, ISPS*), Marcia Johnson, Alan Kazdin, Frank Keil, Marianne LaFrance (*Women's & Gender Studies*), Lawrence Marks (*Epidemiology & Public Health*), Donald Quinlan (*Psychiatry*), Peter Salovey, Jerome Singer, Sara Sparrow (*Child Study Center*), Robert Sternberg, Fred Volkmar (*Child Study Center*), Victor Vroom (*School of Management*), Allan Wagner, Karen Wynn, Edward Zigler

Associate Professors
Jeannette Ickovics (*Epidemiology & Public Health*), Robert Kerns (*Veterans Administration Medical Center*), Linda Mayes (*Child Study Center*), Mark Packard

Assistant Professors
David Armor, Geoffrey Cohen, Karyn Frick, Andrew Hollingworth, Jeansok Kim, Todd Little, Joseph Mahoney, Christy Marshuetz, Mitchell Prinstein, Mark Schaefer (*Child Study Center*), Brian Scholl, Teresa Treat

Lecturers
Sandra Bishop, Nicholas Carnevale, James Charney, Nancy Close, Thierry Devos, Loraine Devos-Comby, Nelson Donegan, Peter Hegarty, Carla Horwitz, Sharon Kagan, Stanislav Kasl, Janet Kremenitzer, Valerie Kuhlmeier, Kristi Lockhart, Todd O'Hearn, Carol Ripple, 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. Andrew Hollingworth.
F 1.30–4
A review of major findings, theories, and empirical approaches in the study of perception with a focus on vision. Topics include the neural mechanisms of perception; color vision; depth, surface, and shape processing; object and scene recognition; and attention.

PSYC 502a, Learning Theory. Allan Wagner.
TTh 10.30–12
The development of learning theory from its beginnings in associationism, behaviorism, and the Darwinian revolution to its present "connectionistic," neural-network expressions.

PSYC 505a, Creativity. Robert Sternberg.
T 1.30–4.20
The nature of creativity. Topics include the concept of creativity, theories of creativity, history of theory and research on creativity, methodologies for studying creativity, biological bases of creativity, development of creativity, cognitive processes in creativity, social processes in creativity, personality and creativity, culture and creativity, prodigies, intelligence and creativity, and enhancing creativity.

PSYC 506b, Introduction to Brain and Behavior. Jeansok Kim.
T 4–6
Introduction to basic principles of brain function, including fundamentals of synaptic transmission, organization of the CNS, sensory and motor integration, and higher processes such as the neurobiology of language, learning, and memory. *Also NSCI 506b.*

[**PSYC 507, Health Psychology: Clinical and Social Foundations.**]

[**PSYC 510a, The Self and Identity.**]

[**PSYC 511, Cognition and Development.**]

[**PSYC 512b, The Cognitive Sciences.**]

PSYC 513b, Personality Development and Psychopathology. Sidney Blatt.

[**PSYC 515a, Structural Equation Modeling.**]

PSYC 518a, Data Analysis: Quantitative Variables. Valerie Kuhlmeier.
MW 9–10.15
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.

PSYC 520b[u], Multivariate Data Analysis with Latent Variables. Teresa Treat.
MWF 9.30–10.20
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 with Observable Variables.**]

[**PSYC 525a, The Minds of Infants.**]

[**PSYC 527, Psychotherapy: Historical and Scientific Foundations.**]

PSYC 530b, Advanced Quantitative Methods. Donald Green.
This course considers the use of statistical evidence in the study of politics. Students learn about the techniques of quantitative analysis and research design including descriptive statis-

tics, sample surveys, data graphics, multiple regression, and hypothesis testing. The purpose is to develop good judgment in evaluating statistical studies done in political science. *Also PLSC 504b, SOCY 579b.*

[**PSYC 533, The Nature of Cognition.**]

[**PSYC 534, Theories of Development.**]

[**PSYC 535, Foundations of Behavioral Neuroscience.**]

[**PSYC 539a, Cognitive and Behavioral Approaches to Psychopathology and Treatment.**]

PSYC 540b, Changing Behavior in Applied Settings. Alan Kazdin.
Th 1.30–4.20
An examination of principles, techniques, and methods of operant conditioning that are used to change human behavior in diverse contexts (treatment, prevention, education, and personal and social adjustment) and settings (e.g., home, school, institutions, community at large).

[**PSYC 541a, Research Methods in Psychology.**]

[**PSYC 542, Research Methods in Psychology: Investigating Social Thought and Behavior.**]

[**PSYC 554b, Human Intelligence and Its Development.**]

[**PSYC 556, Developmental Psychopathology.**]

PSYC 570b, Nonverbal Communication. Marianne LaFrance.
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 605b[u], The Relation of Speech to Language.**]

PSYC 607a[u], Human Thinking and Reasoning. Karen Wynn.
W 2.30–4.20
Examination of human reasoning and thinking processes, including deductive and inductive inference, heuristics and biases used in reasoning, and factors influencing judgment and decision making.

[**PSYC 614a, Neurobiology of Learning and Memory.**]

PSYC 615a[u], Psychology and Psychotherapy: History, Systems, and Practice. Jerome Singer.
T 10.30–12.20
The phenomenon of psychotherapy is a process that was essentially instituted and flourished in the twentieth century. An examination of its historical development, the emergence of psychoanalysis and the cognitive-behavioral approaches, process and outcome research, and integration with basic psychological science.

PSYC 616a[u], Psychopathology and Cognitive Processing. Teresa Treat.
TTh 9–10.15
This course examines theoretical and measurement approaches to evaluating the role of cognition in psychopathology from a cognitive psychological perspective.

[**PSYC 618b, Visual Cognition and Attention.**]

[**PSYC 620, Topics in Cognitive Development.**]

PSYC 622b[u], Social Intervention. Joseph Mahoney.
T 1.30–3.20
Theory and research on social intervention from a developmental perspective. Discussion of interventions for school failure, aggression, substance use, disadvantaged children, high-risk infants, and antisocial youth.

[**PSYC 626b, Modularity and Cognition.**]

[**PSYC 627[u], Infant Cognition.**]

PSYC 628a[u], Working Memory, Attention, and Executive Processing. Christy Marshuetz.
MW 1–2.15
Graduate and advanced undergraduate students learn about and discuss recent developments in cognitive neuroscience: (1) What are working memory and attention? (2) How do they relate to one another? (3) Are executive processes distinct from working memory and attention? We consider questions from an interdisciplinary perspective with patient, behavioral, and neuroimaging studies.

PSYC 630b[u], Consciousness, Volition, and Responsibility. Mahzarin Banaji.
M 1.30–3.20
A study of the psychological and social bases of individual responsibility. Topics include: concept of free will, volition, self-control, awareness, and consciousness and their complements. Selections span neurobiological, cognitive, and socio-cultural approaches to examine fundamental questions regarding the manner in which responsibility is assigned and the consequences for both individuals and society.

[**PSYC 632b, Comparative Psychology.**]

PSYC 636a, Stereotyping and Prejudice. Mahzarin Banaji.
T 1.30–3.20
The literature on the categorization of social groups that leads to stereotyping and consequent prejudice and discrimination. Topics include approaches to stereotyping with an emphasis on modern cognitive approaches.

[**PSYC 638, Self-Evaluation.**]

[**PSYC 642b, Social Psychology and Social Change.**]

[**PSYC 646b, Advances in Cognitive Neuroscience: Prefrontal Cortex and Memory.**]

[**PSYC 648, Cellular Analysis of Learning: Vertebrate Model Systems.**]

PSYC 654b[u], Sensation. Lawrence Marks, Joseph Stevens.
Th 3.30–5.20
A course on the senses, emphasizing functional properties of human vision, hearing, taste, smell, and skin senses.

[**PSYC 656, Teaching Undergraduate Psychology.**]

PSYC 657a, Social and Behavioral Influences on Health. Stanislav Kasl.
T 10–11.50
This course provides students with an introduction to social and behavioral 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.

PSYC 658a, Behavioral Decision Making. Ravi Dhar.
This seminar examines research on the psychology of judgment and choice. Although the normative issue of how decisions should be made is relevant, the main focus is on the descriptive issue of how decisions are made. Topics of discussion include choice, judgment heuristics and biases, decision framing, prospect theory, mental accounting, context effects, task effects, and regret. The goal of the seminar is threefold: to foster a critical appreciation of existing knowledge in behavioral decision theory, to develop the students' skills in identifying and testing interesting research ideas, and to explore research opportunities for adding to that knowledge. *Also MGMT 753a.*

PSYC 660b[u], Child Development and Social Policy. Carol Ripple, Edward Zigler.
Th 1.30–3.20
Theoretical and practical issues underlying the development and implementation of social policies affecting children and their families. Examination of several federal programs including Head Start and Day Care.

PSYC 661a, Clinical Diagnostic Evaluation of Children. Sara Sparrow, Mark Schaefer.
Covers major testing instruments used in the evaluation of children's cognitive, emotional, and academic development as well as adaptive functioning. Limited enrollment.

[**PSYC 666, Health Cognition, Health Communication, and Health Behavior.**]

PSYC 667b[u], Neurobiology of Multiple Memory Systems. Mark Packard.
W 1.30–3.20
Examination of the neurobiological organization of memory in the mammalian brain including both lower animals and humans.

[**PSYC 669b, Neurochemical and Hormonal Modulation of Learning and Memory.**]

PSYC 670b[u], Visual Memory. Andrew Hollingworth.
Th 2.30–4.20
An examination of memory for visual information, from brief forms of visual persistence to long-term visual memory. Topics include integration across saccadic eye movements, "change blindness," visual short-term/working memory, long-term memory for pictorial stimuli, and the role of attention in memory.

[**PSYC 672, Concepts, Categories, and Word Meanings.**]

PSYC 676a[u], Neuroscience Simulation Lab. Nicholas Carnevale.
Th 1–5
Computer simulations take students through an intensive, interactive exploration of the physical basis of brain function. Emphasis on the origin and interaction of electrical and chemical signals in individual neurons and small circuits.

PSYC 677b[u], Introduction to Computational Neuroscience. Nicholas Carnevale.
TTh 1–2.15
An introduction to the use of empirically based modeling as a means for understanding the functional consequences of the anatomical, biophysical, and pharmacological properties of neurons and neural circuits involved in perception, motor control, and learning. *Also NSCI 529b.*

[**PSYC 678a, Psychology's Contribution to Gender and Vice Versa.**]

PSYC 680b: The Concept of Control in Psychology: Consciousness, Volition, and Responsibility. Marcia Johnson, Mahzarin Banaji.
M 1.30–3.20
A consideration of how "control" has been conceptualized in psychology. Topics include: concepts of conscious and unconscious processes, awareness, free will, volition, intention, and

self-control. Readings include neurobiological, cognitive, and sociocultural levels of analysis to examine fundamental questions regarding the manner in which responsibility is assigned to oneself and others.

[**PSYC 682a, Child and Adolescent Peer Relations.**]

PSYC 684, Case Conference Seminar. Todd O'Hearn.
Interdisciplinary seminar in which students and faculty discuss case conceptualization and treatment planning for clinic patients.

[**PSYC 688b, Psychotherapeutic Process: Clinical and Research Perspectives.**]

PSYC 689a, Assessment and Clinical Practice. Todd O'Hearn.
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, Advanced Diagnostic Skills. Todd O'Hearn.
This course provides first-year clinical students with extensive supervision on how to conduct diagnostic evaluations using the Structured Clinical Interview for DSM-IV.

PSYC 702, Current Work in Cognition. Christy Marshuetz.
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 Wanger [F], Karyn Frick [Sp].
F 4–5.30
An informal student/faculty seminar in which each participant chooses, lays groundwork for, 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. Faculty.
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. Geoffrey Cohen.
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 12–1.30
Guest lectures and discussion on recent topics in child development and social policy, and its influence on public policy in the United States.

[**PSYC 715, Current Readings in Social Psychology.**]

PSYC 717a, Ethical Issues in Psychology, Current Work and Current Research in Clinical Psychology. Jerome Singer.
TH 12.30–1.20
Examination of the current status of research and scientific knowledge bearing on ethical issues in psychology as they relate to clinical practice. Weekly speakers present research which is examined methodologically; recent significant journal articles or technical books also reviewed.

[**PSYC 718, Ethnic and Cultural Diversity: Current Work in Clinical Psychology.**]

[**PSYC 719, History and Systems of Psychology: Current Work in Clinical Psychology.**]

[**PSYC 720, Current Work in Clinical Psychology.**]

PSYC 721, Research Topics in Infant Cognition. Karen Wynn.
F 1–3
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.
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 723a, 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 727, Professional and Conceptual Issues in Psychology. Brian Scholl.
M 5–7
Discussion of various professional and conceptual issues in psychology, in an informal atmosphere. Sample topics: How to decipher journal reviews and action letters; depth vs. breadth in research; how to sell yourself on the academic job market; academic hiring: from applying to negotiating a contract; what are the best/worst journals in each sub-area of psychology; how to balance control and ecological validity; what is psychology?

PSYC 728, Current Topics in Prevention Research. Joseph Mahoney.
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 732, Research Topics in Visual Cognition. Andrew Hollingworth.
TH 3.30–5.20
Weekly seminar discussion of current research in visual cognition, focusing on scene perception, eye movement control, attention, object recognition, and visual memory.

PSYC 749b, Research Topics in Memory. Marcia Johnson.
W 10–12
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.
F 12.30–2.20
Weekly discussion of current work on the neurobiological basis of age-related memory dysfunction, sex differences in cognition, and other memory-related processes. Participants discuss these issues in an informal seminar format.

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 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 774, Research Topics in Personal Agency.**]

PSYC 776, Research Topics in Social Cognition. Mahzarin Banaji.
Students plan and conduct research on topics in social cognition.

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 and Current Work 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. Edward Zigler.
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. Sara Sparrow.
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. Sara Sparrow.
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. Faculty.
Discussion of current topics in psychopathology and treatment of anxiety disorders. Group supervision of therapy cases involving OCD, panic, social phobia.

PSYC 812a, 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 813a, Eating and Weight Disorders Practicum. Kelly Brownell.
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. Mitchell Prinstein.
This practicum includes clinical experiences with children, adolescents, and their families. Behavioral and cognitive-behavioral orientations are emphasized for treatment of childhood internalizing and externalizing disorders. Students gain substantial clinical experience, including psychotherapy hours using individual and family therapy modalities, didactic group therapy, and school consultation.

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
Carlos Eire

Director of Graduate Studies
Gene Outka [F] (432.0828, gene.outka@yale.edu)
Robert Wilson [Sp] (432.0828, robert.wilson@yale.edu)

Professors
Marilyn McCord Adams, Robert Adams (*Philosophy*), Harold Attridge (*Divinity School*), Gerhard Böwering, Jon Butler, Adela Collins (*Divinity School*), John Collins (*Divinity School*), James Dittes, Carlos Eire, Margaret Farley (*Divinity School*), Steven Fraade, Paul Groner (*Visiting*), Paula Hyman, Serene Jones (*Divinity School*), David Kelsey (*Divinity School*), Bentley Layton, Ivan Marcus, Dale Martin, Thomas Ogletree (*Divinity School*), Gene Outka, Harry Stout, Michael Toch (*Visiting*), Miroslav Volf (*Divinity School*), Stanley Weinstein, Robert Wilson

Associate Professors
Christine Hayes, Jace Weaver (*American Studies*)

Assistant Professors
Frank Griffel, Jonathan Silk

Lecturers
Adel Allouche (*Visiting*), Shannon Craigo-Snell, Hugh Flick, Jr., Ludger Viefhues

Fields of Study

Students must enroll in one of the following fields of study: American Religious History, Buddhism, Hebrew Bible/Old Testament, History of Ancient Christianity, Islamic Studies, Judaic Studies, New Testament, Philosophy of Religion, Religious Ethics, and Theology.

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. There is no oral examination on the dissertation. Students begin writing their dissertation in the fourth year and normally will have finished by the end of the sixth.

The Department of Religious Studies endeavors to provide all graduate students with opportunities to teach as teaching fellows during their third and fourth years. It considers such teaching to be an important and integral component of the professional training of its graduate students.

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.

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 361–62. 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 ten 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 510b, Theories in the Study of Religion and Visions of Self and Other. Ludger Viefhues.

This graduate-level seminar explores how various theoretical approaches to the study of religion create different visions of self and otherness. We look at theorists relevant to students' particular areas of expertise and at various classics in our field (e.g., W. C. Smith, Müller, Durkheim) through the lenses of some modern and postmodern theories of the self (Taylor, Foucault, Bhabha), thereby examining various ways in which theory functions in our field.

RLST 523a, Religion and Modernity in Europe and America, 1850–2000. Jon Butler. T 10.30–12.20

Examines confrontation of religion with the modern in both Europe and America from the mid-nineteenth century to the present. Readings concentrate on the meaning of modernity for religious belief and practice and on the implications of urbanization, industrialization, and the rise of technocratic society for sustaining religious faith. Among issues concerned are the fate of miracles, religion and modern politics, ethnicity, gender, "therapeutic" religion, and religion's apparent persistence despite the advance of secularization, at least in America, and its potential to assess the alleged uniqueness of "modernity." *Also AMST 704a, HIST 750a.*

RLST 557a[u], History of Indian Buddhism. Stanley Weinstein.
MWF 9.30–10.20
A survey covering the life and teachings of the Buddha, Buddhist monasticism, the formation and composition of the Buddhist scripture, the rise of the Hinayana and Mahayana traditions, and the emergence of Esoteric (Tantric) Buddhism.

RLST 559b, Readings in East Asian Buddhist Texts. Stanley Weinstein.
Close reading of selected Chinese and/or Japanese Buddhist texts. Prerequisite: knowledge of literary Chinese and/or Japanese as appropriate.

RLST 601b, The Required New Testament/Ancient Christianity Seminar: Ancient Lives. Adela Collins.
W 3.30–5.20
The topic and instructor of this seminar change yearly. In this seminar we read selected ancient lives both for their intrinsic interest and significance and also in relation to the canonical Gospels and the debate about their genre. Lives to be read and discussed may include, but are not limited to, the life of Aesop, the life of Homer, Xenophon's *Memorabilia*, Philo's life of Moses, Plutarch's parallel *Lives,* Suetonius' *Lives of the Caesars,* Lucian's *Demonax and Nigrinus,* Athanasius' life of Antony, and Eusebius' life of Constantine. Students are expected to become familiar with the primary texts and with secondary literature on the development of Greek and Roman biography and to acquaint themselves with the debate about the genre of the canonical Gospels. Open to other students only by permission of the instructor.

RLST 605b, Greco-Roman Environment of the New Testament. Dale Martin.
An introduction for advanced students to the religious, philosophical, and cultural milieu in which the New Testament took shape. The course requires extensive readings in primary sources and selected secondary literature. Students not in the Ph.D. program may be admitted with permission of instructor.

RLST 606a, Hellenistic Philosophy and the New Testament. Harold Attridge.
TH 1.30–3.20
This course examines the world of Greco-Roman philosophy and its potential relationship to the texts of the New Testament. The course enables students to enhance their interpretive skills by expanding their knowledge of the intellectual environment of early Christianity. *Also REL 665a.*

RLST 651a[u], Introduction to the History of Christianity in the Ancient World: Jesus to Augustine. Bentley Layton.
MW 10.30–11.20, 1 HTBA
The rise of Christianity and the development of Western culture into the Middle Ages, including the creation of Christian orthodoxy; religious, political, social, gender, literary, and theological history of Christian religion in many forms. No previous background assumed. *Also NELC 726a[u].*

RLST 655a, Christianity in the Second Century. Bentley Layton.
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 657b, Cosmogony, Cosmology, and Salvation in Ancient Christianity. Bentley Layton.
Platonizing and Gnostic cosmogonies in ancient Christian thought examined in the context of Greek philosophy of the Roman period.

RLST 659b[u], The Making of Monasticism. Bentley Layton.
W 1.30–3.20
The history of Christian monasteries, hermits, ascetics, and monastic institutions and values in late antiquity, with special attention to the eastern Mediterranean world. *Also HIST 532b, NELC 736b[u].*

RLST 678a, Readings in Reformation History: Calvin and Calvinism. Carlos Eire, Serene Jones.
T 1.30–3.20
Reading and discussion. *Also HIST 569a.*

RLST 702a, Seminar on the Qur'an. Gerhard Böwering.
T 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 instructor.

RLST 703b, Seminar in Islamic Religious Thought. Gerhard Böwering.
T 2.30–4.20
Readings in Arabic primary sources. Selections from major writings in the Sufi traditions of Islam. Prerequisite: reading knowledge of Arabic. Permission of the instructor.

RLST 706a, Classical Shiism. Adel Allouche.
T 4–6
The seminar explores selected themes contained in the original works of early Shiite theologians and legal scholars from the tenth to the fourteenth century. Prerequisite: strong command of Arabic.

RLST 711a[u], Islamic Rationalism and Its Influence on Europe. Frank Griffel.
TTh 11.30–12.45
The development of a rationalist criticism of revealed religion in Islam and its influence on European thinking. From Plato's dialogues, via Muslim authors, to Boccaccio, Jean Bodin, and Spinoza.

RLST 751a[u], Midrash Seminar: The Theophany at Sinai. Steven Fraade.
Th 1.30–3.20
The giving of Torah to Israel as seen through rabbinic eyes. Close readings of midrashic and talmudic texts. Views of revelation, tradition, interpretation, law, and commandment in their literary and historical contexts. Interpretations compared and contrasted with those of other ancient biblical exegesis (Jewish and non-Jewish). Prerequisite: reading fluency in ancient Hebrew.

RLST 755a[u], The Literature of the Rabbis. Steven Fraade.
Th 9.30–11.20
An examination of the several genres of rabbinic "textuality" as "oral Torah": midrash, targum, mishnah, tosephta, and gemara (Talmud). For each, sections of primary texts closely studied, with consideration of traditional and modern critical views of their histories, forms, and functions. Topics include similarities and differences between genres; antecedents; uses for historical purposes; relation of form to contents and narratives to laws. No prior background assumed.

RLST 756a, The Required Second Temple Judaism Seminar. Christine Hayes.
W 1.30–3.20
The topic and instructor of this seminar change yearly. For fall 2001, the topic is "Impurity, Group Identity, and Group Boundaries in Second Temple and Early Rabbinic Judaism," an analysis of the role of impurity symbolisms in establishing Israelite/Jewish group identity, with special attention to the penetration of group boundaries through intermarriage and conversion, the formation of Jewish sects in the Second Temple period, and the separation of the early church from what would later be rabbinic Judaism.

RLST 757b, Dead Sea Scrolls Seminar: The Rule Scrolls. Steven Fraade, John Collins.
T 1.30–3.20
Close study and critical analysis of two central rule scrolls from Qumran: the Community Rule (1QS) and the Damascus Document (CD). What do these texts reveal about the history, ideology, and practices of the sectarian community of the Dead Sea Scrolls? Attention is paid to theories of the literary histories of these scrolls, their relation to one another, and to recently published fragments from Qumran Cave 5. Prerequisite: reading fluency in ancient Hebrew. *Also REL 693b.*

RLST 762b[u], Memory, Memoirs, and Modern Jewish History. Paula Hyman.
T 1.30–3.20
An exploration of the representation of Jewish historical experience from the seventeenth to the twentieth century through a selection of memoirs. Focus on the construction of identity with special attention to the interaction of minority status, gender, and class in a variety of historical contexts. *Also HIST 951b[u].*

RLST 764b[u], Jews in America, 1654 to the Present. Paula Hyman.
TTh 10.30–11.20
A survey of the development of American Jewry from the colonial period to the present, with special attention to social, cultural, political, and religious issues. *Also HIST 765b[u].*

RLST 765b[u], Capital Punishment in Rabbinic Law. Beth Berkowitz.
T 9.30–11.20
A study of the rabbinic laws of criminal execution and attitudes toward the death penalty. Topics include: the theology imbedded in the rabbinic formulation of the death penalty, the influence of Roman execution on rabbinic modes of execution, the historical reality of the rabbinic death penalty, and the religious and cultural politics that have shaped modern scholarship on this issue.

RLST 766a[u], Jewish Immigration and American Society. Paula Hyman.
W 1.30–3.20
An exploration of the Jewish immigrant experience in America in the context of American immigrant history. Topics include issues of economics, gender, and identity, political activism, religious adaptation, and cultural participation in American society. *Also HIST 766a[u].*

RLST 767b[u], Jewish Reactions to the Destruction of the Second Temple. Adiel Schremer.
Th 1.30–3.20
Examination of the reactions of first- and second-century Jewish society in Palestine to the destruction of the Second Temple and the fall of Jerusalem in the summer of 70 C.E.

RLST 768a[u], Historical Perspectives in the Study of the Holocaust. Paula Hyman.
MW 10.30–11.20
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[u], History, Historiography, and Rabbinic Literature. Isaiah Gafni.
M 1.30–3.20
Examination of rabbinic attitudes toward history, historical processes, and the impact of change on the development of Jewish law and custom. Considers a variety of current approaches and theories on the use — and misuse — of rabbinic literature in contemporary historical research.

RLST 770a[u], Jewish-Christian Confrontations in Medieval Europe. Ivan Marcus.
TTh 11.30–12.45
A history of the major trends and turning points illustrating how medieval Europeans Jews and Christians acted toward and imagined each other's culture from late antiquity to the Reformation. *Also HIST 546a[u].*

RLST 771a[u], The Aramaic of the Elephantine Papyri. David Marcus.
Th 9.30–11.20
An introduction to the morphology and syntax of the Aramaic of the fifth-century B.C. papyri texts found at Elephantine Island, opposite Assuan in Egypt. Reading of selected texts concerning the Temple of Yaho, the so-called Passover Papyrus, some marriage contracts, and the Proverbs of Ahiqar. Prerequisite: knowledge of Hebrew.

RLST 801a, Old Testament/Hebrew Bible Seminar: The Prophetic Stories in Kings. Robert Wilson.
M 1.30–3.20
A study of the stories about prophets in the Book of Kings, with particular attention to the social origins of the stories, to their literary forms, and to their particular functions within the book as a whole. Prerequisite: two years of Biblical Hebrew or the equivalent; previous work in the interpretation of the Hebrew Bible. *Also REL 801a.*

RLST 803a, Advanced Biblical Hebrew: Rapid Reading and the Syntax of Hebrew Prose. Robert Wilson.
T 1.30–3.20
Readings of two or three chapters of Biblical Hebrew prose per week; selections from all periods of the classical language; systematic analysis of prose syntax, with particular emphasis on the syntax of clauses. Prerequisite: two years of Biblical Hebrew or the equivalent. *Also REL 803a.*

RLST 805b, The History and Methods of the Interpretation of the Old Testament/Hebrew Bible. Robert Wilson, John Collins.
M 1.30–3.20
Reading and critical evaluation of major classic works in the history of Old Testament studies from Wellhausen to the present. Prerequisite: working knowledge of Biblical Hebrew and reading knowledge of German. *Also REL 805b.*

RLST 852a, Agape and Special Relations. Gene Outka.
An examination of the neighbor-love commandment as universal in scope, and the place of special bonds between friends, lovers, spouses, parents and children, co-religionists, members of a given society, and so on. Can any view which stresses the sameness of human dignity accommodate judgments of preference and discrimination? Both historical and contemporary discussions are considered. *Also REL 778a.*

RLST 855b, Lutheran Ethics in a Comparative Context. Gene Outka.
Representative themes in ethics in the Lutheran tradition, centering on "faith active in love," with selected comparisons with the Roman Catholic and Reformed traditions. Special attention to two twentieth-century topics: comparative responses to the rise of Nazism in Germany and associated issues about anti-Semitism; and the content of social policy statements that Lutheran church bodies in America have issued since World War II. *Also REL 772b.*

RLST 857b, Love and Justice. Gene Outka.
An examination of how love and justice as basic normative standards are construed in themselves and related to one another. Claims across a spectrum are examined, from love and justice as opposed, to love and justice as distinguished, to love and justice as equated. Readings from theological and philosophical literature, both historical and contemporary, are canvassed.

RLST 859a, Christian Social Ethics. Thomas Ogletree.
TTh 10.30–11.20, 1 HTBA
The course emphasizes the classic traditions of Christian social teaching, beginning with biblical materials. It then examines the most important constructive models of social teaching: Augustine's "theocratic model" of the "Two Cities"; Thomas Aquinas's organic and hierarchical vision of Christian civilization; Reformed and Puritan conceptions of federalism and of convenantal social structures; and monastic and Mennonite "Communitarian" visions of alternative, self-subsistent faith communities. The course emphasizes distinctive American appropriations of these classic traditions, supplemented by traditions that are distinctively American: the Evangelical Protestant vision of Christian America; the Social Gospel commitment to "Christianize the Social Order"; and the independent African American quest for freedom and community beyond race. The course concludes by focusing on contemporary issues, economic and political, under the theme "the public vocation of the Churches." *Also REL 873a.*

RLST 860a, Advanced Medical Ethics. Margaret Farley, Robert Levine.
Th 1.30–3.20
This course builds on basic knowledge of the field of ethics to focus on particular sets of issues in medical ethics. Three particular areas are selected for extended study. The most likely areas are: research ethics, ethical issues regarding death and dying, and reproductive ethics. Both historical and contemporary readings are assigned, though the majority of readings are from contemporary sources. The course is interdisciplinary, combining resources from theology, philosophy, medicine, law, and other related fields. Prerequisite: This is a doctoral seminar. YDS students are admitted only with the permission of one of the instructors.

RLST 904b, The Philosophical Theology of St. Thomas Aquinas. Marilyn McCord Adams.
W 1.30–3.20
An examination of the principal philosophical and theological ideas in the works of St. Thomas Aquinas. *Also PHIL 614b[u], REL 763b.*

RLST 909b, History of Christian Thought, 450–1650. Marilyn McCord Adams.
TTh 1.30–2.45, 1 HTBA
A survey of major themes in Christian doctrine during the medieval and Reformation periods, with emphasis on Anselm, Aquinas, Luther, and Calvin, among others. *Also REL 721b.*

RLST 912a, The Philosophical Theology of St. Anselm of Canterbury. Marilyn McCord Adams.
W 1.30–3.20
Reading, seminar presentations, and discussions of selected topics from Anselm's works, with emphasis on primary sources. *Also PHIL 613a[u], REL 760a.*

RLST 913b, Theology of Karl Rahner. Shannon Craigo-Snell.
M 1.30–3.20
This course explores in depth the theology and spirituality of Karl Rahner, focusing on his theological anthropology. Particular attention is paid to the influence of Ignatius of Loyola and Rahner's historical placement in the trajectory of twentieth century theology.

RENAISSANCE STUDIES

53 Wall, Rm 324, 432.0672
M.A., M.Phil., Ph.D.

Chair and Director of Graduate Studies
David Quint

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, Walter Cahn, Judith Colton, Anne Dunlop, Mary Floyd-Wilson, Paul Freedman, Karsten Harries, John Hollander, Olivia Holmes, Blair Hoxby, Vincent Ilardi, K. David Jackson, Maija Jansson, Lee Patterson

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.

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.

RNST 500a,b, Introduction to Renaissance Studies. David Quint [F], Lawrence Manley [Sp].
T 10.30–12.20 [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 semester 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
Ivo Banac (*History*)

Director of Graduate Studies
Paul Bushkovitch (*History*)

Professors
Vladimir Alexandrov (*Slavic Languages & Literatures*), Ivo Banac (*History*), Paul Bushkovitch (*History*), Katerina Clark (*Slavic Languages & Literatures*), Mirjan Damaška (*Law*), Robert Evenson (*Economics*), John Gaddis (*History*), Harvey Goldblatt (*Slavic Languages & Literatures*), Benjamin Harshav (*Comparative Literature*), Michael Holquist (*Comparative Literature*), Robert L. Jackson (*Emeritus, Slavic Languages & Literatures*), Tatjana Lorkovic (*Library*), William Odom (*Adjunct, Political Science*), Jaroslav Pelikan (*Emeritus, History*), Susan Rose-Ackerman (*Law*), Ivan Szelenyi (*Sociology*), Tomas Venclova (*Slavic Languages & Literatures*), Miroslav Volf (*Divinity*)

Associate Professor
Vladimir Golstein (*Slavic Languages & Literatures*)

Assistant Professors
Keith Darden (*Political Science*), Hilary Fink (*Slavic Languages & Literatures*), Anna Grzymala-Busse (*Political Science*), Lawrence King (*Sociology*), Pauline Jones Luong (*Political Science*), John MacKay (*Slavic Languages & Literatures*), Timothy Snyder (*History*)

Lecturer
Slobodan Novak (*Slavic Languages & Literatures*)

Senior Lectors
Emilia Hramov (*Slavic Languages & Literatures*), Rita Lipson (*Slavic Languages & Literatures*), Julia Titus (*Slavic Languages & Literatures*)

Lectors
Nike Agman (*Slavic Languages & Literatures*), Halyna Hryn (*Slavic Languages & Literatures*), Constantine Muravnik (*Slavic Languages & Literatures*), Karen Von Kunes (*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

2710 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, Harvey Goldblatt, Benjamin Harshav (*Comparative Literature*), Michael Holquist (*Comparative Literature*), Riccardo Picchio (*Emeritus*), Tomas Venclova

Associate Professor
Vladimir Golstein

Assistant Professors
Hilary Fink, John MacKay

Senior Lector
Rita Lipson

Lector
Nike Agman

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. Upon completion of all predissertation requirements, including the prospectus, students are admitted to candidacy for the Ph.D.

Master's Degrees

M.Phil. See Graduate School requirements, page 361. 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.

M.A. (en route to the Ph.D.). The M.A. degree will be recommended by the department upon satisfactory completion of one year of full-time (eight graduate term courses) study in the Ph.D. program. See page 362.

Master's Degree Program. Candidates for the terminal master's degree will be required to take selected courses in Russian literature and linguistics, in consultation with the director of graduate studies. The program will consist of eight term courses and an M.A. essay. A grade of Honors in at least two courses and an average of High Pass in the remaining courses must be attained. A reading knowledge of French or German is required. An M.A. degree in the department does not guarantee admission to the Ph.D. program.

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 602a, Old Russian Literature: Muscovite Period. Riccardo Picchio.
T 10.30–12.20
This course treats the evolution of Old Russian literary civilization from the late-medieval period (fourteenth and fifteenth centuries) to the pre-modern (sixteenth and seventeenth centuries). Through the reading of selected texts, special attention is devoted to religious and ideological movements as well as to the problems of language and style.

RUSS 666b, Pushkin. Vladimir Golstein.
W 1.30–3.20
A study of Pushkin's evolution through the analysis of his major texts. Examination of the key critical issues that surround Pushkin's oeuvre (e.g., genre, parody, influence, the treatment of time, history).

RUSS 671a, Russian Literature in the Context of Western Philosophy. Hilary Fink.
Th 10.30–12.20
An intensive analysis of Dostoevsky's *Notes from the Underground,* Tolstoy's *Death of Ivan Il'ich* and *The Cossacks*, and selected short stories by Chekhov. These works are examined first in their own right and then through the prism of such Western philosophers as Rousseau, Schiller, Kierkegaard, Schopenhauer, Nietzsche, Bergson, and Heidegger. Some attention given to Russian philosophy in its relation to the Russian literary tradition.

RUSS 673b, Tolstoy, Novelness, and World Literature. Michael Holquist.
T 1.30–3.20
Although he created works in many different genres, Tolstoy is primordially associated with the novel. There are those who think of him as *the* novelist. And yet Tolstoy himself despised generic thinking in general, and normative concepts of "the novel" in particular. In this seminar we examine some of the contradictions concerning the idea of the novel as it is complicated by the case of Tolstoy. We of course read *War and Peace, Anna Karenina,* and *Resurrection,* as well as some of Tolstoy's short fiction and polemical essays. In addition, we examine theoretical speculation about novels that might be helpful in understanding their peculiarity in shaping Tolstoy's achievement. In particular, we meditate questions about the relation between the novel and its complex filiation with concepts of "Europe." Readings and discussion in English, but Russian, German, and French texts are read in the original by those having the relevant languages. *Also CPLT 977b.*

RUSS 680b, Acmeism. Tomas Venclova.
Acmeist ideas and values within their historical and cultural context. Close readings of poems by Gumilev, Mandelstam, Akhmatova, and others.

RUSS 689a, Russian Symbolist Poetry. Tomas Venclova.
T 1.30–3.20
Theory and history of symbolism. Close readings of poems by Bryusov, Blok, Ivanov, Annensky, and others.

RUSS 695a, Soviet Literature of the 1920s and 1930s. Katerina Clark.
W 1.30–3.20
The 1920s was 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 747b, Eisenstein, Pudovkin, Vertov. John MacKay.
M 1.30–3.20
An examination of all the major cinematic and theoretical works of Sergei Eisenstein, Vsevolod Pudovkin, and Dziga Vertov, centering on the period 1925–1945. We consider the films in light of the theories, the filmmakers in light of one another, and Soviet film and theory in light of contemporary developments. Attention is also paid to the international legacy of these filmmakers, and particularly their reception during the 1960s and 1970s (Godard, Marker, Barthes). No knowledge of Russian required. *Also CPLT 919b.*

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 the complexities of contemporary Russian press and media. Accompanied by a grammar review. Fall and spring.

RUSS 851b, 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. Nike Agman.
TTh 4–5.15
Rudiments of Old Church Slavic, the oldest Slavic literary language. Introduction to glagolitic and cyrillic as early writing systems. Study of grammar, both as attested in the Old Church Slavic literary canon and in its relationship to the modern Slavic languages, especially Russian. Close readings of selected Old Church Slavic texts from the tenth and early eleventh centuries.

SLAV 805b, History of the Russian Literary Language. Harvey Goldblatt.
W 10.30–12.20
This course traces the different types of literary language used in the Russian lands from the medieval period to modern times. Special attention is devoted to the relations between language and culture in general and literary codification and formal techniques in particular.

SLAV 900, Directed Reading.
By arrangement with faculty.

SOCIOLOGY

140 Prospect, 432.3323
M.A., M.Phil., Ph.D.

Chair
Ivan Szelenyi

Director of Graduate Studies
Jeffrey Alexander (Williams Hall 102, 436.4354, jeffrey.alexander@yale.edu)

Professors
Jeffrey Alexander, Scott Boorman, Deborah Davis, Paul Gilroy, Roger Gould, Karl Ulrich Mayer (*Visiting* [F]), Ivan Szelenyi, Stanton Wheeler, Lawrence Wu (*Visiting* [Sp])

Associate Professors
Dalton Conley (*Visiting* [F]), Joshua Gamson, Joseph Soares

Assistant Professors
Jennifer Bair, Hannah Brueckner, Lawrence King, Sharon Kinsella, Christopher Rhomberg, Andrew Schrank

Lecturers
Derrick Gilbert, Eric Kostello, Vron Ware

Fields of Study

Fields include Social Policy, Comparative Sociology/Macrosociology, Culture, Historical Sociology, Mathematical Sociology, Methodology (Qualitative and Quantitative Approaches), Networks, Political Sociology, Race/Ethnic/Minority Relations, Social Change, Social Movements, Social Organization/Formal/Complex, Social Stratification, 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. Any exception to this regulation must be approved in advance by the appropriate dean. As a result of the qualification procedure, a student shall be either (1) admitted to candidacy for the Ph.D. or (2) explicitly terminated. To qualify for candidacy the student must complete fourteen term courses, demonstrate competence in sociological theory, statistics, research methods, and comprehensive examination in two substantive fields, and complete a dissertation prospectus exam. No more than one term of independent study will be accepted for credit toward the fourteen-course requirement. Admission to candidacy implies that the student's position in the department is secure, subject only to continued satisfactory progress toward completion of remaining departmental and university requirements. Competence in sociological theory, statistics, and research methods may be demon-

strated by passing two term courses in each area. Students are also required to pass written and oral comprehensive examinations in two selected fields and have a dissertation prospectus approved. After admission to candidacy, the student is permitted to proceed with the dissertation. The dissertation represents a test of the candidate's ability to select and execute a major research project of professional quality. It should show the student's mastery of the field of specialization and it must demonstrably contribute to the body of sociological knowledge.

Teaching is an important part of the professional preparation of graduate students in Sociology. The department expects students to teach, usually 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, page 361.

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. Joseph Soares.
T 4–6
An intensive reading seminar on the textual groundwork of the sociological tradition. An examination of the philosophical commitments, conceptual resources, and empirical arguments of Adam Smith, Edmund Burke, Mary Wollstonecraft, Alexis de Tocqueville, Karl Marx, Emile Durkheim, Max Weber, Sigmund Freud, Gerry Simmel, and W. E. B. DuBois.

[**SOCY 502b, Contemporary Sociological Theory.**]

SOCY 506b[u], Survey Methods. Hannah Brueckner.
T 2.30–4.20
We explore both theory and practice of survey design, including conceptualization, measurement issues, sample design, questionnaire construction, interviewing, data analysis, publication of results, limitations and ethical aspects of survey research. The National Longitudinal Study of Adolescent Health (www.cpc.unc.edu/addhealth/) serves as an example for addressing difficult design problems in social research throughout the course. Students are also welcome to contribute survey design or analysis problems from their own work.

[**SOCY 510b[u], Setting the Scholarly Agenda.**]

SOCY 522b[u], The Sociology of Development. Andrew Schrank.
TH 1.30–3.20
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 525a, Issues in Cultural Sociology. Jeffrey Alexander.
W 3–5
After a review of a broad range of contemporary perspectives, the seminar examines in depth, and in its variations, the "strong program" in cultural sociology. We look at theoretical ideas about hermeneutics and interpretation, semiotics and structuralism, social drama and ritual, performance studies, and social approaches to symbolic process. The course also considers empirical studies that apply cultural methods to such issues as politics, violence, civil society, and collective trauma. Readings include works by: Dilthey, Ricoeur, Geertz, Durkheim, Shils, Turner, Saussure, Sahlins, White, Brooks, Wagner-Pacifici, Eyerman, Gibson, Sewell, Alexander, Jacobs, and Smith.

[**SOCY 526a, Recent Trends in Social Stratification Processes.**]

SOCY 528a[u], Reading Race and Gender. Vron Ware.
W 1.30–3.20
An exploration of feminist writing that demonstrates how race and gender are constituent of each other. Comparative examples from the United States, the United Kingdom, and South Africa. Themes include: theories of race and gender formation; gender and white supremacism; sex and race; and class, ethnicity, and domestic service. *Also AMST 680a[u].*

[**SOCY 529b, Legislation.**]

SOCY 534a, Writing Sociology. Joshua Gamson.
TH 2–4
This course combines readings and intensive workshop sessions, with the goal of developing practical social science writing skills, and more broadly of considering issues of representation, authority, creativity, and audience in sociology, and examining the social, political, and professional context of sociological writing and publishing. Students enter the course with a draft of an article, typically but not necessarily an analysis of empirical data, that they intend to develop for publication; these drafts serve as the basis for workshop sessions.

SOCY 541b, New Theories of Civil Society. Jeffrey Alexander.
W 3–5
Civil society has recently emerged as a primary topic in political and social theory. The aim of this seminar is to see whether, and how, a more specifically sociological theory of civil society might be developed vis-à-vis the normative theorizing that dominates contemporary debates. After briefly reviewing historical approaches, this seminar surveys the range of contemporary debates, from neo-Tocquevillian (Putnam) to radical-democratic (Keane), to discourse ethics (Habermas, Cohen/Arato), to more cultural and institutional approaches (Alexander). We then consider these approaches, and civil society in general, in relation to issues of race, religion, gender and sexuality, and globalization.

SOCY 545a, Reading Max Weber. Ivan Szelenyi.
M 1–3
A close textual analysis of some of Weber's work, with particular emphasis on *Economy and Society. Also PLSC 607a.*

SOCY 550a, The Future of Work. Karl Ulrich Mayer.
Th 10–12
This graduate seminar examines the ongoing changes in employment and occupational structures as well as conditions of work as a consequence of information technology, global economic competition, increasing gender equality, and changing work values. Special emphasis is placed on labor markets and career mobility as well as cross-national comparative studies.

SOCY 555b, Poverty in the United States. Lawrence Wu.
M 4–6
Nature, causes, and consequences of poverty in the United States. Topics include: poverty dynamics; distribution across social and demographic characteristics; role of labor markets, family structure, human and social capital; quantitative and qualitative studies; history of antipoverty measures and proposals in the U.S. and other industrialized countries.

SOCY 557a, Current Debates in Political Sociology. Christopher Rhomberg.
T 2.30–4.20
Examination of current topics in the sociology of the state and politics. Initial survey of development of the field since the 1960s; primary focus then turns to recent debates, including the racial and gendered character of politics, restructuring of the welfare state, relations between state and civil society and/or social movements, and other topics.

SOCY 560a,b, Comparative Research Workshop. Hannah Brueckner.
M 5–7
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 561b[u], Topics in Contemporary Chinese Society. Deborah Davis.
T 9.30–11.20
Development of research skills through study of one topic in contemporary Chinese society. In 2002, focus is on change in Chinese family life in the twentieth century. Particular attention to the consequences of the one-child campaign, the revival of ancestor veneration, and the re-emergence of family businesses, on the nature of family life in the People's Republic of China. Comparison with family life in Taiwan and Hong Kong. Knowledge of modern Chinese is desirable but not necessary. Prerequisite: at least one course focused on China after 1911.

[**SOCY 577a, Topics in Multivariate Data Analysis.**]

SOCY 580a[u], Introduction to Statistics in Sociology. Joseph Chang, Eric Kostello.
TTh 1–2.15
An introduction to probability and statistics, with emphasis on applications to sociology. *Also STAT 503a[u].*

[**SOCY 581b, Multivariate Methods for the Social Sciences.**]

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 607a, Seminar on Field Methods. Deborah Davis.

F 9.30–11.20

An introduction to the challenges and problems of doing fieldwork through a series of supervised field experiences as well as close reading of old and new classics (e.g., Whyte, Gans, Becker, Lauman, Bourdieu, Luker, Halle, Hochschild, Gamson, and Anderson). The course begins by discussing questions of ethics, privacy, and consent and then focuses on analytic and practical problems of observations, note taking, interviewing, transcription and coding, focus groups, photographic data, and life histories.

[**SOCY 607b, Participant Observation Research.**]

SOCY 611b[u], Historical Approaches in Sociology. Christopher Rhomberg.

M 2.30–4.20

This seminar focuses on general methodological and theoretical problems of doing research in historical sociology. We examine such topics as 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 in the students' own practice of historical research.

SOCY 615b[u], Black Communities in the Twentieth Century. Derrick Gilbert.

T 2.30–4.20

A review of historical and contemporary issues confronting black communities in twentieth-century America. Using ethnographic case studies of black communities, the course explores social, economic, political, and cultural history of the black experience. *Also AFAM 715b[u].*

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. Hannah Brueckner.

F 2.30–5.20

The class aims at building a framework for comparisons across time and space for the way in which welfare states structure social relations, and social relations structure the welfare state. Topics include: history of the American welfare state, welfare state regimes in comparative perspective, gender and the welfare state, the state and the life course, family structure and poverty, and gender regimes and welfare state transitions. For each of six thematic sessions, a leading scholar in the field is invited as a guest lecturer.The remainder of the class sessions are devoted to discussing the literature in preparation for the guest lectures.

SOCY 627b, Gender and Society. Jennifer Bair.

F 2.30–5.20

The class aims at laying a foundation in the sociology of gender. Topics include: the social construction of genera; the economics of gender; the (re-)production of gender inequality in education, work, and the family; gender and development; race and gender. For each of six thematic sessions, a leading scholar in the field is invited as a guest lecturer. The remainder of the class sessions are devoted to discussing the literature in preparation for the guest lectures.

SOCY 637b, The Transition to Democracy and Capitalism in Eastern Europe. Lawrence King.

Th 2–4

Survey of the sociological accounts of Eastern Europe's "double transition" to capitalism and democracy. Focus on the competing accounts of the collapse of Communist systems, and the resulting political and economic systems that have emerged over the past six to eight years.

[**SOCY 643b, Comparative Political Economy.**]

[**SOCY 644a, Contemporary Racial and Ethnic Formation.**]

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.**]

[**SOCY 651a, Roots and Routes: Identity and Travel in African American Political Culture.**]

SOCY 652a[u], Race, Class, and Public Policy. Dalton Conley.

T 2.30–4.20

An investigation into the state of black-white inequality since the 1960s. Topics include theories of race, the role of societal institutions in perpetuating or ameliorating racial inequality, the race-class debate, and the issues of affirmative action and social policy. *Also AFAM 682a[u]*.

COUNCIL ON SOUTHEAST ASIA STUDIES

Luce Hall, 34 Hillhouse, 432.3431, seas@yale.edu

Chair
Michael Dove (*Forestry & Environmental Studies*)

Language Studies Coordinator
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*), Robin Winks (*History*), Mimi Yiengpruksawan (*History of Art*)

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.

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 520u, Elementary Indonesian. Indriyo Sukmono.
MTWThF 10.30–11.20
A beginning course in colloquial Indonesian. Conversation practice, discussions of grammar, and, in the second term, introduction to reading and discussion of texts.

INDN 527[u], Intermediate Indonesian. Indriyo Sukmono.
MWF 2.30–3.20
Continues practice in colloquial Indonesian conversation 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 [F] (432.1154, rolena.adorno@yale.edu)
Guillermo Irizarry (*Acting* [Sp]) (432.8065, guillermo.irizarry@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

Assistant Professors
Guillermo Irizarry, Oscar Martín, Cristina Moreiras Menor, Simone Pinet, Lidia Santos

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; two courses taken outside the department; and two courses in the literature of the language-literature minor. 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 mentoring by the faculty as well as 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, page 361. 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 922a[u], Modernism in Brazilian Literature and Arts. K. David Jackson.
MW 1–2.15
Investigates the intellectual, aesthetic, and social projects of avant-garde movements and writers in Brazil in the twentieth century, and their changing perspectives from Modernism of the 1920s to Concretism of the 1950s–1980s. Documentation drawn from the plastic arts, music, literature, and the socio-cultural environments within which authors attempted to revolutionize art and life.

PORT 964b, Brazilian Fiction in the Twentieth Century. Lidia Santos.
W 4–6
The course focuses on fiction and literary criticism of the second half of the twentieth century in Brazil. Criticism by Schwarz, Cândido, Santiago, and Haroldo do Campos. Fiction by Lispector, Noll, Gabeira, and Lins, among others. Taught in Spanish. Most of the texts in Portuguese. Some must be read in Spanish or English translations.

PORT 991a, Tutorial.
By arrangement with faculty.

PORT 999b, Tutorial.
By arrangement with faculty.

SPAN 500a, History of the Spanish Language. Oscar Martín.
M 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 cenutry, 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. Taught in Spanish.

SPAN 518b, History and Literature: The Medieval Canon and the Writing of Literary History. María Rosa Menocal.
T 1.30–3.20
A seminar on the theoretical and practical challenges of writing literary histories on any scale. We examine the complex of relationships between "history" and "literature" as they affect a wide range of literary-critical projects: the premises underlying the organization of a survey-course syllabus or the background materials of a monographic study of a single author, and of course the conceptualization of literary histories proper. The practical materials we work with are the literatures of the culturally and linguistically complex medieval period in the Iberian peninsula, and students with little or no background in that are asked to attend the lectures of the related undergraduate course "The Cultures of Medieval Spain" (TTH 11.30–12.45). Taught in English.

SPAN 665b[u], Love and the Law in Cervantes. Roberto González Echevarría.
TH 4–5.15
This course (the DeVane Lectures, 2002) explores how the regulation of love by the early modern Spanish state during the sixteenth century is reflected in Cervantes's works. Love and the law are adversaries from *La Galatea* to the posthumously published *The Trials of Persiles and Sigismunda*, but most dramatically in *Don Quijote* and the *Exemplary Stories*, Cervantes's masterworks. The lectures deal with the evolution of the novel form in relation to criminal and civil legislation pertaining to sexuality.

SPAN 735b, Literature and Crisis. Cristina Moreiras Menor.
W 1.30–3.20
This class focuses on the way literature addresses the relation between modernity and its crises. We analyze historical, social, and cultural crises, and how twentieth-century writers deal with, for example, war and its aftermath, AIDS, immigration, and women's issues. The course centers on the work (essays, fiction, and poetry) of some of the most significant Spanish authors (Unamuno, Ortega y Gasset, Zambrano, Umbral, Goytisolo, Trías, Pérez Reverte, Marsé, Savater, Marías, among others) as well as on influential theoretical readings on modernity and postmodernism. Taught in Spanish.

SPAN 747a, Generation of '27: Poetry. Noël Valis.
T 1.30–3.20
This course examines the theory and art of vanguard writing. Selected poetry of Guillén, Salinas, Lorca, Cernuda, Alberti, and others, along with Ortega y Gasset's influential *Deshumanización del arte*, are read. Taught in Spanish.

SPAN 790b, Methodologies of Modern Foreign Language Teaching. María Martino Crocetti.
M 4–6
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 one-hour practicum meets weekly. Taught in Spanish.

SPAN 825a, Postcolonial Readings and Colonial Texts. Rolena Adorno.
TH 4–6
This course aims to create a dialogue between colonial writings and postcolonial formulations. Works of El Inca Garcilaso de la Vega, Sor Juana Inés de la Cruz, Bartolomé de las Casas, Guaman Poma de Ayala, and others are examined as texts of their own times and interrogated for their role as emblems of postcolonial discursivity. Each anchors clusters of pertinent theoretical readings, which include Memmi, Appiah, and others. Taught in English. Primary texts in Spanish (some available in English translation); theoretical works in English or Spanish. *Also CPLT 726a.*

SPAN 925a, Travel and Translation in U.S. Latina/o Literature. Guillermo Irizarry.
W 4–6
An exploration of the problematics of constructing national and cultural identities by focusing mostly, though not exclusively, upon the sites of travel and the translation of diasporic communities in texts written by Hispanics in the United States. Authors include Hinojosa-Smith, Rivera, Cisneros, Anzaldúa, Valdez, Montoya, Laviera, Santiago, Pietri, López, Álvarez, Thomas, and Fernández. Taught in Spanish, but some texts are read in English.

SPAN 965a, Violence in Latin American Literature. Josefina Ludmer.
TH 10.30–12.20
Analysis of the representation and writing of violence in modern fiction (nineteenth and twentieth centuries), theories of violence, and different correlations. Texts by A. Roa Bastos, E. Echeverría, M. Puig, G. García Márquez, and others. Taught in Spanish.

SPAN 969b, New Writings in Latin American Literature: New Imaginaries? Josefina Ludmer.
TH 10.30–12.20
Analysis of the latest literary tendencies: trends, forms, and imagination in Mexico, Chile, Argentina, Colombia, and other countries. Texts by C. Aira, M. Sánchez, M. Bellatin, and others. Taught in Spanish.

SPAN 991a, Tutorial.
By arrangement with faculty.

SPAN 999b, Tutorial.
By arrangement with faculty.

STATISTICS

24 Hillhouse, 432.0666
M.A., Ph.D.

Chair
Andrew Barron

Director of Graduate Studies
Nicolas Hengartner (Rm 207, 24 Hillhouse, nicolas.hengartner@yale.edu)

Professors
Donald Andrews (*Economics*), Andrew Barron, Joseph Chang, John Hartigan, Theodore Holford (*Epidemiology & Public Health; Biostatistics*), Peter Phillips (*Economics*), David Pollard

Associate Professors
Nicolas Hengartner, Junhyong Kim (*Ecology & Evolutionary Biology*), Heping Zhang (*Epidemiology & Public Health; Biostatistics*)

Assistant Professor
Marten Wegkamp

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 Degrees

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 362–63.

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. Joseph Chang, Junhyong Kim.
Statistical and probabilistic analysis of biological problems presented with a unified foundation in basic statistical theory. The problems are drawn from genetics, ecology, epidemiology, and bioinformatics.

STAT 502a[u], Introduction to Statistics: Political Science. Joseph Chang.
Statistical analysis of social science problems, primarily drawn from political science and sociology, presented with a unified foundation in basic statistical theory.

STAT 503a[u], Introduction to Statistics: Sociology. Joseph Chang, Eric Kostello.
TTh 1–2.15
An introduction to probability and statistics, with emphasis on applications to sociology. *Also SOCY 580a[u].*

STAT 504a[u], Introduction to Statistics in Psychology. Joseph Chang, Thomas Brown.
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. *Also NSCI 540a.*

STAT 505a[u], Introduction to Statistics: Environmental Sciences. Joseph Chang, Jonathan Reuning-Scherer.
An introduction to probability and statistics with emphasis on applications to forestry and environmental sciences, presented with a unified foundation in basic statistical theory.

STAT 506a[u], Introduction to Statistics: Data Analysis. Joseph Chang, Nicolas Hengartner.
TTh 1–2.15
An introduction to probability and statistics, with emphasis on data analysis.

STAT 530b[u], Introductory Data Analysis. John Hartigan.
Survey of statistical methods: plots, transformations, regression, analysis of variance, clustering, principal components, contingency tables, and time series analysis. Uses SPLUS and Web data sources. After or concurrent with STAT 501a.

STAT 541a[u], Probability Theory. Marten Wegkamp.
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. Andrew Barron.
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[u] and concurrent with or after MATH 222b or 225a or b or the equivalent.

STAT 551b[u], Stochastic Processes. David Pollard.
A study of random processes, including Markov chains, Markov random fields, martingales, random walks, Brownian motion, and diffusions. Introduction to certain modern techniques in probability like coupling and large deviations. Applications to image reconstruction, Bayesian statistics, finance, probabilistic analysis of algorithms, genetics, and evolution. After STAT 541 or the equivalent.

STAT 600b[u], Advanced Probability. Marten Wegkamp.
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. David Pollard.
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. Prerequisite: knowledge of measure-theoretic probability at the level of STAT 600, although some key concepts, such as conditioning, are reviewed. After STAT 600.

STAT 610a, Statistical Inference. David Pollard.
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. Marten Wegkamp.
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 Hartigan.
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. Staff.
Individual one-term projects, with students working on studies outside the department, under the guidance of a statistician.

STAT 645a, Topics in the Statistical Analysis of Genomic Data. Joseph Chang.
Several recently developed statistical methods either have already played an important role in the analysis of genomic and post-genomic data or appear to be promising candidates to do so. We study hidden Markov models, Bayesian networks, support vector machines and kernel methods, and perhaps other topics to be determined. For each topic, instructors present introductory lectures on the statistical theory, models, and methods of analysis. Students work on projects and present results, which may include computer implementations of the statistical techniques, analyses of biological sequence and gene expression data using available programs, and reports on research papers. Although there are no specific prerequisites, the course makes substantial use of probability theory, statistics, introductory biology, and computation; students without background in some of these areas may need to do additional work and should consult the instructors before enrolling.

STAT 661b[u], Data Analysis. Nicolas Hengartner.
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 542 and MATH 222 or 225 or the equivalents.

STAT 664b[u], Information Theory. Andrew Barron.
Foundations of information theory in mathematical 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 channel coding. Applications in statistics and finance. After STAT 541a.

STAT 665b[u], Introduction to Function Estimation. Nicolas Hengartner.
A practical introduction to modern curve estimation techniques, such as nonlinear regression, regression splines, series estimators, local regression smoothers, and neural networks, with discussion of boundary effects, model and bandwidth selection, goodness of fit, and confidence intervals/bands. Further topics include estimation under shape restriction, pattern recognition, inverse problems, hazard estimation, and density estimation.

STAT 674a[u], Analysis of Spatial and Time Series Data. John Hartigan.
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 700, Departmental Seminar.
Important activity for all members of the department. See weekly seminar announcements.

WOMEN'S AND GENDER STUDIES

315 WLH, 100 Wall, 432.0845

Chair
Margaret Homans (*English; Women's & Gender Studies*)

Professors
Mahzarin Banaji (*Psychology*), Linda Bartoshuk (*Psychology*), Kelly Brownell (*Psychology*), Jill Campbell (*English*), Hazel Carby (*African American Studies; American Studies*), Kang-i Sun Chang (*East Asian Languages & Literatures*), Cathy Cohen (*Political Science; African American Studies*), Nancy Cott (*History; American Studies*), Deborah Davis (*Sociology; East Asian Studies*), Glenda Gilmore (*History*), Paul Gilroy (*Sociology; African American Studies*), Ingeborg Glier (*German*), Sara Suleri Goodyear (*English*), Dolores Hayden (*Architecture*; *American Studies*), Paula Hyman (*History; Religious Studies*), Vera Kutzinski (*American Studies; African American Studies; English*), Marianne LaFrance (*Psychology; Women's & Gender Studies*), Charles Musser (*Film Studies; American Studies*), Cynthia Russett (*History*), Harold Scheffler (*Anthropology*), Naomi Schor (*French*), Vicki Schultz (*Law School*), Helen Siu (*Anthropology*), William Summers (*Molecular Biophysics & Biochemistry*), Robert Wyman (*Molecular, Cellular, & Developmental Biology*)

Associate Professors
Kathryn Dudley (*American Studies*), Joshua Gamson (*Sociology*), Janet Henrich (*School of Medicine*), Serene Jones (*Divinity School*), Laura Wexler (*American Studies; Women's & Gender Studies*)

Assistant Professors
Jennifer Bair (*Sociology*), Jessica Brantley (*English*), Hannah Brueckner (*Sociology*), Kamari Clarke (*Anthropology*), Elizabeth Dillon (*English*), Laura Frost (*English*), Nora Groce (*Epidemiology & Public Health*), Peter Hegarty (*Visiting, Women's & Gender Studies; Psychology*), Mary Lui (*History*), Michael Mahoney (*History*), Linda-Anne Rebhun (*Anthropology*), Naomi Rogers (*Women's & Gender Studies; History of Medicine*), Alicia Schmidt Camacho (*American Studies*), Michael Trask (*English*)

Lecturers
Pamela Bro, Susan Rieger, Vron Ware (*Sociology*)

Women's and Gender Studies, an interdisciplinary field, establishes gender and sexuality as fundamental categories of social and cultural analysis. It offers new critical perspectives from which to study the diversity of human experience. The introduction of these perspectives into all fields of knowledge necessitates new research, criticism of existing research (assumptions, methods, conclusions), and the formulation of new paradigms and organizing concepts. Gender (the social meaning of the distinction between the sexes) and sexuality (sexual practices, identities, discourses, and institutions) are studied in their interaction with such aspects of identity as class, race, ethnicity, and nationality.

Faculty members affiliated with Women's and Gender Studies are available to graduate students as advisers, and they offer graduate courses of relevance to Women's and Gender Studies in their own departments and schools (most frequently African American Studies, American Studies, Anthropology, Divinity, English, History, Law, Psychology, and Sociology). Graduate students may draw on these resources to develop a focus on Women's and Gender Studies while working toward degrees in their chosen disciplines.

Program materials are available on request from the Chair, Women's and Gender Studies Program, Yale University, PO Box 208319, New Haven CT 06520-8319.

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 and on the microeconomics of labor and population 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 INSTITUTE FOR THE ADVANCED STUDY OF RELIGION

250 Church, 432.4040

Directors
Jon Butler and Harry Stout

The Institute for the Advanced Study of Religion at Yale was established through a grant from the Pew Charitable Trusts. The Institute's mission is to encourage and coordinate the study of religion in American life and history, to increase awareness of the role and importance of religion in the life of this country and world, to address moral and spiritual concerns of leadership in national and international contexts, and to remedy the relative inattention to and ignorance about the role of religion in America's history and contemporary life among policy makers, scholars, and practitioners. It features annual themes or "problems" that focus the selection of fellows, conference topics, and lectures under the institute's direction. The Institute's first theme, implemented in academic year 1999–2000, addressed the problem of American Religion, Race, and Ethnicity with a special focus on African American Religion. For the 2000–2001 academic year, the Institute extended the theme of Religion, Race, and Ethnicity, covering a wide range of racial and ethnic groups. The Institute will focus on American Religion and the Family for the 2001–2002 academic year.

The idea behind this initiative is to create teams of scholars, both inside Yale and outside, who will share insights even as they pursue individual research projects. Each year, three advanced resident scholars from outside of Yale will be awarded fellowships to pursue their individual research and writing in a collegial environment of seminars, symposia, lectures, and, not least, scholarly presentations. In these settings, fellows will interact with up to eight nonresidential graduate and postdoctoral fellows from outside of Yale, as well as with faculty, staff, students, and academic centers and departments at Yale. The Institute also offers Yale Graduate summer and academic year fellowships.

INSTITUTION FOR SOCIAL AND POLICY STUDIES

77 Prospect, 432.3234

Director
Donald P. Green

Executive Committee
Roger Gould, John Roemer, Peter Salovey, Stephanie Spangler

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 *Scholars in Health Policy Program*, Theodore Marmor, director; the *Program in Ethics, Politics, and Economics,* Geoffrey Garrett, 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 international history and security, with particular emphasis on diplomatic and military history. Its goals are to fill critical national needs; to train leaders to take responsibility for security concerns; to discover flexible and fruitful ways to recognize, define, and analyze security issues; and to conduct independent critiques of policy thinking and policy making on these matters. United Nations Studies at Yale (UNSY) exists under the umbrella of ISS and is directed by Bruce Russett. UNSY is a policy think tank on key issues concerning the future of the United Nations. Neither ISS nor UNSY is a degree-granting program; rather, they facilitate the work and welcome the participation of students from all academic departments and the professional schools.

ISS offers research grants and postdoctoral fellowships in an international competition. Like UNSY, it sponsors conferences, lecture series, seminars, and workshops. Current projects at UNSY include the 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 four-volume edition of Dr. Boutros-Ghali's papers. ISS's Pivotal States Study Group wound up work with the publication of Robert Chase, Emily Hill, and Paul Kennedy, eds., *The Pivotal States: A New Framework for U.S. Policy in the Developing World* (W. W. Norton, 1999).

ISS's current endeavors include its Redefining Security Project, which examines how foundations and academic institutions have adjusted definitions of security since the early 1980s. The focus of ISS for the next five years, however, will be on its Grand Strategy Project. This Project seeks to revive the study and practice of grand strategy at the graduate and undergraduate levels, and to foster a network of individuals and institutions trained to think about grand strategies in imaginative and effective ways. The Project, launched in January 2000, combines historical depth and analytical range with the belief that the preparation of leaders is the best long-term investment ISS can make in the future.

Inquiries should be directed to International Security Studies, Yale University, PO Box 208353, New Haven CT 06520-8353. Further information on ISS can be found at http://www.yale.edu/iss/.

YALE CENTER FOR INTERNATIONAL AND AREA STUDIES

Luce Hall, 34 Hillhouse, 432.3410

Director
Gustav Ranis

The Center for International and Area Studies is Yale's institutional focus for international and area studies. Although not an academic department or a separate school, the center's interdisciplinary teaching, research, and outreach programs bring together faculty and students from all parts of the University — the humanities, social sciences, professional schools, and the natural sciences.

The center supports and encourages programs in international affairs, world regional studies, and comparative interdisciplinary research. Regional studies programs include African Studies, Canadian Studies, East Asian Studies (focusing on China and Japan), Latin American Studies, Middle East Studies, Russian and East European Studies (supporting the interdisciplinary study of Russia, the post-Soviet successor states, as well as East Central and Southeastern Europe), South Asian Studies, Southeast Asia Studies, and West European Studies. Comparative programs include the Academic Council on the United Nations System, Agrarian Studies, Genocide Studies, Global Migration, International Affairs, International Security Studies, and United Nations Studies.

Additionally, the center's individual councils, committees, and programs offer four graduate degree programs (African Studies, East Asian Studies, International Relations, and Russian and East European Studies), five undergraduate majors (Ethnicity, Race, and Migration Studies; East Asian Studies; International Studies; Latin American Studies; and Russian and East European Studies), and several joint-degree programs (with the schools of Law, Management, and Forestry & Environmental Studies, and the Department of Epidemiology and Public Health).

The Yale Center for International and Area Studies plays many roles at Yale: mobilizing multidisciplinary resources for the study and teaching of international and area studies within the formal curriculum; sponsoring over 150 lectures, conferences, work-

shops, seminars, and films annually covering a variety of topics and interests; facilitating faculty interaction and exchange of ideas; financing student and faculty research on topics relating to all parts of the world and in all disciplines; and supporting and contributing resources to Yale library collections in international and area studies.

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 may be viewed on the Graduate School's Web site or obtained by writing to Graduate School Admissions, Yale University, PO Box 208323, New Haven CT 06520-8323 (graduate.admissions @yale.edu).

It is important to note that application for admission to the Graduate School may be made to only one department or program. The individual program descriptions listed in this book, in the 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, 2002. Applications received by December 1, 2001, are eligible for a reduced application fee.

Students who seek a professional degree should write to one of the University's professional schools, which are listed on pages 398–99. 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 as Special Students, for nondegree study (please see Nondegree Study on page 353 for more information). Students interested in postdoctoral appointments should see the information on page 357.

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. 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). 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 the Educational Testing Service. The SPEAK test is administered by Yale's English Language Institute.

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. 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 prior degrees at registration the following September. 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 previously been 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 pages 357–58.

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.

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 378 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 $1,500 of their tuition per term. Students enrolling for the summer only are charged $750. Applicants for admission as Visiting Affiliated Research Graduate Students should complete the Applicant's Financial Statement and should submit any other documentation that would clearly establish their need for tuition assistance. Support beyond tuition in the form of fellowship stipends or 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 $1,500 per term. Students enrolling for the summer only are charged $750.

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.

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, 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 that students can pursue. 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 59–61).

Exchange Scholar Program

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 the Graduate School Student Information Office, Room 139, Hall of Graduate Studies (HGS).

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 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)

Epidemiology and Public Health
Many internship opportunities in numerous countries across the world

French
Ecole Normale Supérieure, Paris; University of Geneva, Switzerland

Linguistics
Tokyo Metropolitan University

Philosophy, Comparative Literature, & History
The Connecticut Department of Education and the State of Baden-Württemberg Exhange – Germany

Political Science
Nuffield College, University of Oxford

PROGRAMS IN DEVELOPMENT
Council on East Asian Studies
Kyoto University, Japan

German
Free University, Berlin

History
Leiden University, Netherlands; Paris-Sorbonne, Paris VI; Royal Holloway College, University of London, England

Agrarian Studies
Amsterdam School for Social Science Research

Summer Study

Many graduate students remain in New Haven during the summer for independent study and research (see Summer Registration, page 370). 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.

Postdoctoral Study

Holders of the doctorate and similarly qualified individuals who wish to undertake special research at Yale may be appointed as postdoctoral fellows, research affiliates, or visiting fellows by the dean of the Graduate School upon recommendation by the chair of the appropriate department. Please consult the appropriate department for further information.

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 19–345 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 should be devoted to the completion of predissertation requirements (courses, examinations, selection of a dissertation topic). The remaining time, typically two and one-half to three years, should be 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 will be counted as part of the six years (for further information, please see Transfer Credit and Advanced Standing on page 359).

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 358). 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 pay four years of full tuition to receive the Ph.D. (see pages 358 – 59). 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 matric-

ulation in the Ph.D. program. Students admitted with University Fellowships continue to be eligible for financial aid during the same period.

Once the full-tuition obligation has been completed, students are charged the Continuous Registration Fee (CRF), $240 per term in 2001–2002, 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 previously 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 19–345. 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 19–345. 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 20. 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.

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 pages 365–66. Students should also consult the booklet entitled *Preparation and Submission of the Doctoral Dissertation*, available at the Student Information Office, Room 139, 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 19–345.

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 19–345.

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 19–345.

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 19–345.

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 206–12.

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 may 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 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. program, 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 400–403). 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 (139 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 and health care coverage). 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.

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 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 370–71) will be considered to have withdrawn from the Graduate School.

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 392).

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 359–61 (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 submit to the registrar a course enrollment form, signed by the director of graduate studies of the student's department. The deadlines for filing course enrollment forms each term are listed in the Schedule of Academic Dates and Deadlines on pages 400–403. 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, 139 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 400–403. 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 26; spring term: March 8).

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 400–403 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 studying on campus, attending classes, and using University facilities register 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 in person during the normal registration period at the beginning of that term (see the Schedule of Academic Dates and Deadlines on pages 400–403).

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 (141 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 386.

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 358–59 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 2001–2002 is $240 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 study temporarily may request a leave of absence. There are two types of leave, personal and medical, 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 eligible, 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 400–403). 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 391.

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 is currently registered and who withdraws 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 400–403. 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 391.

A student who has withdrawn from the Graduate School 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 375–77.)
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. Possession or use of explosives and weapons on University property. Firearms and ammunition for sporting purposes must be registered and deposited with the University Police.
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 expres-

sion 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, 2001–2002

*Tuition:**

Full-time study, per term	$11,825
Full-time study in IDE, per term	12,325
Half-time study, per term	5,913
Master's programs, less than half time per term	
One-quarter time study, per term	2,956
Division of Special Registration (DSR, nondegree study)	
Course work, per course, per term (including audited courses)	2,956
Visiting Affiliated Research Graduate Students, per term	11,825
Visiting Assistants in Research, per term	1,500
Visiting Assistants in Research appointed for the summer only	750

Fees:†

Continuous Registration Fee (CRF), per term (see p. 370)	$240
Special in absentia registration, per term (see p. 369)	240
YHP Hospitalization/Specialty Coverage, twelve months‡	780
YHP Prescription Plus Coverage, twelve months	264

For fees relating to registration and course enrollment see page 367.

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. University employees and faculty spouses 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.

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

* 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.

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 fee to cover administration of the plan is $50. The deadline for enrollment is June 22. 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.amsweb.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.

FINANCIAL AID

Financial assistance is available in the form of University Fellowships, traineeships, research assistantships, teaching fellowships, and loans. The nature of the assistance varies among the divisions and departments, but every effort is made to help students meet tuition and living expenses while they are enrolled in the Graduate School.

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). 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 pages 389–90.

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 will be 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. Because available fellowship support is limited, the Graduate School expects that students themselves will contribute toward the cost of their education and living expenses. Students are strongly recommended to seek financial support from external sources.

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 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.

To assist students in the completion of their studies, the Graduate School also offers University Dissertation Fellowships to eligible advanced graduate students 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 year 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 some departments where there are insufficient opportunities for undergraduate teaching, graduate students who were admitted with stipends may continue to receive fellowship stipends in their third and fourth years of study up to the level of their standard departmental stipend. Stipend support will normally be withheld if a student in the third or fourth year 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

When departments are considering applications for teaching fellowships, qualified graduate students in the third and fourth years of study will be given priority in the assignment of such fellowships regardless of their department or program of registration. Students in their fifth or sixth year of study (who have been admitted to candidacy) will be permitted to teach as long as they do not currently hold a dissertation fellowship. Students who are permitted to register beyond the sixth year of study may be appointed as teaching fellows or part-time acting instructors, 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 least should be given preference.

CONDITIONS OF ELIGIBILITY

A student must be registered full time in the Graduate School to be appointed as a teaching fellow (TF) or as a part-time acting instructor (PTAI).

The Graduate School requires that all students who teach be fluent in English. Graduate students from countries where English is not the principal language will normally be asked to demonstrate their eligibility to teach by passing the SPEAK test before they may begin teaching.

TYPES OF APPOINTMENTS

Graduate students may hold one of two principal types of teaching fellowships: they may be named teaching fellows or part-time acting instructors. Teaching fellows assist full-time faculty in teaching and administering relatively large undergraduate courses. Part-time acting instructors are fully responsible for undergraduate courses, subject to guidance and advice by department faculty.

LIMITS ON THE AMOUNT OF 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 the director of graduate studies, the appropriate associate dean, and the director of the Teaching Fellow Program. First-year students in the sciences and second-year students in all divisions will normally not be allowed to teach more than eight teaching fellow units in a single year, and not more than four units in a single term.

After the second year, but before they have completed their qualifying examinations, students are permitted to teach up to a maximum of four TF units or one PTAI in introductory courses per term with a maximum of eight TF units or two PTAIs per year.

Students appointed as trainees on NIH or NIMH training grants or as assistants in research are eligible to serve as a TF 2 for each term of the academic year, or as a PTAI for one term only. Any exception to this rule must be approved in advance by the appropriate associate dean.

Students who hold full outside fellowships with a stipend that is larger than the standard departmental stipend will not be eligible for more than four TF units in one academic year. Students with other outside fellowships are eligible to serve as TFs according to the policies of their departments and the conditions of their outside awards.

LEVELS OF TEACHING FELLOWS

The levels of teaching fellows at Yale are distinguished from one another by several considerations, including the kind or kinds of teaching required and the number of students taught. For example, courses in which teaching fellows 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.

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. If the TF's duties include substantial amounts of both (a) and (b), he or she should be appointed TF 2. Approximate weekly effort, 5 hours. Stipend in 2001–2002: $1,681.

Teaching Fellow 2: TF 2s typically lead and grade one discussion or laboratory section of up to twenty students or combine duties (a) and (b) as described under TF 1. Approximate weekly effort, 10 hours. Stipend in 2001–2002: $3,362.

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. Stipend in 2001–2002: $5,043.

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. This appointment is also used for Writing Intensive TFs. Approximate weekly effort, 17.5 hours. Stipend in 2001–2002: $5,884.

Teaching Fellow 4: This appointment is appropriate for TFs in humanities and social science departments where teaching fellows usually lead and grade two sections. Approximate weekly effort, 20 hours. Stipend in 2001–2002: $6,724

The Graduate School normally limits the size of discussion sections in lecture courses led by teaching fellows to eighteen to twenty students. Enrollments should not exceed twenty students unless an unavoidable circumstance, such as the absence of another qualified teaching fellow, makes it necessary.

PART-TIME ACTING INSTRUCTORS

Graduate students appointed as part-time acting instructors (PTAIs) are fully 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.

Graduate students who are chosen to teach Residential College Seminars will be appointed as PTAIs and will receive the standard PTAI per-course stipend.

Like all teaching, hours of effort for PTAIs cannot be approximated and will vary from one individual to another. The stipend in 2001 – 2002 will be $6,834 per term course.

Traineeships and Assistantships in Research

Traineeships (National Research Service Awards) from the National Institutes of Health and the National Institute of Mental 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. In no case will the application of this policy reduce the amount of an external award, nor will it reduce the amount of a teaching fellowship.

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 2001–2002, University Dissertation Fellowships will carry a stipend of $13,700. A student may be awarded a dissertation fellowship for one year only. Additional information about these fellowships may be obtained 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

www.yale.edu/graduateschool/financial/student_loans.html

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, 128 HGS.

During 2001–2002, 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 Financial Aid.

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 2001–2002 *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 128 HGS.

University Services and Facilities

LIVING ACCOMMODATIONS

Graduate Housing — On Campus

www.yale.edu/hronline/gho/

The Graduate Housing Office has dormitory and apartment units for a small number of graduate and professional students. Approximate rates for 2001–2002 are: dormitory (single) housing, $4,022–4,782 per academic year; apartments (single and family housing), $580–838 per month. The Graduate School of Arts and Sciences will mail or fax the Graduate Housing brochure and application to students when they have accepted an offer of admission. 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 at www.yale.edu/hronline/gho/. 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, contact Betsy Rosenthal at 203.432.8270, fax 203.432.0177, or betsy.rosenthal@yale.edu.

Off-Campus Listing Service

www.yale.edu/hronline/ochousing/

The University's Off-Campus Listing Service, a service for current or incoming members of the Yale community, is located at 155 Whitney Avenue, third floor, and is 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 at www.yale.edu/hronline/ochousing/. Call 203.432.9756 to obtain the necessary passwords to access the system from other areas.

HEALTH SERVICES

www.yale.edu/uhs/

Yale University Health Services (YUHS) is located on campus at the University Health Services Center (UHSC) 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 twenty-four-hour urgent care clinic, and such specialty services as allergy, dermatology, and orthopedics, among others. 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 comprehensively described in the *YHP Student Handbook,* available through the YHP Member Services Department, 203.432.0246, located at 17 Hillhouse Avenue.

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 health (mental hygiene). In addition, through the Urgent Care Clinic, treatment for urgent medical problems can be obtained twenty-four hours a day. Students who need more acute care receive services in the ICF.

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 fee. 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 UHSC. 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 requires all students eligible for YHP Basic Coverage also 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 in August. 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 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 fee 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. 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

Before matriculation, 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 one month 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.

Students who have not met these requirements prior to arrival at Yale University must receive the immunizations from YHP and will be charged accordingly.

COMPUTING AND COMMUNICATIONS

www.yale.edu/its/

Information Technology Services (ITS), located at 175 Whitney Avenue, is the University central computing and communications services organization, providing academic computing, data networking, telephone services, voice and video networking, computer sales and repair, training, printing and reprographic services, and general user support (www.yale.edu/its).

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/acs/). Windows NT and Apple Macintosh 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 networking cards, modems, and printers, as well as software and supplies. Apple, IBM, and Dell now support direct purchase of computers over the Internet, and MCSC works closely with vendors to ensure that systems are properly configured for the Yale network. Up-to-date information on pricing and on ordering can be found at the eportal Web site. 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. The Internet Information Center, at 221 Whitney Avenue, offers consulting services for campus network and Internet access for those who live off campus (www.yale.edu/iic/).

To enhance support for graduate student research activities, the University provides "dynamic IP addressing" for laptop computers. Laptop Ethernet ports are available in residences, in the McDougal Center Common Room, in the Sterling Memorial Library (SML) reading room and, for doctoral students, in the SML carrels. Registered users can plug in to the network automatically to access network resources.

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 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. In addition, OISS maintains an electronic newsletter, which is distributed by e-mail on a regular basis. To subscribe, e-mail your e-mail address and name to oiss@yale.edu.

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 to providing suitable accommodations. Documentation may be submitted to the Resource Office even if 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, 100 Wall Street, PO Box 208305, New Haven CT 06520-8305. Access to the Resource Office is through the College Street entrance to William L. Harkness Hall (WLH). Office hours are Monday through Friday, 8.30 A.M. to 5 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 Thursday, and from 9 A.M. to noon on 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, or e-mail international.centernh@yale.edu.

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 Unification Church, the New Haven Zen Center, and the Muslim Student Association. Additional information is available at http://www.yale. edu/chaplain/.

CULTURAL OPPORTUNITIES

Yale has long been known for its training and work in the creative and performing arts and this leadership adds much to the cultural life of the University, the city of New Haven, and the entire region. A calendar of events in the University is issued each week

during the academic year in the *Yale Bulletin & Calendar*. The hours when special as well as permanent collections of the University are also recorded in this publication.

The Yale Peabody Museum of Natural History contains collections in anthropology, mineralogy, oceanography, paleontology, and some aspects of 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 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.

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, 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 Theater, 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 amazing 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, an architectural marvel; 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 envy of the Ivy League; 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 undergraduate 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.

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 undergraduate 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 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.), Bachelor of Liberal Studies (B.L.S.).

For additional information, please write to the Office of Undergraduate Admissions, Yale University, PO Box 208234, New Haven 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 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, 203.432.2770; 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 Yale Graduate School 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, www.info.med.yale.edu/medadmit/

For additional information about the Department of Epidemiology and Public Health, an accredited School of Public Health, please write to the Director of Admissions, Department of Epidemiology and Public Health, Yale School of Medicine, PO Box 208034, New Haven CT 06520-8034; e-mail, eph.admissions@yale.edu; Web site, www.info.med.yale.edu/eph/

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 University Divinity School, 409 Prospect Street, New Haven CT 06511; telephone, 203.432.5360; fax, 203.432.5356; 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.yale.edu/law/

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 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 2001

Monday, August 27	New student orientation week begins.
Tuesday, August 28	Orientation for new international students begins.
Wednesday, August 29	Matriculation ceremony.
Thursday, August 30	SPEAK test for new international students in Ph.D. programs.
Friday, August 31	Registration and orientation in departments for all new students begins.
Tuesday, September 4	Registration for returning students begins.
Wednesday, September 5	Fall-term classes begin, 8.30 A.M.
Friday, September 7	Final day to pick up registration materials from academic departments.
Wednesday, September 19	Fall-term course enrollment forms are due. Final day for registration. *A fee of $25 is assessed for forms 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 28	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.*)
Monday, October 1	Final date for the faculty to submit grades to replace Temporary Incompletes (TI's) awarded during the 2000 – 2001 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 26	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 7.*
	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 9.*
	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.*
Thursday, November 1	Readers' reports are due for dissertations to be considered by the Degree Committees for award of the Ph.D. in December.
Wednesday, November 7	Departmental recommendations are due for candidates for December degrees.
Friday, November 9	Final day to change enrollment in a fall-term course from Credit to Audit *or* from Audit to Credit.
Saturday, November 17	Fall recess begins, 9.00 P.M.
Monday, November 26	Classes resume, 8.30 A.M.
Thursday, November 29	SPEAK test for international students in Ph.D. programs.
Friday, December 7	Final day to withdraw from a fall-term course.
Saturday, December 22	Fall term ends; winter recess begins.

SPRING TERM 2002

Monday, January 14

Registration and spring ID validation begin.

Spring-term classes begin, 8.30 A.M.

Wednesday, January 16

Final grades for fall-term courses due.

Friday, January 18

Final day to pick up registration materials from academic departments. Friday undergraduate classes do not meet. Monday classes meet instead.

Monday, January 21

Martin Luther King Day. Administrative offices closed. Classes do not meet.

Monday, January 28

Registration and spring ID validation end. Spring-term course enrollment forms are due. *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 8

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 8

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 Friday, 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, April 1.
	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.*
Friday, 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 25	Classes resume, 8.30 A.M.
Friday, March 29	Good Friday; *classes meet.*
Monday, April 1	Final day to change enrollment in a spring-term course from Credit to Audit *or* from Audit to Credit.
Thursday, April 18	Readers' reports are due for dissertations to be considered by the Degree Committees for award of the Ph.D. in May.
Thursday, April 25	Departmental recommendations are due for candidates for May degrees.
	SPEAK test for international students in Ph.D. programs.
Monday, April 29	Final day to withdraw from a spring-term course. Friday undergraduate classes meet. Classes end, 5.20 P.M.
Tuesday, May 14	Spring term ends.
Friday, May 17	Final grades for spring-term courses are due for candidates for M.A. and M.S. degrees to be awarded at Commencement (master's programs).
Sunday, May 26	Graduate School Convocation.
Monday, May 27	University Commencement.
Monday, June 3	Final grades for spring-term courses and full-year courses are due.

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YALE UNIVERSITY—SOUTH

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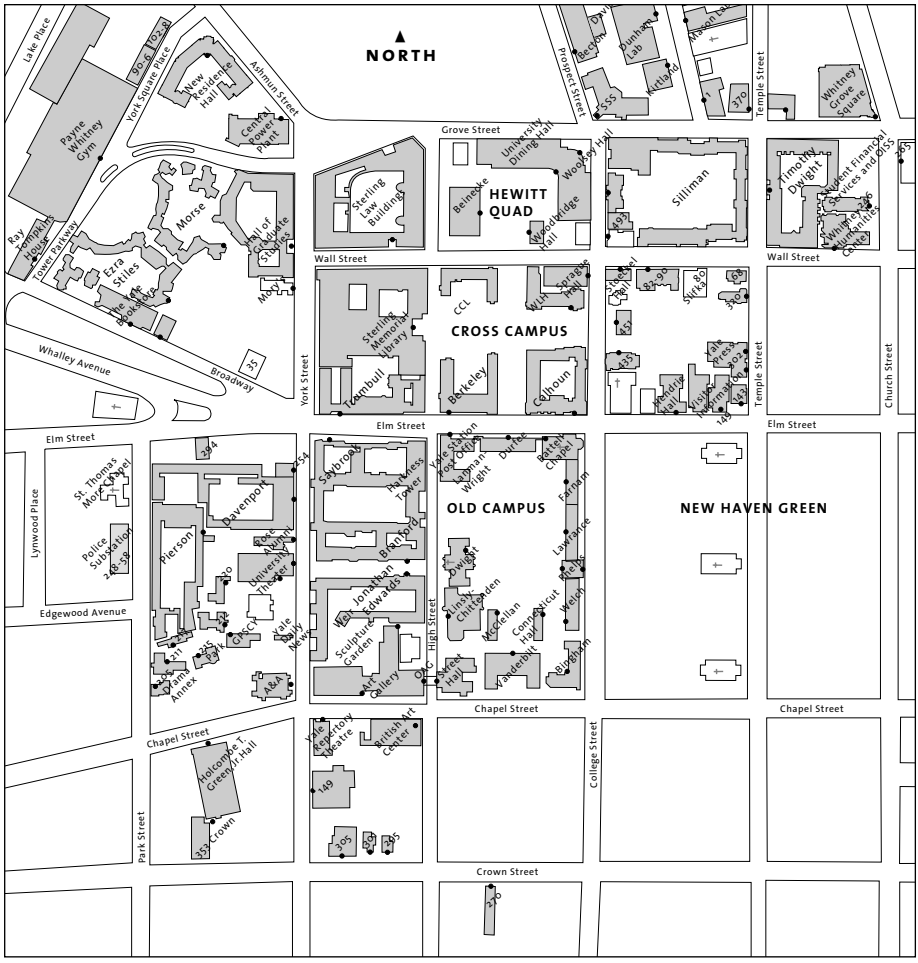

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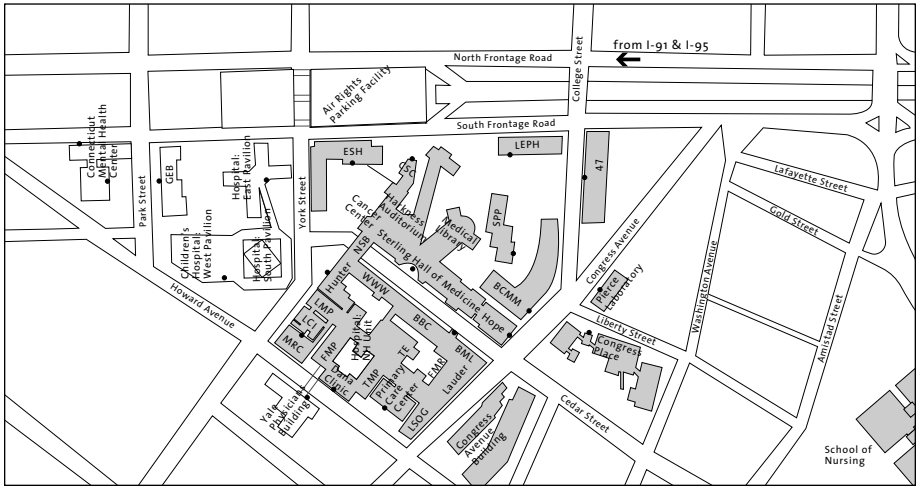

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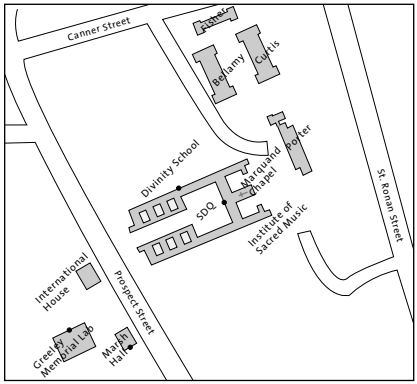

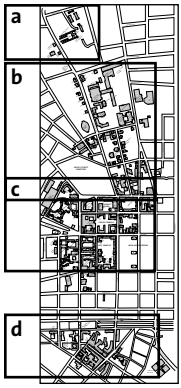

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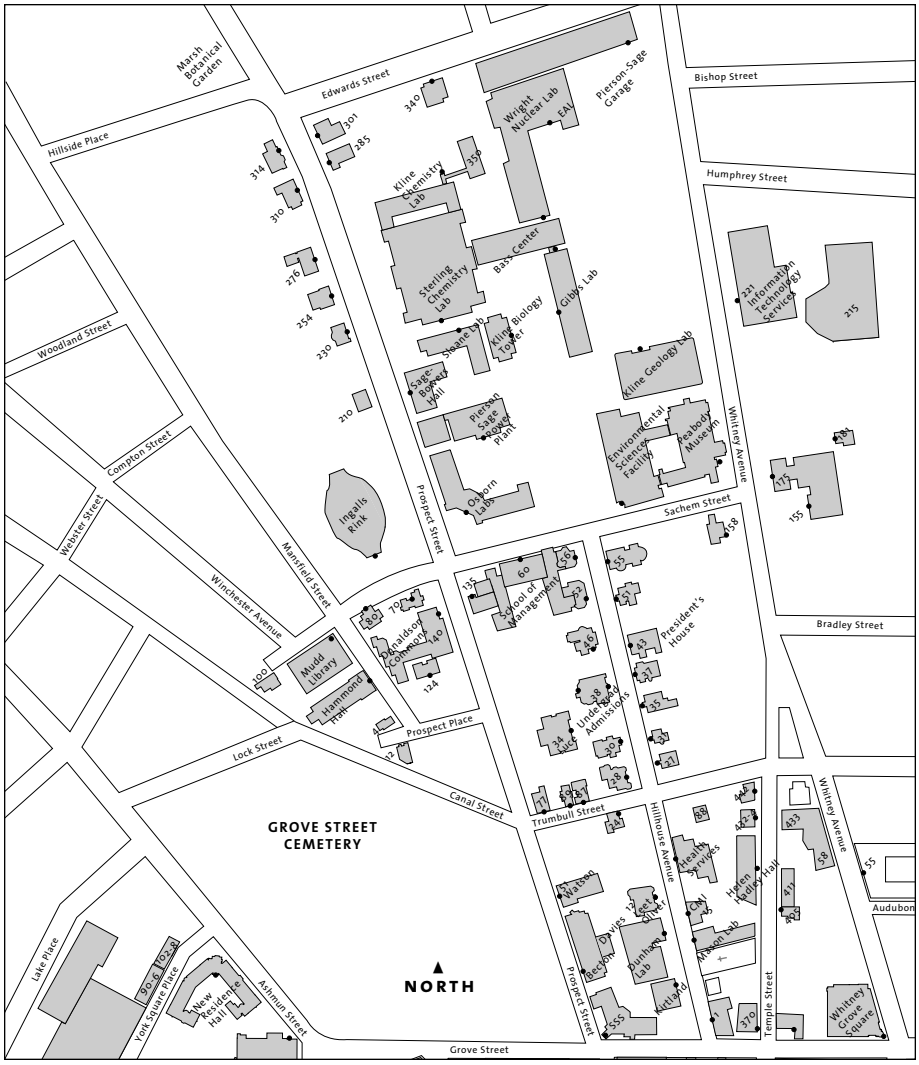

Not to scale

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 Frances A. Holloway, 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: 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
451 College 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
165 Elm Street (Assists students in obtaining part-time employment both inside and outside the University.)

STUDENT LOAN OFFICE: 432.4120
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.)

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