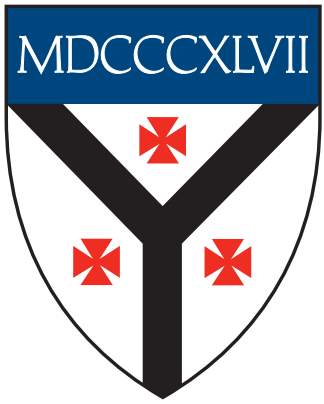
Graduate School of Arts and Sciences

Programs and Policies

2016–2017



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Series 112 Number 5 July 15, 2016

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The President and Fellows of Yale University

President
Peter Salovey, A.B., A.M., Ph.D.

Fellows
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Her Honor the Lieutenant Governor of Connecticut, *ex officio*
Joshua Bekenstein, B.A., M.B.A., Wayland, Massachusetts
Jeffrey Lawrence Bewkes, B.A., M.B.A., Old Greenwich, Connecticut
Maureen Cathy Chiquet, B.A., Purchase, New York
Peter Brendan Dervan, B.S., Ph.D., San Marino, California
Donna Lee Dubinsky, B.A., M.B.A., Portola Valley, California
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Paul Lewis Joskow, B.A., Ph.D., New York, New York
William Earl Kennard, B.A., J.D., Charleston, South Carolina
Gina Marie Raimondo, A.B., D.Phil., J.D., Providence, Rhode Island (*June 2020*)
Emmett John Rice, Jr., B.A., M.B.A., Bethesda, Maryland (*June 2017*)
Eve Hart Rice, B.A., M.D., Bedford, New York (*June 2021*)
Kevin Patrick Ryan, B.A., M.B.A., New York, New York (*June 2018*)
Annette Thomas, S.B., Ph.D., London, England (*June 2022*)
Douglas Alexander Warner III, B.A., Hobe Sound, Florida
Lei Zhang, B.A., M.A., M.B.A., Beijing, China

The Officers of Yale University

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Vice President for New Haven and State Affairs and Campus Development
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Scott Allan Strobel, B.A., Ph.D.

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Eileen Mary O'Connor, B.S., J.D.

Effective August 10, 2016

The Administration of the Graduate School

Office of the Dean
Lynn Cooley, Ph.D., Dean of the Graduate School
Susanne Olsen, Senior Executive Assistant to the Dean

Academic Affairs
Pamela Schirmeister, Ph.D., Dean for Strategic Initiatives, the Graduate School and Faculty of Arts and Sciences; Dean of Undergraduate Education, Yale College; Senior Associate Dean of the Graduate School
Allegra di Bonaventura, J.D., Ph.D., Associate Dean of the Graduate School
Michelle Nearon, Ph.D., Associate Dean for Graduate Student Development and Diversity; Director, Office for Graduate Student Development and Diversity
Richard G. Sleight, Ph.D., Associate Dean of the Graduate School
Jasmina Besirevic Regan, Ph.D., Assistant Dean of the Graduate School
Robert Harper-Mangels, Ph.D., Assistant Dean of the Graduate School
Carl Hashimoto, Ph.D., Assistant Dean of the Graduate School
Elena D. Kallestinova, Ph.D., Assistant Dean of the Graduate School; Director of Graduate Writing Laboratory, Yale Center for Teaching and Learning

Graduate Student Life
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Graduate Admissions
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Lisa Furino, Assistant Director of Admissions

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Howard el-Yasin, M.A., Assistant Director, Teaching Fellow Program
Susan Wroszek, Assistant Director of Financial Aid

Administration
Mary Magri, M.B.A., Lead Administrator for the Dean's Administration

Other Academic Officers with Responsibilities in the Graduate School
Peter Salovey, Ph.D., President
Benjamin Polak, Ph.D. Provost
Tamar S. Gendler, Ph.D., Dean of the Faculty of Arts and Sciences

Schedule of Academic Dates and Deadlines

FALL TERM 2016

Aug. 22	M	New student orientation week begins
		Oral Performance Assessment for international students in Ph.D. programs
Aug. 24	W	Fall-term Online Course Selection (OCS) begins
Aug. 25	TH	Matriculation ceremony
Aug. 29	M	*Teaching @ Yale Day:* orientation for all new Teaching Fellows
Aug. 31	W	Fall-term classes begin, 8:20 a.m.
Sept. 2	F	Monday classes meet on Friday
		Due date to notify department of intention to submit dissertation for award of the Ph.D. in December
Sept. 5	M	Labor Day. Classes do not meet
Sept. 9	F	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 leave of absence effective on or before this date
Sept. 14	W	Fall-term Online Course Selection (OCS) ends
		Final day for registration. *A fee of $50 is assessed for course schedules accepted after this date*
Sept. 15	TH	Final day to file petitions for M.A., M.S., and M.Phil. degrees to be awarded in December
Sept. 23	F	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*
Oct. 3	M	Due date for dissertations to be considered by the Degree Committees for award of the Ph.D. in December
		Final date for the faculty to submit grades to replace grades of Temporary Incomplete (TI) awarded during the previous academic year
Oct. 18	T	October recess begins, 5:20 p.m.

Oct. 24	M	Classes resume, 8:20 a.m.
		Final day to change enrollment in a fall-term course from Credit to Audit or from Audit to Credit
		Final day to withdraw from a fall-term course
Oct. 28	F	Midterm
		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*
		Teaching appointments will not appear on the transcripts of students who withdraw from the assignment on or before this date
Nov. 3	TH	Readers' Reports are due for dissertations to be considered by the Degree Committees for award of the Ph.D. in December
Nov. 9	W	Final day to withdraw a degree petition for degrees to be awarded in December
Nov. 10	TH	Oral Proficiency Assessment for international students in all GSAS degree programs
Nov. 14	M	Departmental recommendations are due for candidates for December degrees
Nov. 18	F	November recess begins, 5:20 p.m.
Nov. 28	M	Classes resume, 8:20 a.m.
		Final day to submit petitions for extended registration and Dissertation Completion status for the spring term
Dec. 15	TH	Classes end, 5:20 p.m.
Dec. 16	F	Final examinations begin
Dec. 21	W	Examinations end. Winter recess begins

SPRING TERM 2017

Jan. 3	T	Final grades for fall-term courses due
		Final day that faculty may submit a request for the assignment of a grade of Temporary Incomplete
Jan. 11	W	Spring-term Online Course Selection (OCS) begins
Jan. 16	M	Martin Luther King Jr. Day. Administrative offices are closed

Jan. 17	T	Spring-term classes begin, 8:20 a.m.
		Registration begins
		Teaching @ Yale Day: orientation for all new Teaching Fellows
Jan. 20	F	Monday classes meet on Friday
Jan. 26	TH	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
Jan. 27	F	Spring-term Online Course Selection (OCS) ends
		Final day for registration. *A fee of $50 is assessed for course schedules accepted after this date*
Feb. 10	F	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*
Feb. 15	W	Due date to notify department of intention to submit dissertation for award of the Ph.D. in May
Mar. 1	W	Final day to file petitions for M.A., M.S., and M.Phil. degrees to be awarded in May
Mar. 10	F	Midterm
		Spring recess begins, 5:20 p.m.
		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*
		Teaching appointments will not appear on the transcripts of students who withdraw from the assignment on or before this date
Mar. 15	W	Due date for dissertations to be considered by the Degree Committees for award of the Ph.D. in May
Mar. 27	M	Classes resume, 8:20 a.m.
Apr. 7	F	Final day to change enrollment in a spring-term course from Credit to Audit or from Audit to Credit
		Final day to withdraw from a spring-term course

Apr. 17	M	Readers' Reports are due for dissertations to be considered by the Degree Committees for award of the Ph.D. in May
		Oral Proficiency Assessment for international students in all GSAS degree programs
Apr. 21	F	Departmental recommendations are due for candidates for May degrees
		Final day to withdraw a degree petition for degrees to be awarded in May
May 4	TH	Classes end, 5:20 p.m.
May 5	F	Final examinations begin
		Final day to submit Dissertation Progress Reports
		Final day to submit petitions for extended registration and Dissertation Completion status for the subsequent academic year
May 10	W	Final examinations end
May 12	F	Final grades for spring-term courses are due for candidates for terminal M.A. and M.S. degrees to be awarded at Commencement
May 21	SU	Graduate School Convocation
May 22	M	University Commencement
June 1	TH	Final grades for spring-term courses and full-year courses are due
		Final day that faculty may submit a request for the assignment of a grade of Temporary Incomplete

A Message from the Dean

Welcome to the Graduate School of Arts and Sciences at Yale University, the first of its kind in North America. The Graduate School stands at the very heart of Yale's mission as a university, and this publication, *Programs and Policies,* reveals the extraordinary breadth of opportunities for graduate study at Yale. As you peruse it, you likely will discover the intriguing ways in which graduate study differs from the undergraduate experience and the fulfillment brought by this intellectual progression. You have undertaken to explore a field in depth, master an area of inquiry, and learn to disseminate knowledge through classroom teaching. Graduate education culminates in a creative and original contribution in one's field of study representing the ability to participate in the advancement of human knowledge.

Yale's departments and programs constitute the center for most graduate student intellectual and social life at Yale. They comprise vital communities of scholars who share a common interest in advancing a particular discipline, and graduate students and faculty alike gain immeasurably from their intellectual and disciplinary collaborations. Yale's excellent laboratory facilities, unique museum collections, and tremendous library holdings all enrich the experience of a Yale University graduate education.

The Graduate School of Arts and Sciences has worked to extend and enrich the community life found within these disciplines. Interdisciplinary programs and institutes, as well as the events offered by the McDougal Graduate Student Center, the Office of Career Strategy, and the Center for Teaching and Learning, help graduate students prepare for their professional lives. The Graduate School enables students to connect with skilled experts with a shared commitment to careers in teaching, research, and an array of potential leadership opportunities.

Use *Programs and Policies* as a guide throughout your graduate study at Yale. It includes practical information about registration, financial aid, teaching experiences, University resources available to you, and the full range of assistance provided by the Graduate School. All of us in the Graduate School wish you good fortune as you pursue your advanced degree, and we want you to contact us if we can help you along the way. Graduate study is exhilarating and life-changing. For well over a century Yale has prepared women and men for truly extraordinary careers across many old, new, and evolving disciplines.

Lynn Cooley, Ph.D.
Dean, Graduate School of Arts and Sciences
C.N.H. Long Professor of Genetics and Professor of Cell Biology
and of Molecular, Cellular, and Developmental Biology

The Graduate School of Arts and Sciences

The Yale Graduate School of Arts and Sciences is one of fourteen 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. Fifty-six departments and programs offer courses of study leading to the Ph.D. degree. There are nineteen programs that terminate with the master's degree.

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

The Graduate School community has grown vigorously since the early twentieth century; today it comprises more than 2,800 graduate students and a faculty of 999 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 600 students.

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

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

MISSION STATEMENT

The mission of the Graduate School of Arts and Sciences is to seek students of the highest intellectual promise and achievement of all backgrounds, from across the nation and around the world, and to educate them to be scholars, teachers, and leaders for many sectors of society. The larger aim of this enterprise is to prepare and stimulate each new generation to perpetuate and advance human knowledge and to contribute to the health and development of the human community.

YALE AND THE WORLD

The Yale Graduate School has always comprised an international community, but it recognizes as well that now, more than ever, advanced scholarship must occur on

transnational grounds. It is increasingly important that we prepare our students to participate in a global economy of research and knowledge and that we create institutional channels through which such participation can flourish. In addition to formal student exchanges that enable graduate students to perform research and fieldwork abroad, individual faculty members, departments, and the School participate in collaborative efforts with international partners.

Approximately one-third of full-time graduate students at Yale come from outside the United States. In addition, many international students come to the Graduate School as nondegree students in the Division of Special Registration (DSR). DSR students may undertake course work and/or research for periods of one term or one year. When appropriate the period may extend for a second year. These students are subject to the usual admissions procedure, are admitted to a department, and often work with a specific faculty member. See International Student Life for additional information regarding international student life at Yale.

A Global University

Yale continues to evolve as a global university, educating leaders and advancing the frontiers of knowledge across the entire world. The University's engagement beyond the United States dates from its earliest years. Yale has drawn students from abroad for nearly two centuries, and international topics have been represented in its curriculum for the past hundred years and more.

This year, Yale welcomed the largest number of international students and scholars in its history. The current enrollment of approximately 2,500 international students from more than 115 countries comprises 20 percent of the student body. Yale is committed to attracting the best and brightest from around the world by offering generous international financial aid packages, conducting programs that introduce and acclimate international students to Yale, and fostering a vibrant campus community. The number of international scholars (visiting faculty, researchers, and postdoctoral fellows) has also grown to nearly 2,500 each year.

Yale's globalization is guided by three overarching goals: prepare students for leadership and service in an increasingly interdependent world, attract the most talented students and scholars to Yale from around the world, and position Yale as a global university of consequence. These efforts are coordinated by several University-wide organizations, in addition to the work being done within the individual schools and programs.

The Whitney and Betty MacMillan Center for International and Area Studies (http://macmillan.yale.edu) is the University's focal point for teaching and research on international affairs, societies, and cultures.

The Jackson Institute for Global Affairs (http://jackson.yale.edu) seeks to institutionalize the teaching of global affairs throughout the University and to inspire and prepare Yale students for global citizenship and leadership.

The Office of International Affairs (http://world.yale.edu/oia) provides administrative support for the international activities of all schools, departments, centers, and organizations at Yale; promotes Yale and its faculty to international audiences; and works to increase the visibility of Yale's international activities around the globe.

The Office of International Students and Scholars (http://oiss.yale.edu) hosts orientation programs and social activities for the University's international community and is a resource for international students and scholars on immigration matters and other aspects of acclimating to life at Yale.

The Yale World Fellows Program (http://worldfellows.yale.edu) hosts fifteen emerging leaders from outside the United States each year for an intensive semester of individualized research, weekly seminars, leadership training, and regular interactions with the Yale community.

The Association of Yale Alumni (http://aya.yale.edu) provides a channel for communication between the alumni and the University and supports alumni organizations and programs around the world.

Additional information may be found on the "Yale and the World" Web site (http://world.yale.edu), including resources for those conducting international activities abroad and links to international initiatives across the University.

THE DEAN

Lynn Cooley, grad.dean@yale.edu

The dean of the Graduate School is appointed by the president of the University and is responsible for the educational mission of the Graduate School, the quality of its programs, and the welfare of graduate students.

ASSOCIATE AND ASSISTANT DEANS FOR ACADEMIC AFFAIRS

Pamela Schirmeister, Dean for Strategic Initiatives, the Graduate School and Faculty of Arts and Sciences; Dean of Undergraduate Education, Yale College; Senior Associate Dean of the Graduate School, pamela.schirmeister@yale.edu
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Richard G. Sleight, Associate Dean, richard.sleight@yale.edu
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Jasmina Besirevic Regan, Assistant Dean, jasmina.besirevic@yale.edu
Robert Harper-Mangels, Assistant Dean, robert.harper-mangels@yale.edu
Carl Hashimoto, Assistant Dean, carl.hashimoto@yale.edu

The academic 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 progress and well-being of students. They participate in decisions regarding admissions, financial aid, academic performance, and the application of the policies of the Graduate School.

Dean Schirmeister oversees initiatives linking the schools in the Faculty of Arts and Sciences, including the Teaching Fellow Program.

Deans di Bonaventura, Besirevic Regan, and Harper-Mangels oversee graduate education at the programmatic level, as well as the distribution of admissions resources.

Dean Sleight oversees individual student progress and academic support services.

Dean Nearon oversees initiatives to build and maintain a diverse and supportive campus community.

Dean Hashimoto works on special projects and serves as the school's Title IX coordinator.

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 departments 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.

GRADUATE STUDENT DEVELOPMENT AND DIVERSITY

Michelle Nearon, Associate Dean for Graduate Student Development and Diversity;
Director, OGSDD, 206 Warner House, 1 Hillhouse Ave., 203.436.1301
http://gsas.yale.edu/diversity

The Office for Graduate Student Development and Diversity's mission is to expand the diversity of the student body and to enhance the intellectual experience of the entire scholarly community. The office coordinates efforts to recruit and retain students of color, women, and other diverse groups at Yale Graduate School. The associate dean works collaboratively with departments and programs to support the needs of these students as they pursue graduate study. The associate dean advises prospective and current minority graduate students, directs the Summer Undergraduate Research Fellowship (SURF) Program, co-directs the Postbaccalaureate Research Education Program, oversees Diversity Recruitment Days, coordinates the Annual Yale Bouchet Conference on Diversity and Graduate Education, writes and administers grants, and provides reports on the Graduate School's progress in recruiting and retaining diverse 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 diverse scholars, and social and cultural events. An Advisory Committee, appointed by the dean, meets regularly to discuss and review the office's programmatic efforts.

MCDOUGAL GRADUATE STUDENT CENTER

Hall of Graduate Studies, 203.432.BLUE (2583)
http://gsas.yale.edu/life-yale/mcdougal-graduate-student-center

A generous gift from Mr. Alfred McDougal '53, a Yale alumnus, and his wife, Ms. Nancy Lauter, enabled Yale to create the McDougal Graduate Student Center in 1997. The McDougal Center provides space and programs for building intellectual, cultural, and

social community, as well as facilitating professional development activities across the departments of the Graduate School. The McDougal Center endowment supports the facilities of the center and the appointment of more than fifty McDougal Fellows in five offices who create programs and services for the graduate community.

Graduate Student Life

Lisa Brandes, Assistant Dean for Student Affairs and Director, 126 HGS, 203.432.2583, mcdougal.center@yale.edu
Jennifer Mendelsohn, Associate Director, 125 HGS, 203.432.2583, mcdougal.center@yale.edu
http://gsas.yale.edu/life-yale/graduate-student-life-office
http://gsas.yale.edu/events

The Office of Graduate Student Life is responsible for student life programs in the McDougal Center and student services in the Graduate School. McDougal Graduate Fellows and staff produce a wide array of student life programs, including concerts; arts, literary, music, sports, and cultural events; health and wellness programs; outings; family activities and resources; international student events; religious and spiritual events; public service opportunities; and monthly happy hours, dances, and events for various student groups. Graduate Student Life provides advice and support to graduate student organizations, which may sponsor events at the center. Activities are announced in the weekly e-mail McDougal Graduate Student Life Notes, on social media, and on the GSAS Web calendar listed above. This office also oversees the facilities and general services of the McDougal Center, including meeting rooms and room requests, online ticket sales, and lockers.

In collaboration with the Office of the Vice President for Student Life, the assistant dean for student affairs coordinates general campus services for graduate students, serving as a graduate student advocate and departmental liaison for graduate housing, dining services, health services, athletics, security, chaplains, child care, and parking and transit. The assistant dean 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. The Graduate Student Life office also assists departmental recruitment activities and organizes new student orientation, GS Dean's social events, and other events for the Graduate School community, including the Graduate School's participation in the University's Commencement exercises.

ADMISSIONS

Robert Colonna, Director, 307 Warner House, 1 Hillhouse Ave., 203.432.2771, graduate.admissions@yale.edu
Lisa Furino, Assistant Director, 302 Warner House, 1 Hillhouse Ave., 203.432.2771, graduate.admissions@yale.edu
http://gsas.yale.edu/admission-graduate-school

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 also works with the associate deans and academic departments to provide relevant information and decisions to applicants.

BUSINESS OPERATIONS

Mary Magri, Lead Administrator for the Dean's Administration, Warner House, 1 Hillhouse Ave., 203.432.7980, mary.magri@yale.edu

The Office of Business Operations is responsible for all financial transactions in the Graduate School, overseeing both financial aid and operating activities. Working with the dean and others, the office develops and monitors all Graduate School budgets and expenditures, maintaining compliance with internal and external policies and regulations. The office provides support to the dean and Graduate School supervisory staff in hiring, training, and related human resources activities of the School. The office is a resource to Graduate School, University, and external organizations seeking interpretation of policies and regulations, providing guidance about procedures, reporting, and interactive systems.

FINANCIAL AID

Jennifer Brinley, Director, 106 Warner House, 1 Hillhouse Ave., 203.432.7980, gradfinaid@yale.edu
http://gsas.yale.edu/office-financial-aid

The Office of Financial Aid is a resource to graduate students, departments, and non-Yale organizations needing guidance or assistance regarding financial aid policies and the administration of fellowships and student loan programs. The office oversees and maintains financial and data management systems and disburses all graduate student financial aid.

REGISTRAR'S OFFICE

Shonna Marshall, Associate University Registrar for Student Support, 246 Church St., 203.436.8036, registrar.gsas@yale.edu
Claudia Schiavone, Assistant University Registrar, 246 Church St., 203.432.2743, registrar.gsas@yale.edu

The Office of the Registrar maintains the academic records of all students in the Graduate School. In addition, the 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 Social Security number, to request transcripts, or to certify their enrollment in the Graduate School. Students can change their address listing at www.yale.edu/sis.

TEACHING FELLOW PROGRAM

teaching.fellows@yale.edu
http://gsas.yale.edu/academic-professional-development/teaching-fellow-program

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.

AFFILIATED OFFICES

Office of Career Strategy

Hyun Ja Shin, Director, Graduate and Postdoctoral Career Services, careerstrategy@yale.edu
Brian Frenette, Senior Associate Director, Graduate and Postdoctoral Career Services, careerstrategy@yale.edu
55 Whitney Ave., 3rd Floor
http://ocs.yale.edu

The Office of Career Strategy assists currently enrolled degree students in the Graduate School of Arts and Sciences and recent alumni with career advising, nonacademic employment opportunities, and career development resources. Offerings include individual advising appointments and daily walk-in hours; workshops, programs, and online webinars; employer recruiting events, information sessions, and an on-campus interview program; alumni networking events; an employer database with more than 10,000 registered employers and an online job posting resource with current opportunities; an interactive mock interview system; partnerships with external career partners; and the Office of Career Strategy McDougal Fellows, who plan programming unique to graduate students and offer peer advising. All degree students in the Graduate School of Arts and Sciences receive regular communication and program updates from the Office of Career Strategy via its weekly e-newsletter. In addition, degree students can view its calendar of events and make appointments with a career adviser via Symplicity, the office's career services management system.

Yale Center for Teaching and Learning

Jennifer Frederick, Executive Director, jennifer.frederick@yale.edu
113 HGS
http://ctl.yale.edu

The Yale Center for Teaching and Learning (CTL) supports teaching excellence and innovation campuswide and unites Yale's work in online education with the University's other pedagogical initiatives. Several units within the CTL are focused exclusively on

professional development and skill-based training for graduate and professional school students.

MCDOUGAL PROGRAM FOR GRADUATE TEACHING

120 HGS
http://ctl.yale.edu/teaching

This CTL unit offers a full range of training, consultation, and teacher development services to teaching fellows and postdoctoral fellows at Yale. The professional staff and graduate teaching consultants are available throughout the year and in a variety of capacities to provide assistance and training in a wide array of topics and issues. For first-time teaching fellows, the center organizes Fundamentals of Teaching courses for specific departments, such as Chemistry, Engineering & Applied Science, History, Music, Political Science, and Physics. (Departments and programs seeking their own discipline-centered program should contact the CTL.) In addition, the center offers Fundamentals of Teaching courses in the humanities, social sciences, sciences, and foreign languages. For more advanced graduate teachers, the CTL offers workshops on topics such as classroom management, course design, grading, instructional technology, and leading discussions. It also offers upper-level programs to help graduate students prepare for the academic job market, including sessions on interview preparation, syllabus design, and developing a teaching portfolio, including writing a teaching statement. The CTL also offers an extensive program of individual consultations and coaching, which may include classroom visits and videotaping. All of the CTL's programs and consultations are strictly confidential. Graduate students who avail themselves of these and other on-campus teaching programs can obtain a Certificate of College Teaching Preparation (CCTP). Through its Spring Teaching Forum, the CTL provides a venue for members of the Yale community to discuss issues in education and pedagogy. Its Associates in Teaching program allows graduate students to co-design and co-teach a course with a faculty mentor.

On the CTL Web site, graduate students will find a variety of online teaching resources, including a calendar of events, descriptions of the CTL programs, a "Teaching How-To" for new and returning teachers, and modules on important teaching topics. The CTL connects with graduate students through its blog, Facebook page, and Twitter account, all of which are accessible at http://ctl.yale.edu/teaching. All graduate students also receive its occasional e-newsletter about upcoming and new programs and events.

GRADUATE WRITING LABORATORY

Elena D. Kallestinova, Assistant Dean and Director, 35 Broadway, Rm. 210,
203.432.7725, elena.kallestinova@yale.edu, grad.writing@yale.edu
http://ctl.yale.edu/writing/graduate

The Graduate Writing Laboratory (GWL), a unit of the CTL, offers resources to all currently enrolled GSAS students who want to grow as successful academic writers. The GWL offers support through individual advising, academic writing workshops, writing groups, and online resources. Graduate students are encouraged to schedule individual writing consultations with Graduate Writing Advisers, available throughout the academic year and meeting in the GWC, the Center for Science and Social Science

Information (CSSSI), and the Cushing/Whitney Medical Library. During these consultations, the students can receive feedback on their written course work, grant proposals, fellowship applications, conference presentations, research papers, prospectuses, and dissertation chapters. In addition, the GWL offers a comprehensive program of workshops, seminars, and discussion panels led by the director, McDougal Graduate Writing Fellows, and invited speakers. These workshops relate to topics of academic research, writing, and publishing and take place at different locations convenient for the graduate students. The center also organizes regular writing groups including peer-review groups, dissertation boot camps, and study halls. These groups help students with the process of writing and provide accountability and peer support. A complete list of programs, together with a variety of handouts and online resources, is available through the GWL Web site and the e-newsletter circulated among graduate students.

CENTER FOR LANGUAGE STUDY

Nelleke Van Deusen-Scholl, Director; Associate Dean, Yale College; 203.432.6456, nelleke.vandeusen-scholl@yale.edu
Suzanne Young, Associate Director, 203.432.0168, suzanne.young@yale.edu
James Tierney, Director, English Language Program, james.tierney@yale.edu
Dow Hall, 370 Temple St.
http://cls.yale.edu

The Center for Language Study (CLS), a unit of the CTL, supports language teaching and learning across the university. For graduate students in language and literature programs, it offers a Certificate in Second Language Acquisition that includes pedagogy workshops, a capstone course in SLA, and a series of professional development workshops that, taken together, give graduate students grounding in the theory and practice of language teaching. Graduate students have found the SLA Certificate helpful in preparing for the job market, in part because the teaching ePortfolio they prepare as they exit the program is attractive to hiring committees. For international graduate students, the CLS offers the English Language Program (ELP), which includes a Summer Program for incoming students, a series of courses that focus on academic English and teaching in the American classroom, workshops on a range of topics such as pronunciation and public speaking, and a final assessment that certifies graduate students for teaching at Yale. The goal of ELP is to prepare international graduate students for success in their academic and professional lives here at Yale and beyond. For more information, contact James Tierney at james.tierney@yale.edu. Finally, the CLS offers two programs for independent language learning, Directed Independent Language Study (DILS) and Fields, both of which are available to graduate students. DILS matches students who want to study languages not taught at Yale with an educated native speaker of that language. Fields matches advanced students of any language (including those taught at Yale) with a language partner to study a language and a field together (e.g., Chinese and Economics). Although neither DILS nor Fields carries course credit, graduate students often use these programs to prepare for field study and research, and for fellowship applications. For more information, contact Angela Gleason at angela.gleason@yale.edu.

COMMITTEES

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

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

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

Dean's Advisory Committee on Student Grievances Composed of three graduate 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 Grievance Procedures, under Policies and Regulations).

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 Personal Conduct, under Policies and Regulations).

GRADUATE STUDENT ASSEMBLY (GSA)

B43 HGS, 203.432.8893, gsa@yale.edu
http://gsa.yale.edu

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, nominates the student members of all Graduate School standing committees, and administers a conference travel fund for graduate students. 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.

GRADUATE-PROFESSIONAL STUDENT SENATE (GPSS)

gpss@yale.edu
http://gpss.yale.edu

The Graduate and Professional Student Senate (GPSS or "Yale Senate") is composed of student-elected representatives from each of the thirteen graduate and professional schools at Yale. Any student enrolled in these schools is eligible to run for a senate seat during fall elections. As a governing body, the GPSS advocates for student concerns and advancement within Yale, represents all graduate and professional students to the outside world, and facilitates interaction and collaboration among the schools through social gatherings, academic or professional events, and community service. GPSS meetings occur on alternating Thursdays and are open to the entire graduate and professional school community, as well as representatives from the Yale administration. GPSS also oversees the management of the Graduate and Professional Student Center at Yale (GPSCY), located at 204 York Street. GPSCY provides office and event space for GPSS and other student organizations and houses Gryphon's Pub.

Degree-Granting Departments and Programs

This section provides information on all degree-granting departments and programs of the Graduate School of Arts and Sciences. Each listing provides a roster of faculty, special admissions and degree requirements, and course offerings for that department or program. 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, under Policies and Regulations. 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* bulletin are posted on the departments' Web sites. General changes to degree requirements will be posted on the Graduate School's Web site.

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 www.yale.edu/oci for the most recent information.

Fall-term courses are indicated by the letter "a," spring-term courses by the letter "b"; summer courses are indicated by the letter "c." Yearlong courses have no letter designation or list both "a" and "b." A superscript "u" after a course number indicates that the course also has a Yale College course number. Courses in brackets are not offered during the current academic year.

AFRICAN AMERICAN STUDIES

81 Wall Street, 203.432.1170
http://afamstudies.yale.edu
M.A., M.Phil., Ph.D.

Chair
Jacqueline Goldsby (81 Wall St., jacqueline.goldsby@yale.edu)

Director of Graduate Studies
Daphne Brooks (81 Wall St., daphne.brooks@yale.edu)

Professors Elijah Anderson (*on leave* [Sp]), David Blight, Daphne Brooks, Hazel Carby, Glenda Gilmore (*on leave* [Sp]), Jacqueline Goldsby, Emily Greenwood (*on leave* [Sp]), Jonathan Holloway, Matthew Jacobson (*on leave*), Gerald Jaynes, Kobena Mercer (*on leave* [Sp]), Christopher Miller (*on leave* [Sp]), Joseph Roach, Robert Stepto (*on leave* [F]), Michael Veal

Associate Professors Crystal Feimster, Anthony Reed (*on leave* [F]), Edward Rugemer, Vesla Weaver

Assistant Professors Erica James, Christopher Lebron

Fields of Study

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

Special Admissions Requirements

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

Requirements for Transfer into the African American Studies Combined Ph.D. Program

A student currently enrolled in one of the departments or programs participating in the combined Ph.D. in African American Studies who desires to transfer into the combined Ph.D. program may do so after:

1. Providing the DGS of African American Studies with a written statement of interest detailing the reasons for the transfer;
2. Providing the DGS with a letter of support from an African American Studies faculty member agreeing to serve as the student's adviser;
3. A vote by the African American Studies faculty approving the transfer, with such vote held at a department meeting no earlier than the spring term of the student's first year as a graduate student at Yale.

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 DGS of African American Studies, and the DGS of the participating department or program and must be approved by all three. Students are required to take five courses in African American Studies, generally at least one course each term. Any variance in scheduling requires DGS approval. Core courses are (1) Theorizing Racial Formations (AFAM 505a/AMST 643a), which is a required course for all first-year graduate students in the combined program, and (2) Dissertation Prospectus Workshop (AFAM 895), a two-term course, which graduate students in their third year of study must satisfactorily complete. This workshop is intended to support preparation of the dissertation proposal; each student will be required to present his or her dissertation prospectus orally to the faculty and to turn in a written prospectus draft by the end of spring term. Three other graduate-level African American Studies courses are required: (1) a history course, (2) a social science course, and (3) a course in literature or culture.

Qualifying examinations and the dissertation proposal will be administered jointly by the African American Studies department and the participating department or program and must be passed within the time required by the participating department or program. A current tenured or ladder faculty member in African American Studies must serve on the dissertation committee, and the dissertation must have an African American Studies component. The total number of courses required will adhere to the requirements of the participating department or program. Each student must complete the minimum number of courses required by the participating department or program; African American Studies courses (excepting the dissertation prospectus workshop) count toward the participating department's or program's total. For details of these requirements, see the special requirements of the combined Ph.D. for the particular department or program printed in this bulletin. Students will be required to meet the foreign language requirements of the participating department or program (see Degree Requirements under Policies and Regulations). 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 or program. If a student intends to apply for this combined Ph.D. in African American Studies and another department or program, he or she should consult the other department's or program's Ph.D. requirements and courses.

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

Master's Degrees

M.Phil. See Degree Requirements under Policies and Regulations.

M.A. (en route to the combined 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 Dissertation Prospectus Workshop, which is taken in the student's third year of study. See also Degree Requirements under Policies and Regulations.

More information is available on the department's Web site, http://afamstudies.yale.edu.

Courses

AFAM 505a/AMST 643a, Theorizing Racial Formations Christopher Lebron
A required course for all first-year students in the combined Ph.D. program in African American Studies; also open to students in American Studies. This interdisciplinary reading seminar focuses on new work that is challenging the temporal, theoretical, and spatial boundaries of the field. M 9:25–11:15

AFAM 511b/HSAR 698b/WGSS 698b, Fault Lines: Race, Gender, and Sexuality in Contemporary Art Erica James
This seminar examines moments in which prevailing representational paradigms of race, gender, and sexuality were disrupted and transformed, affecting three-dimensional paradigm shifts in reading of race, gender, and sexuality in fine art and visual culture. Students deepen their engagement with and writing on this work beyond the ghetto of identity politics by considering multiple methods of theoretical analyses simultaneously. Sites of rupture include the art and visual culture that emerged around the figure of the boxer through Jack Johnson and Muhammad Ali; African diaspora visual poetics in the youth culture of South Africa and Jamaica; and the work of contemporary artists Kalup Linzy, Mickalene Thomas, and Iona Rozeal Brown. TH 1:30–3:20

AFAM 514a/AMST 735a/ENGL 950a, A Sound Theory of Blackness: African American Literature and Music in High Fidelity Daphne Brooks
An exploration of sonic theory and the African American literary tradition from the nineteenth century through the millennium with special emphasis on major debates in jazz studies and a critical (re)examination of blues ideologies, as well as the politics and poetics of spirituals, R&B and soul, funk, Afrofuturism, punk, pop, and hip-hop. The course places the work of a range of cultural theorists (Douglass, Du Bois, Adorno, Hurston, Ellison, Murray, Baraka, Mackey, Carby, Spillers, O'Meally, Griffin, Moten, Edwards,

Radano, Nancy, Szendy, Perry, Weheliye, etc.) in conversation with key texts and epochs in black letters. T 1:30–3:20

AFAM 546b/WGSS 610b, Theories of Race, Sex, and Injustice Joseph Fischel
Explorations of race, sex, and gender in political theories of injustice; identity formations as ambivalent aspirations for justice theory and justice politics; the body as policed, desired, and desiring; "matter" as idiom of justice. T 1:30–3:20

AFAM 558a/AMST 688a/HIST 577a/RLST 688a/WGSS 695a, Historicizing Religion Kathryn Lofton
What does it mean to offer a history of religion? How is a history of religion distinct from, or overlapping with, the history of race or gender? This course takes as its central subject a key methodological problem of modernity, namely the task to offer material accounts for human perception, social organization, and epistemological vantage. We read new historical monographs and relevant classic theories that consider what religion is, how its categorization is like and unlike other concepts for human distinction, and why it became something in modernity requiring historical diagnosis. Included in our topical survey are examinations of secularization and disenchantment; myth and narrative; church history and hagiography; objectivity and positivism; world religions and comparative religions; Orientalism and colonialism; sectarianism and secularism. Works read include Elizabeth A. Clark, *History, Theory, Text: Historians and the Linguistic Turn;* Sylvester Johnson, *African American Religions, 1500–2000: Colonialism, Democracy, and Freedom;* and Suzanne Marchand, *German Orientalism in the Age of Empire: Religion, Race, and Scholarship.* M 9:25–11:15

AFAM 584a/SOCY 584a, Inequality, Race, and the City Elijah Anderson
Urban inequality in America. The racial iconography of the city is explored and represented, and the dominant cultural narrative of civic pluralism is considered. Topics of concern include urban poverty, race relations, ethnicity, class, privilege, education, social networks, social deviance, and crime. M 11:30–1:20

AFAM 588b[U]/AMST 710b[U]/ENGL 948b[U], Autobiography in America Robert Stepto
A study of autobiographical writings from Mary Rowlandson's Indian captivity narrative (1682) to the present. Classic forms such as immigrant, education, and cause narratives; prevailing autobiographical strategies involving place, work, and photographs. Authors include Franklin, Douglass, Jacobs, Antin, Kingston, Uchida, Balakian, Als, and Karr. M 1:30–3:20

AFAM 616a/AMST 880a/WGSS 616a, Imagined Futures: Species Being, Biotechnologies, and Planetary Relations in Literature, Art, and Music Hazel Carby
This course interrogates the premises of speculative fiction alongside the futuristic compositions of visual artists and musicians. The theoretical and historical frameworks of the course are shaped by a deep engagement with questions of the possibilities and limits of the human, addressing theoretical and imaginative questions of species being, hybridity, genders and sexualities, racialization, and relationships between biology, technology, and the body. Readings in cultural and postcolonial theory provide an important lens into this material, and students are asked to consider how colonial and imperial pasts

and presents inform future imaginings or provide the motivation for creative artists to envision alternative futures. T 2:30–4:20

AFAM 622a/PLSC 851a, Race and Ethnicity in American Politics Vesla Weaver
This course examines different theories for understanding the racial order—non-zero-sum mobility, racial triangulation, interest convergence, racial resentment, capture, among others—as well as strategic responses by minorities to the racial order to undermine disadvantages: linked fate, distancing, threat mobilization, and coalition formation. Various social science methods are used. TH 9:25–11:15

AFAM 660b[U]/AFST 678b[U]/CPLT 678b[U]/ENGL 938b[U]/JDST 678b[U], The Literatures of Blacks and Jews in the Twentieth Century Marc Kaplan
This seminar compares representative writings by African, Caribbean, and African American authors of the past one hundred years, together with European, American, and South African Jewish authors writing in Yiddish, Hebrew, French, and English. This comparison examines the paradoxically central role played by minority, "marginal" groups in the creation of modern literature and the articulation of the modern experience. TH 1:30–3:20

AFAM 705b/AMST 708b/ENGL 708b/HIST 708b/HSHM 729b, The History of Race Greta LaFleur
This course offers a broad survey of the history of racial science and racialist thinking in the Atlantic world from the early modern period through the late nineteenth century. Rather than attempting to detail the histories of specific racial formations (such as blackness or whiteness), the course tracks the intellectual history of the emergence of "race" as a specific category of human differentiation and traces a swath of its most muscular—and pernicious—permutations through the eighteenth and nineteenth centuries. W 1:30–3:20

AFAM 716a/AMST 910a/HIST 764a, Working Group on Latina/o Studies I Stephen Pitti, Alicia Schmidt Camacho
A continuous workshop for graduate students in American Studies, History, African American Studies, and related fields. This group devotes the fall term to intensive reading and discussion of important interdisciplinary texts in Latina/o studies. Students interested in participating should contact stephen.pitti@yale.edu. F 9:25–11:15

AFAM 718b/AMST 911b/HIST 765b, Working Group on Latina/o Studies II Stephen Pitti, Alicia Schmidt Camacho
A continuous workshop for graduate students in American Studies, History, African American Studies, and related fields. The spring term focuses on the development of individual research projects and on public history work with the Smithsonian Museums and organizations in New Haven. Students interested in participating should contact stephen.pitti@yale.edu. F 9:25–11:15

AFAM 723b/AMST 645b/CPLT 949b/WGSS 645b, Caribbean Diasporic Intellectuals Hazel Carby
This course examines work by writers of Caribbean descent from different regions of the transatlantic world. In response to contemporary interest in issues of globalization, the premise of the course is that in the world maps of these black intellectuals we can

see the intertwined and interdependent histories and relations of the Americas, Europe, and Africa. Thinking globally is not a new experience for black peoples, and we need to understand the ways in which what we have come to understand and represent as "Caribbeanness" is a condition of movement. Literature is most frequently taught within the boundaries of a particular nation, but this course focuses on the work of writers who shape the Caribbean identities of their characters as traveling black subjects and refuse to restrain their fiction within the limits of any one national identity. We practice a new and global type of cognitive mapping as we read and explore the meanings of terms like black transnationalism, migrancy, globalization, and empire. Diasporic writing embraces and represents the geopolitical realities of the modern, modernizing, and postmodern worlds in which multiple racialized histories are inscribed on modern bodies. T 2:30–4:20

AFAM 738a/AMST 706a/HIST 711a/WGSS 716a, Readings in African American Women's History Crystal Feimster

The diversity of African American women's lives from the colonial era through the late twentieth century. Using primary and secondary sources we explore the social, political, cultural, and economic factors that produced change and transformation in the lives of African American women. Through history, fiction, autobiography, art, religion, film, music, and cultural criticism we discuss and explore the construction of African American women's activism and feminism; the racial politics of the body, beauty, and complexion; hetero- and same-sex sexualities; intraracial class relations; and the politics of identity, family, and work. M 1:30–3:20

AFAM 764a/AMST 715a/HIST 715a, Readings in Nineteenth-Century America David Blight

The course explores recent trends and historiography on several problems through the middle of the nineteenth century: sectionalism, expansion; slavery and the Old South; northern society and reform movements; Civil War causation; the meaning of the Confederacy; why the North won the Civil War; the political, constitutional, and social meanings of emancipation and Reconstruction; violence in Reconstruction society; the relationships between social/cultural and military/political history; problems in historical memory; the tension between narrative and analytical history writing; and the ways in which race and gender have reshaped research and interpretive agendas. W 1:30–3:20

AFAM 775a/AMST 771a/ENGL 981a, Affect Theory Tavia Nyong'o

This seminar traces the emergence of affect, sense, feeling, and mood as critical keywords in American studies. Particular attention is paid to the manner in which queer theorists such as Eve Kosofsky Sedgwick, Lauren Berlant, Ann Cvetkovich, Heather Love, Jennifer Doyle, Jonathan Flatley, and José Esteban Muñoz developed the concept in what has been called "the affective turn" in queer and feminist aesthetics. The philosophical basis of affect theory in the writings of Spinoza, Heidegger, and Deleuze form the core of the seminar. We also look to an alternate genealogy for affect politics in the writings of Bergson and Deleuze on fabulation. We consider the psychoanalytic take on affect, in particular the object relations school of Klein and Winnicott, and we read critics who contrast affect theory with trauma theory. Marxist contributions to affect theory include readings from Virno (on humor), Hardt and Negri (on affective labor), and Rancière

(on the distribution of the sensible). The writings of Jasbir Puar and Brian Massumi on the affective politics of contemporary war, empire, and societies of control are also considered, as are writings by Fred Moten, Saidiya Hartman, and Frank Wilderson on optimism and pessimism as moods/modalities of black studies. M 1:30–3:20

AFAM 776b/REL 704b, "Beyond the Veil": Approaches to the Study of Black Religion in the United States Clarence Hardy

This course explores how scholars have developed and pursued the modern study of black religion in the United States from its inception in the early decades of the twentieth century, through its institutionalization in the academy after the civil rights movement, and its continued evolution in contemporary times. The course focuses especially on pioneers in the field (e.g., W.E.B. Du Bois, Zora Neale Hurston, and Carter Woodson) and considers the rise of competing methodologies for the study of black religious cultures—ranging from the historical to the sociological, while including at various moments the theological, anthropological, and literary. Special attention is given to the ways in which racial and religious identities have shaped and confounded scholarly efforts to interpret black religious subjects, even as these identities have also provided a platform for interrogating the meaning of race, nation, and the nature of political commitment in America. T 1:30–3:20

AFAM 793b/AMST 694b/ENGL 955b, Colonial Theater, Postcolonial Drama, and World Performance Joseph Roach

Uniting the approaches of theater history, dramaturgy, and performance studies, this seminar begins with the case study of Lolita Chakrabarti's *Red Velvet* (2012, revived 2016), a play about the life of Ira Aldridge (1807–1867), the African American actor who is said to be the first black man to play Othello. Readings include plays, critical theories, and historical documents from the eighteenth century to the twenty-first. The seminar is organized around selected genealogies of performance as represented by adaptations, revivals, and critical rewritings: Aphra Behn's *Oroonoko* by Thomas Southerne and Biyi Bandele-Thomas; John Gay's *The Beggar's Opera* by Bertolt Brecht, Wole Soyinka, and P.L. Deshpande; Daniel Defoe's *Robinson Crusoe* by Richard Brinsley Sheridan and Derek Walcott; and Samuel Beckett's *Waiting for Godot* by Femi Osofisan and Suzan-Lori Parks. W 3:30–5:20

AFAM 797a/AMST 797a/HIST 797a, Atlantic Abolitions Marcela Echeverri, Edward Rugemer

This readings course explores the historiography on the century of abolition, when the new states of the Americas abolished racial slavery. Beginning with the first abolitions in the U.S. North during the 1780s, we consider the emergence and process of abolition throughout the Atlantic world, including the Caribbean, Spanish America, and Brazil, through the 1880s. TH 9:25–11:15

AFAM 802a/AMST 804a/HIST 750a, Readings in African American History since 1865 Glenda Gilmore

Students read major secondary works alongside key primary sources on African American history from 1865 to the present. The course covers Reconstruction; the Jim Crow era; the Long Civil Rights Movement, including its classical phase; African American

transnationalism; and urban, political, and labor history from the African American perspective. The course emphasizes gender and racial formation. Students read thematically within the course, make class presentations, and write a historiographical paper. W 1:30–3:20

AFAM 826a/HSAR 783a, Theorizing Diaspora Kobena Mercer
This seminar reviews different methods in the study of diasporas and demonstrates their application in research on visual culture and art history. Models addressed to African American, Caribbean, and black British contexts by Stuart Hall, Paul Gilroy, James Clifford, Brent Hayes Edwards, among others, are examined in relation to art, film, and photography that articulate cross-cultural aesthetics. Debates on hybridization that led to such cognate concepts as syncretism, creolization, and translation are tested in comparative case studies. Texts include Homi Bhabha, Sarat Maharaj, Jean Fisher, Edouard Glissant, and Jan Nederveen Pieterse; and book-length introductions by Robin Cohen, *Global Diasporas* (2d ed., 2008), and Sudesh Mishra, *Diaspora Criticism* (2006). TH 3:30–5:20

AFAM 851a/CPLT 989a/FREN 943a, Creole Identities and Fictions
Christopher Miller
Focusing on the French and English Caribbean, the course analyzes the quintessential but ambiguous American condition: that of the "Creole." Encompassing all nonnative cultures, this term is inseparable from issues of race and slavery. Readings of historical and literary texts: Moreau de Saint-Méry, Bernardin de Saint-Pierre, Madame de Staël, Charlotte Brontë (and reinventions of *Wuthering Heights* by Jean Rhys and Maryse Condé), the Créolistes of Martinique. Attention to Louisiana and to the Haitian Revolution. Prerequisite: reading knowledge of French. TH 1:30–3:20

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

AFAM 895a and b, Dissertation Prospectus Workshop Daphne Brooks
A noncredit, two-term course, which graduate students in their third year of study must satisfactorily complete. This workshop is intended to support preparation of the dissertation proposal.

For course offerings in African languages, see African Studies.

AFRICAN STUDIES

Council on African Studies
The MacMillan Center
309 Luce Hall, 203.432.9903
http://african.macmillan.yale.edu
M.A.

Chair
Michael Cappello (*Pediatrics; Microbial Pathogenesis; Public Health*)

Director of Graduate Studies
David Simon (203.432.5243, david.simon@yale.edu)

Director of Program in African Languages
Kiarie Wa'Njogu (203.432.0110, john.wanjogu@yale.edu)

Professors Serap Aksoy (*Epidemiology*), Lea Brilmayer (*Law*), John Darnell (*Near Eastern Languages & Civilizations*), Owen Fiss (*Law*), Gerald Friedland (*Internal Medicine; Epidemiology*), Robert Harms (*History*), Roderick McIntosh (*Anthropology*), Christopher Miller (*French; African American Studies; on leave* [Sp]), Stephanie Newell (*English*), Catherine Panter-Brick (*Anthropology*), Curtis Patton (*Emeritus, Epidemiology*), Ashgar Rastegar (*Internal Medicine*), Lamin Sanneh (*History; Divinity*), Ian Shapiro (*Political Science*), Robert Thompson (*Emeritus, History of Art*), Christopher Udry (*Economics*), Michael Veal (*Music*), Immanuel Wallerstein (*Emeritus, Sociology*), David Watts (*Anthropology*), Elisabeth Wood (*Political Science*)

Associate Professors Theodore Cohen (*Epidemiology*), Kaveh Khoshnood (*Epidemiology*), Adria Lawrence (*Political Science; on leave*), Daniel Magaziner (*History*), Urania Magriples (*Obstetrics, Gynecology & Reproductive Sciences*), Elijah Paintsil (*Pediatrics; Epidemiology; Pharmacology*), Jonathan Wyrtzen (*Sociology; on leave*)

Assistant Professors Katharine Baldwin (*Political Science; on leave*), Louisa Lombard (*Anthropology; on leave* [Sp]), Hani Mowafi (*Emergency Medicine*), Doruk Ozgediz (*Surgery; Pediatrics*), Sunil Parikh (*Public Health; Medicine*), Tracy Rabin (*Internal Medicine*), Jeremy Schwartz (*Internal Medicine*), Brian Wood (*Anthropology*)

Lecturers Anne-Marie Foltz (*Epidemiology & Public Health*), W. Casey King (*Public Health*), Sarah Ryan (*Law*), David Simon (*Political Science*), Jason Stearns (*Political Science*), Veronica Waweru (*African Languages*)

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

Senior Lectors Oluseye Adesola (*African Languages*), Matuku Ngame (*French*)

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.

The Program in African Studies also offers two interdisciplinary seminars to create dialogue and to integrate approaches across disciplines. In addition to the M.A. degree program, the Council on African Studies offers students in the University's doctoral and other professional degree programs the chance to obtain a Graduate Certificate of Concentration in African Studies by fulfilling a supplementary curriculum (see the section on the African Studies Council, under Non-Degree Granting Programs, Councils, and Research Institutes). Joint degrees are possible with the approval of the director of graduate studies (DGS) and the relevant officials in the schools of Forestry & Environmental Studies, Law, Management, and Public Health.

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

Special Admissions Requirement

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 or a professional school, or for those who will enter business, government service, or another career in which a sound knowledge of Africa is essential or valuable. A student may choose one of the following areas of concentration: history; anthropology; political science; sociology; arts and literatures; languages and linguistics; religion; environmental and development studies; and public health.

The program requires sixteen courses: two compulsory introductory interdisciplinary seminars, Research Methods in African Studies (AFST 501a) and Topics in African Studies (AFST 764b) or an alternate course, as specifically designated by the DGS; four courses of instruction in an African language; four courses in one of the foregoing areas of concentration; four other approved courses offered in the Graduate School or professional schools; and two terms of directed reading and research (AFST 590a and 900b) 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 DGS, with whom students should consult as soon as possible in the first term.

The Master's Thesis

The master's thesis is based on research on a topic approved by the DGS and advised by a faculty member with expertise or specialized competence in the chosen topic. Students must submit their thesis for joint evaluation by the adviser and a second reader, who is chosen by the student in consultation with the DGS.

Program in African Languages

The language program offers instruction in four major languages from sub-Saharan Africa: Kiswahili (eastern and central Africa), Wolof (west Africa), Yorùbá (west Africa), and isiZulu (southern Africa). Language-related courses and language courses for professionals are also offered. African language courses emphasize communicative competence, and instructors use multimedia materials that focus on the contemporary African context. Course sequences are designed to enable students to achieve advanced competence in all skill areas by the end of the third year, and the African Languages program encourages students to spend one summer or term in Africa during their language study.

Noncredited instruction in other African languages is available by application through the Directed Independent Language Study program at the Center for Language Study. Contact the director of the Program in African Languages.

More information is available on the program's Web site, http://african.macmillan.yale.edu.

Courses

AFST 501a[U], Research Methods in African Studies
Disciplinary and interdisciplinary research methodologies in African studies. The focus of the course is on field methods and archival research in the social sciences and humanities. Topics include use of African studies and disciplinary sources (including bibliographical databases and African studies archives), research design, interviewing, survey methods, analysis of sources, and the development of databases and research collections. M 1:30–3:20

[**AFST 541b[U], Comparative Perspectives on African Literatures**]

[**AFST 548b[U]/SOCY 548b[U], Islamic Social Movements**]

[**AFST 573b[U]/SOCY 563b[U], Imperialism, Insurgency, and State Building in the Middle East and North Africa**]

[**AFST 582a[U]/SOCY 559a[U], Comparative Nationalism in North Africa and the Middle East**]

AFST 590a[U], African Studies Colloquium

AFST 630b[U], Language Planning in Sub-Saharan Africa Kiarie Wa'Njogu
Examination of language policies in selected sub-Saharan African countries. Analysis of language use in different contexts; assessment of the impact of globalization on African languages. W 1:30–3:20

AFST 639a[U]/ANTH 639a[U], Political Anthropology and Africa Louisa Lombard
A historical-anthropological study of politics in Africa. How have anthropologists made sense of the workings of African politics, both those of state and nonstate actors? This course charts how African states came into being, how they operate, and how state agents and the people they govern negotiate legitimacy, authority, and belonging. W 3:30–5:20

AFST 647a[U], The Rwandan Genocide in Comparative Context Jason Stearns
An examination of the 1994 Rwandan genocide: historical sources of the conflict, the motivations of the killers, actions and reactions of outside actors, efforts to reconstruct a post-genocide society, and continuation of the genocidal dynamic within the Great Lakes region. Consideration of other countries in similar situations, as well as other genocides in recent decades. T 3:30–5:20

AFST 678b[U]/AFAM 660b[U]/CPLT 678b[U]/ENGL 938b[U]/JDST 678b[U], The Literatures of Blacks and Jews in the Twentieth Century Marc Kaplan
This seminar compares representative writings by African, Caribbean, and African American authors of the past one hundred years, together with European, American, and South African Jewish authors writing in Yiddish, Hebrew, French, and English. This comparison examines the paradoxically central role played by minority, "marginal" groups in the creation of modern literature and the articulation of the modern experience. TH 1:30–3:20

AFST 680b[U], Nigeria and Its Diaspora Oluseye Adesola
Nigerians in the modern diaspora, both those who endured forced migration and those who migrated voluntarily. Specific reference to the Igbos and the Yorùbás. The preservation and maintenance of Nigerian culture, history, dance, literature, traditional education, theater, politics, art, music, film, religion, and folklore, especially in African American and Nigerian American contexts.

AFST 746b/ENGL 936b, Postcolonial World Literature and Theory Stephanie Newell
Introduction to key debates about post-1945 world literature in English, the politics of English as a language of world literature, and theories of globalization and postcolonial culture. Course themes include colonial history, postcolonial migration, translation, national identity, cosmopolitanism, writing the self, global literary prizes. TH 9:25–11:15

AFST 830b/HIST 830b, Cities, Media, and Culture in Twentieth-Century Africa Daniel Magaziner
This seminar considers the scholarship on African urban life during the twentieth century. We read recent works about intellectual and cultural history, infrastructure and technology, political economy, urban planning, and media. In consultation with the instructor, students spend the last weeks of the course developing a study of a specific African city based on a mix of secondary literature and a dedicated primary source. W 1:30–3:20

AFST 837b/HIST 837b, Decolonization and Independence in Africa Robert Harms
This seminar looks at the process of decolonization in twentieth-century Africa and explores some of the major political, economic, and cultural forces that influenced the trajectories of independent African countries. W 9:25–11:15

AFST 839a/HIST 839a, Environmental History of Africa Robert Harms
An examination of the interaction between people and their environment in Africa and the ways in which this interaction has affected or shaped the course of African history. W 9:25–11:15

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

AFST 951a or b, Directed Reading and Research David Simon and faculty
By arrangement with faculty.

SWAH 610a[U], Beginning Kiswahili I Kiarie Wa'Njogu
A beginning course with intensive training and practice in speaking, listening, reading, and writing. Initial emphasis is on the spoken language and conversation. Credit only on completion of SWAH 620b. MTWTHF 9:25–10:15

SWAH 620b[U], Beginning Kiswahili II Kiarie Wa'Njogu
Continuation of SWAH 610a. Texts provide an introduction to the basic structure of Kiswahili and to the culture of the speakers of the language. Prerequisite: SWAH 610a. MTWTHF 9:25–10:15

SWAH 630a[U], Intermediate Kiswahili I Veronica Waweru
Further development of speaking, listening, reading, and writing skills. Prepares students for further work in literary, language, and cultural studies as well as for a functional use of Kiswahili. Study of structure and vocabulary is based on a variety of texts from traditional and popular culture. Emphasis on command of idiomatic usage and stylistic nuance. Prerequisite: SWAH 620b. MTWTHF 11:35–12:25

SWAH 640b[U], Intermediate Kiswahili II
Continuation of SWAH 630a. MTWTHF 11:35–12:25

SWAH 650a[U], Advanced Kiswahili I Kiarie Wa'Njogu
Development of fluency through readings and discussions on contemporary issues in Kiswahili. Introduction to literary criticism in Kiswahili. Materials include Kiswahili oral literature, prose, poetry, and plays, as well as texts drawn from popular and political culture. Prerequisite: SWAH 640b. TTH 1–2:15

SWAH 660b[U], Advanced Kiswahili II Kiarie Wa'Njogu
Continuation of SWAH 650a. TTH 1–2:15

SWAH 670a[U], Topics in Kiswahili Literature Kiarie Wa'Njogu
Advanced readings and discussion with emphasis on literary and historical texts. Reading assignments include materials on Kiswahili prose, plays, poetry, Kiswahili dialects, and the history of the language. TTH 10:30–11:20, F 8:20–9:10

SWAH 671b[U], Topics in Kiswahili Literature Kiarie Wa'Njogu
Advanced readings and discussion with emphasis on literary and historical texts. Reading assignments include materials on Kiswahili prose, plays, poetry, Kiswahili dialects, and the history of the language. TTH 11:35–12:50

YORU 610a[U], Beginning Yorùbá I Oluseye Adesola
Training and practice in speaking, listening, reading, and writing. Initial emphasis is on the spoken aspect, with special attention to unfamiliar consonantal sounds, nasal vowels, and tone, using isolated phrases, set conversational pieces, and simple dialogues. Multimedia materials provide audio practice and cultural information. Credit only on completion of YORU 620b. MTWTHF 10:30–11:20

YORU 620b[U], Beginning Yorùbá II Oluseye Adesola
Continuing practice in using and recognizing tone through dialogues. More emphasis is placed on simple cultural texts and role playing. Prerequisite: YORU 610a. MTWTHF 10:30–11:20

YORU 630a[U], Intermediate Yorùbá I Oluseye Adesola
Refinement of speaking, listening, reading, and writing skills. More natural texts are provided to prepare students for work in literary, language, and cultural studies as well as for a functional use of Yorùbá. Prerequisite: YORU 620b. MTWTHF 11:35–12:25

YORU 640b[U], Intermediate Yorùbá II Oluseye Adesola
Students are exposed to more idiomatic use of the language in a variety of interactions, including occupational, social, religious, and educational. Cultural documents include literary and nonliterary texts. Prerequisite: YORU 630a. MTWTHF 11:35–12:25

YORU 650a[U], Advanced Yorùbá I Oluseye Adesola
An advanced course intended to improve aural and reading comprehension as well as speaking and writing skills. Emphasis is on acquiring a command of idiomatic usage and stylistic nuance. Study materials include literary and nonliterary texts; social, political, and popular entertainment media such as video movies and recorded poems (*ewì*); and music. Prerequisite: YORU 640b. 3 HTBA

YORU 660b[U], Advanced Yorùbá II Oluseye Adesola
Continuing development of aural and reading comprehension, and speaking and writing skills, with emphasis on idiomatic usage and stylistic nuance. Study materials are selected to reflect research interests of the students. Prerequisite: YORU 650a. 3 HTBA

YORU 670a[U] or b[U], Topics in Yorùbá Literature and Culture Oluseye Adesola
The course provides students with the opportunity to acquire Yorùbá up to the superior level. It is designed to give an in-depth discussion on advanced readings on Yorùbá literature and culture. It focuses on Yorùbá history, poetry, novels, dramas, and oral folklore. It also seeks to uncover the basics of the Yorùbá culture in communities where Yorùbá is spoken across the globe, with particular emphasis on Nigeria. It examines movies, texts, and written literature to gain insight into the Yorùbá philosophy and ways of life. TTH 4–5:15

YORU 680a[U], Advanced Topics in Yorùbá Literature and Culture Oluseye Adesola
A course for students with advanced proficiency in Yorùbá who are interested in discussion and research in Yorùbá at a level not covered by existing courses. A term paper or its equivalent is required. TTH 1–2:15

YORU 682b[U], Advanced Topics in Yorùbá Literature and Culture II
Oluseye Adesola
Continuation of YORU 680a. TTH 1–2:15

ZULU 610a[U], Beginning isiZulu I Sandra Sanneh
A beginning course in conversational isiZulu, using Web-based materials filmed in South Africa. Emphasis on the sounds of the language, including clicks and tonal variation, and on the words and structures needed for initial social interaction. Brief dialogues concern everyday activities; aspects of contemporary Zulu culture are introduced through readings and documentaries in English. Credit only on completion of ZULU 620b. MTWTHF 11:35–12:25

ZULU 620b[U], Beginning isiZulu II Sandra Sanneh
Development of communication skills through dialogues and role play. Texts and songs are drawn from traditional and popular literature and songs. Students research daily life in selected areas of South Africa. Prerequisite: ZULU 610a. MTWTHF 11:35–12:25

ZULU 630a[U], Intermediate isiZulu I Sandra Sanneh
Development of basic fluency in speaking, listening, reading, and writing isiZulu, using Web-based materials filmed in South Africa. Students describe and narrate spoken and written paragraphs. Review of morphology; concentration on tense and aspect. Materials are drawn from contemporary popular culture, folklore, and mass media. Prerequisite: ZULU 620b. MTWTHF 9:25–10:15

ZULU 640b[U], Intermediate isiZulu II Sandra Sanneh
Students read longer texts from popular media as well as myths and folktales. Students are prepared for initial research involving interaction with speakers of isiZulu in South Africa, and for the study of oral and literary genres. Prerequisite: ZULU 630a. MTWTHF 9:25–10:15

ZULU 650a[U], Advanced isiZulu I Sandra Sanneh
Development of fluency in using idioms, speaking about abstract concepts, and voicing preferences and opinions. Excerpts are drawn from oral genres, short stories, and dramas made for television. Introduction to other South African languages and to issues of standardization, dialect, and language attitude. Prerequisite: ZULU 640b. 3 HTBA

ZULU 660b[U], Advanced isiZulu II Sandra Sanneh
Readings may include short stories, a novel, praise poetry, historical texts, or contemporary political speeches, depending on student interests. Study of issues of language policy and use in contemporary South Africa; introduction to the Soweto dialect of isiZulu. Students are prepared for extended research in South Africa involving interviews with isiZulu speakers. Prerequisite: ZULU 650a.

AMERICAN STUDIES

230 Hall of Graduate Studies, 203.432.1186
http://americanstudies.yale.edu
M.A., M.Phil., Ph.D.

Chair
Kathryn Dudley (230 HGS, 203.432.1186)

Director of Graduate Studies
Joanne Meyerowitz (230 HGS, 203.432.1186)

Professors Jean-Christophe Agnew, Ned Blackhawk, David Blight, Daphne Brooks, Hazel Carby, George Chauncey (*on leave* [Sp]), Edward Cooke, Jr., Michael Denning, Wai Chee Dimock, Kathryn Dudley, John Mack Faragher (*Emeritus*), Glenda Gilmore (*on leave* [Sp]), Inderpal Grewal, Jonathan Holloway, Amy Hungerford, Matthew Jacobson (*on leave*), Kathryn Lofton, Mary Lui, Joanne Meyerowitz, Charles Musser, Tavia Nyong'o, Stephen Pitti, Sally Promey, Joseph Roach, Marc Robinson, Michael Roemer (*Adjunct*), Paul Sabin, Alicia Schmidt Camacho, Caleb Smith (*on leave*), Robert Stepto (*on leave* [F]), Harry Stout (*on leave* [Sp]), Michael Veal, John Harley Warner, Michael Warner, Laura Wexler

Associate Professors Crystal Feimster, Zareena Grewal, Elihu Rubin, Tisa Wenger

Assistant Professors Laura Barraclough, Greta LaFleur, Albert Laguna, Dixa Ramirez, Jenifer Van Vleck

Lecturers James Berger, Ronald Gregg (*on leave* [Sp])

Fields of Study

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

Special Admissions Requirement

A twenty-page writing sample 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 half of these courses must be in American Studies. First-year students are also required to take AMST 600a, American Scholars (graded Satisfactory/Unsatisfactory). The student's program will be decided in consultation with the adviser and the director of graduate studies (DGS). 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 are required to show proficiency in a language other than English; they may fulfill this requirement by (1) conducting substantial research in the chosen language as part of the course requirements for one of the twelve required seminars, (2) passing a

translation test, offered each term by various language departments, or (3) receiving a grade of B or higher in a Yale College intermediate- or advanced-level language course or in a Yale language-for-reading course, such as French for Reading or German for Reading.

Upon completion of course work, students in their third year of study are required to participate in at least one term of a monthly prospectus workshop (AMST 902a and b). Intended to complement the work of the prospectus committee, the workshop is designed as a professionalization experience that culminates in students' presentation of the dissertation prospectus at their prospectus colloquium.

Students should schedule the oral qualifying examinations in four fields, in the fifth term of study. Preparation, submission, and approval of the dissertation prospectus should be completed by the end of the sixth term, with a final deadline at the end of the seventh term with permission from the DGS. Students are admitted to candidacy for the Ph.D. upon completion of all predissertation requirements, including the prospectus. The faculty in American Studies considers training in teaching to be an important part of the program. Students in American Studies normally teach in years three and four.

Combined Ph.D. Programs

AMERICAN STUDIES AND AFRICAN AMERICAN STUDIES

The American Studies Program also offers, in conjunction with the Department of African American Studies, a combined Ph.D. in American Studies and African American Studies. This combined degree is most appropriate for students who intend to concentrate in and write a dissertation on any aspect of African American history, literature, or culture in the United States and other parts of the Americas. Applicants to the combined program must indicate on their application that they are applying both to American Studies and to African American Studies. All documentation within the application should include this information.

AMERICAN STUDIES AND FILM AND MEDIA STUDIES

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

Master's Degrees

M.Phil. See Degree Requirements under Policies and Regulations.

M.A. (en route to the Ph.D.) The M.A. is granted upon the completion of seven term courses (two grades must be Honors and the other five grades must average High Pass), and the successful completion of the language requirement. It can be petitioned for in the term following completion of the requirements. Candidates in combined programs will be awarded the master's degree only when the master's requirements for both programs have been met.

Public Humanities Concentration The M.A. with a concentration in Public Humanities is granted upon the completion of all requirements for the en route M.A. Of the seven term courses required, students must take four Public Humanities courses, including AMST 903, 904, 905.

Terminal Master's Degree Program The basic requirements for this terminal degree are seven term courses, including a special writing project, and the successful completion of the language requirement. 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.

More information is available on the department's Web site, http://americanstudies.yale.edu.

Courses

AMST 600a, American Scholars Hazel Carby

"What would we really know the meaning of? The meal in the firkin; the milk in the pan; the ballad in the street; the news of the boat; the glance of the eye; the form and the gait of the body. The literature of the poor, the feelings of the child, the philosophy of the street, the meaning of household life, are the topics of the time."

—Ralph Waldo Emerson, *The American Scholar,* 1837

A half-century ago American studies was a movement; now it is an institution. But it remains an anomaly in the academy, with neither method nor discipline: a modest program, not a department that immodestly claims the space between disciplines, beyond disciplines, and perhaps encompassing disciplines. In the early days, American studies was imagined as a home for Emerson's American scholar; these days Emerson's scholar is apt to be eyed more skeptically. Nevertheless the philosophy of the street and the meaning of household life continue to be the topics of the time, and American studies remains an oddly Emersonian place for nurturing intellectuals. To explore the various kinds of American scholars and American studies, the American Scholars colloquium meets weekly. Each week, we ask a member of the American Studies faculty: What are the key works that shape your intellectual project? What works pose the crucial issues? What works engage what you would really know the meaning of? Each speaks briefly and leads a discussion of the works chosen. There is no writing assignment, and students receive a credit for participating. This course is mandatory for first-year American Studies graduate students. W 9:25–11:15

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

A continuing collective research project, a cultural studies "laboratory," that has been running since the fall of 2003. The group, made up of graduate students and faculty from several disciplines, meets regularly to discuss common readings, to develop collective and individual research projects, and to present that research publicly. The general theme for the working group is globalization and culture, with three principal aspects: (1) the

globalization of cultural industries and goods, and its consequences for patterns of everyday life as well as for forms of fiction, film, broadcasting, and music; (2) the trajectories of social movements and their relation to patterns of migration, the rise of global cities, the transformation of labor processes, and forms of ethnic, class, and gender conflict; (3) the emergence of and debates within transnational social and cultural theory. The specific focus, projects, and directions of the working group are determined by the interests, expertise, and ambitions of the members of the group, and change as its members change. There are a small number of openings for second-year graduate students. Students interested in participating should contact michael.denning@yale.edu. M 1:30–3:20

AMST 643a/AFAM 505a, Theorizing Racial Formations Christopher Lebron
A required course for all first-year students in the combined Ph.D. program in African American Studies; also open to students in American Studies. This interdisciplinary reading seminar focuses on new work that is challenging the temporal, theoretical, and spatial boundaries of the field. M 9:25–11:15

AMST 645b/AFAM 723b/CPLT 949b/WGSS 645b, Caribbean Diasporic Intellectuals Hazel Carby
This course examines work by writers of Caribbean descent from different regions of the transatlantic world. In response to contemporary interest in issues of globalization, the premise of the course is that in the world maps of these black intellectuals we can see the intertwined and interdependent histories and relations of the Americas, Europe, and Africa. Thinking globally is not a new experience for black peoples, and we need to understand the ways in which what we have come to understand and represent as "Caribbeanness" is a condition of movement. Literature is most frequently taught within the boundaries of a particular nation, but this course focuses on the work of writers who shape the Caribbean identities of their characters as traveling black subjects and refuse to restrain their fiction within the limits of any one national identity. We practice a new and global type of cognitive mapping as we read and explore the meanings of terms like black transnationalism, migrancy, globalization, and empire. Diasporic writing embraces and represents the geopolitical realities of the modern, modernizing, and postmodern worlds in which multiple racialized histories are inscribed on modern bodies. T 2:30–4:20

AMST 650a/HIST 807a, Resistance, Rebellion, and Survival Strategies in Modern Latin America Gilbert Joseph
An interdisciplinary examination of new conceptual and methodological approaches to such phenomena as peasants in revolution, millenarianism, "banditry," refugee movements, and transnational migration. F 1:30–3:20

AMST 681b/DRAM 496b/ENGL 953b, The American Avant-Garde Marc Robinson
Topics include the Living Theater, Happenings, Cunningham/Cage, Open Theater, Judson Dance Theater, Grand Union, Bread and Puppet Theater, Ontological-Hysteric Theater, Theater of the Ridiculous, Meredith Monk, Robert Wilson, and the Wooster Group. TH 10–11:50

AMST 688a/AFAM 558a/HIST 577a/RLST 688a/WGSS 695a, Historicizing Religion Kathryn Lofton

What does it mean to offer a history of religion? How is a history of religion distinct from, or overlapping with, the history of race or gender? This course takes as its central subject a key methodological problem of modernity, namely the task to offer material accounts for human perception, social organization, and epistemological vantage. We read new historical monographs and relevant classic theories that consider what religion is, how its categorization is like and unlike other concepts for human distinction, and why it became something in modernity requiring historical diagnosis. Included in our topical survey are examinations of secularization and disenchantment; myth and narrative; church history and hagiography; objectivity and positivism; world religions and comparative religions; Orientalism and colonialism; sectarianism and secularism. Works read include Elizabeth A. Clark, *History, Theory, Text: Historians and the Linguistic Turn;* Sylvester Johnson, *African American Religions, 1500–2000: Colonialism, Democracy, and Freedom;* and Suzanne Marchand, *German Orientalism in the Age of Empire: Religion, Race, and Scholarship.* M 9:25–11:15

AMST 692b/HSAR 730b/JDST 799b/REL 967b/RLST 788b, Religion and the Performance of Space Sally Promey, Margaret Olin

This interdisciplinary seminar explores categories, interpretations, and strategic articulations of space in a range of religious traditions. In conversation with the work of major theorists of space, this seminar examines spatial practices of religion in the United States during the modern era, including the conception, construction, and enactment of religious spaces. It is structured around theoretical issues, including historical deployments of secularity as a framing mechanism, ideas about space and place, geography and gender, and relations between property and spirituality. Examples of case studies treated in class include the enactment of rituals within museums, the marking of religious boundaries such as the Jewish "eruv," and the assignment of "spiritual" ownership in Hawai'i Volcanoes National Park. The seminar coordinates with several campus events, including research group presentations and an exhibition of work by Thomas Wilfred at the Yale University Art Gallery. Prerequisite: permission of the instructors; qualified undergraduates are welcome. M 3:30–5:20

AMST 694b/AFAM 793b/ENGL 955b, Colonial Theater, Postcolonial Drama, and World Performance Joseph Roach

Uniting the approaches of theater history, dramaturgy, and performance studies, this seminar begins with the case study of Lolita Chakrabarti's *Red Velvet* (2012, revived 2016), a play about the life of Ira Aldridge (1807–1867), the African American actor who is said to be the first black man to play Othello. Readings include plays, critical theories, and historical documents from the eighteenth century to the twenty-first. The seminar is organized around selected genealogies of performance as represented by adaptations, revivals, and critical rewritings: Aphra Behn's *Oroonoko* by Thomas Southerne and Biyi Bandele-Thomas; John Gay's *The Beggar's Opera* by Bertolt Brecht, Wole Soyinka, and P.L. Deshpande; Daniel Defoe's *Robinson Crusoe* by Richard Brinsley Sheridan and Derek Walcott; and Samuel Beckett's *Waiting for Godot* by Femi Osofisan and Suzan-Lori Parks. W 3:30–5:20

AMST 703a/WGSS 630a, Postcolonial and Transnational Feminist Theories
Inderpal Grewal
An advanced survey course in feminist theory with a focus on postcolonial and transnational approaches. It is often assumed that if postcolonial theory focuses on history and historicity, then transnational theories emphasize space and place, assuming the importance of networks and flows. How might we think otherwise of these theoretical contributions? What are their connections across fields and areas? What, finally, are the ways that feminist theory has come to incorporate these approaches in the way that it conceptualizes the "international," "global," and "regional" in relation to histories of culture, politics, difference, and intersectionality. We examine these and other questions of disciplinarity, method, and history. W 3:30–5:30

AMST 706a/AFAM 738a/HIST 711a/WGSS 716a, Readings in African American Women's History Crystal Feimster
The diversity of African American women's lives from the colonial era through the late twentieth century. Using primary and secondary sources we explore the social, political, cultural, and economic factors that produced change and transformation in the lives of African American women. Through history, fiction, autobiography, art, religion, film, music, and cultural criticism we discuss and explore the construction of African American women's activism and feminism; the racial politics of the body, beauty, and complexion; hetero- and same-sex sexualities; intraracial class relations; and the politics of identity, family, and work. M 1:30–3:20

AMST 708b/AFAM 705b/ENGL 708b/HIST 708b/HSHM 729b, The History of Race
Greta LaFleur
This course offers a broad survey of the history of racial science and racialist thinking in the Atlantic world from the early modern period through the late nineteenth century. Rather than attempting to detail the histories of specific racial formations (such as blackness or whiteness), the course tracks the intellectual history of the emergence of "race" as a specific category of human differentiation and traces a swath of its most muscular—and pernicious—permutations through the eighteenth and nineteenth centuries. W 1:30–3:20

AMST 710b[U]/AFAM 588b[U]/ENGL 948b[U], Autobiography in America Robert Stepto
A study of autobiographical writings from Mary Rowlandson's Indian captivity narrative (1682) to the present. Classic forms such as immigrant, education, and cause narratives; prevailing autobiographical strategies involving place, work, and photographs. Authors include Franklin, Douglass, Jacobs, Antin, Kingston, Uchida, Balakian, Als, and Karr. M 1:30–3:20

AMST 715a/AFAM 764a/HIST 715a, Readings in Nineteenth-Century America
David Blight
The course explores recent trends and historiography on several problems through the middle of the nineteenth century: sectionalism, expansion; slavery and the Old South; northern society and reform movements; Civil War causation; the meaning of the Confederacy; why the North won the Civil War; the political, constitutional, and social meanings of emancipation and Reconstruction; violence in Reconstruction society; the relationships between social/cultural and military/political history; problems

in historical memory; the tension between narrative and analytical history writing; and the ways in which race and gender have reshaped research and interpretive agendas. W 1:30–3:20

AMST 717a/HIST 783a, Readings in Transnational History Jenifer Van Vleck
Readings in historiography after the "transnational turn"—the project of writing and teaching history across national boundaries. Emphasis on methods, especially research strategies and interpretive frameworks. Topics of readings and discussions include empire, colonialism, and postcolonialism; nations and nationalisms; borders and borderlands; globalization; cultural transfer and hybridity; and transnational approaches to histories of race, gender, and sexuality. M 1:30–3:20

AMST 719b/RLST 703b, Interrogating the Crisis of Islam Zareena Grewal
In official and unofficial discourses in the United States, diagnoses of Islam's various "crises" are ubiquitous, and Muslim "hearts and minds" are viewed as the "other" front in the War on Terror. Since 9/11, the U.S. State Department has made the reform of Islam an explicit national interest, pouring billions of dollars into USAID projects in Muslim-majority countries, initiating curriculum development programs for madrasas in South Asia, and establishing the Arabic Radio Sawa and the satellite TV station Al-Hurra to propagate the U.S. administration's political views as well as what it terms a "liberal" strain of Islam. Muslim Americans are also consumed by debates about the "crisis" of Islam, a crisis of religious authority in which the nature and rapidity of change in the measures of authority are felt to be too difficult to assimilate. This course maps out the various and deeply politically charged contemporary debates about the "crisis of Islam" and the question of Islamic reform through an examination of official U.S. policy, transnational pulp Islamic literature, fatwas and essays authored by internationally renowned Muslim jurists and scholars, and historical and ethnographic works that take up the category of crisis as an interpretive device. M 1:30–3:20

AMST 729b[U]/WGSS 746b[U], Visual Kinship: Photography and the Idea of Family
Laura Wexler, Thy Phu
Family photography is often understood simply as snapshots of domestic scenes taken by amateur photographers. Yet family photographs are more complex than we think: they can also include images taken by a wide spectrum of producers, including the press and the state; they frequently circulate between private and public spheres, linking personal memories with national and even global histories; and, just as importantly, they help to shape the very idea of family itself, one that is frequently racialized and gendered. This course explores the relationship between family photography and the concept of family, from the age of analog to the digital era, from snapshots to portraits, from instrumental images to art exhibitions, and more. We look closely at family photographs held in special collections at the Beinecke Library, the Museum of Modern Art, the Library of Congress, and the National Archive and Records Administration, among other sites. Bringing these photographs in dialogue with critical writings drawn from photography studies and cultural history, we investigate the ways in which visual kinship is shaped, and how this process mediates the idea of family. T 10:30–12:30

AMST 735a/AFAM 514a/ENGL 950a, A Sound Theory of Blackness: African American Literature and Music in High Fidelity Daphne Brooks
An exploration of sonic theory and the African American literary tradition from the nineteenth century through the millennium with special emphasis on major debates in jazz studies and a critical (re)examination of blues ideologies, as well as the politics and poetics of spirituals, R&B and soul, funk, Afrofuturism, punk, pop, and hip-hop. The course places the work of a range of cultural theorists (Douglass, Du Bois, Adorno, Hurston, Ellison, Murray, Baraka, Mackey, Carby, Spillers, O'Meally, Griffin, Moten, Edwards, Radano, Nancy, Szendy, Perry, Weheliye, etc.) in conversation with key texts and epochs in black letters. T 1:30–3:20

AMST 736b/HSAR 725b, An Introduction to American Material Culture Edward Cooke, Jr.
The field of material culture has drawn from a number of different disciplines and scholarly traditions. Through readings and applications of methodologies ranging from structuralism and semiotics to Marxist criticism and cultural studies, this seminar provides a solid foundation for the interpretation of artifacts.

AMST 741a/HIST 752a, Indians and Empires Ned Blackhawk
This course explores recent scholarship on Indian-imperial relations throughout North American colonial spheres from roughly 1500 to 1900. It examines indigenous responses to Spanish, Dutch, French, English, and lastly American and Canadian colonialism and interrogates commonplace periodization and geographic and conceptual approaches to American historiography. It concludes with an examination of American Indian political history, contextualizing it within larger assessments of Indian-imperial and Indian-state relations. T 7–8:50

AMST 744a/F&ES 617a/HIST 744a/HSHM 747a, Readings and Research in Energy History Paul Sabin
The history of energy in the United States and the world. Readings and discussion range widely across different forms of energy: animal power, biomass, and early hydropower; coal, oil, and atomic energy; and present-day hydraulic fracturing, wind, and solar. Themes include relations between energy producers and communities, including resistance to energy projects; cultural and social change associated with dominant energy regimes; labor struggles and environmental transformations; the global quest for oil; and changing national energy policies. We explore new approaches to writing and teaching the history of energy. Open to undergraduates with permission of the instructor. M 1:30–3:20

AMST 749a/HSAR 733a, Material Culture of the Colonial Americas (South and North) Edward Cooke, Jr.
This seminar explores the material culture created and used during the period of the European colonization of North and South America. The intent and priorities of Spanish, Portuguese, French, Dutch, English, and German settlers in the period 1500–1800 are explored and contrasted. In looking at the entire colonial period, the course explores the effects of colonial policies on importation and local production, the impact of imported objects and immigrant craftsmen upon local craft structures, the extent of trade and

mobility within the colonies, and the movement of raw materials within a global economy. Close analysis of indigenous cultures, the uneven impact of various European powers, and the different market levels in the New World contribute to a more nuanced understanding of cultural transfer, adaptation, imposition, emulation, imitation, and hybridity. The result is a deeper sense of the meaning of objects within empire, and the agency of the colonial craftsmen. Ceramics, glass, textiles, and base metals reveal the vast trade networks that linked the various colonies. On the other hand, furniture, and some textiles often borrowed from European conventions but were translated into local materials wrought by local modes of workmanship. W 10:30–12:20

AMST 768a/HIST 768a, Asian American History and Historiography Mary Lui
This reading and discussion seminar examines Asian American history through a selection of recently published texts and established works that have significantly shaped the field. Major topics include the racial formation of Asian Americans in U.S. culture, politics, and law; U.S. imperialism; U.S. capitalist development and Asian labor migration; and transnational and local ethnic community formations. The class considers both the political and academic roots of the field as well as its evolving relationship to "mainstream" American history. TH 9:25–11:15

AMST 771a/AFAM 775a/ENGL 981a, Affect Theory Tavia Nyong'o
This seminar traces the emergence of affect, sense, feeling, and mood as critical keywords in American studies. Particular attention is paid to the manner in which queer theorists such as Eve Kosofsky Sedgwick, Lauren Berlant, Ann Cvetkovich, Heather Love, Jennifer Doyle, Jonathan Flatley, and José Esteban Muñoz developed the concept in what has been called "the affective turn" in queer and feminist aesthetics. The philosophical basis of affect theory in the writings of Spinoza, Heidegger, and Deleuze form the core of the seminar. We also look to an alternate genealogy for affect politics in the writings of Bergson and Deleuze on fabulation. We consider the psychoanalytic take on affect, in particular the object relations school of Klein and Winnicott, and we read critics who contrast affect theory with trauma theory. Marxist contributions to affect theory include readings from Virno (on humor), Hardt and Negri (on affective labor), and Rancière (on the distribution of the sensible). The writings of Jasbir Puar and Brian Massumi on the affective politics of contemporary war, empire, and societies of control are also considered, as are writings by Fred Moten, Saidiya Hartman, and Frank Wilderson on optimism and pessimism as moods/modalities of black studies. M 1:30–3:20

AMST 775b[U]/ENGL 838b[U], Performing American Literature Wai Chee Dimock
A broad selection of short stories, poems, and novels, accompanied by class performances throughout the term, culminating in a term project with a significant writing component. "Performance" here includes a wide range of activities, from staging to the making of videos and films, digital game design, and the creative use of social media. Readings include poetry by Walt Whitman, Emily Dickinson, Yusef Komunyakaa, and Claudia Rankine; fiction by F. Scott Fitzgerald, Jhumpa Lahiri, and Junot Díaz. W 1:30–3:20

AMST 778a[U] , Global Cities: New York, Chicago, San Francisco Wai Chee Dimock
This course explores the vibrant openness of three cities through an in-depth study of the geographies invoked, the literary genres experimented with, the sights and sounds

produced, the collective pasts recalled, and the collective futures intimated. Beginning with Upton Sinclair's immigrant labor force in *The Jungle,* and ending with Teju Cole's interweaving of Africa, Europe, and America in *Open City,* we also read the detective fiction of Dashiell Hammett; the science fiction of Philip K. Dick; the generational sagas of Julia Alvarez, Jonathan Safran Foer, and Amy Tan; and theoretical works by Judith Butler, Michel de Certeau, and Fredric Jameson.

AMST 780b/HIST 734b, Class and Capitalism in Twentieth-Century United States
Jennifer Klein

Reading course on class formation, labor, and political economy in the twentieth-century United States; how regionalism, race, and class power shaped development of American capitalism. The course reconsiders the relationships between economic structure and American politics and political ideologies, and between global and domestic political economy. Readings include primary texts and secondary literature (social, intellectual, and political history; geography). W 3:30–5:20

AMST 789a, Social Theory of the City Laura Barraclough

This reading-intensive course considers how scholars from a variety of disciplines have constructed and conceptualized the city, with particular attention to the role of the urban setting as both product and producer of social relations of power. Students examine the historiography of urban theory, including both classical and contemporary approaches. Readings draw from a variety of theoretical formations including but not limited to urban ecology, political economy, neoliberal urbanism, critical race theory, feminism, queer theory, and more. A primary aim of the course is to trouble the spatial, temporal, and conceptual bounds of what qualifies as urban, and to consider how alternative ways of imagining the city can and do support a range of political agendas and social movements. W 9:25–11:15

AMST 797a/AFAM 797a/HIST 797a, Atlantic Abolitions Marcela Echeverri, Edward Rugemer

This readings course explores the historiography on the century of abolition, when the new states of the Americas abolished racial slavery. Beginning with the first abolitions in the U.S. North during the 1780s, we consider the emergence and process of abolition throughout the Atlantic world, including the Caribbean, Spanish America, and Brazil, through the 1880s. TH 9:25–11:15

AMST 801a/HIST 730a, U.S. Intellectual Formations in the Twentieth Century
Jean-Christophe Agnew

This seminar introduces students to recent works on some of the more important intellectual movements in twentieth-century U.S. history and explores the widely different contextualist approaches that historians have taken toward them. Our first set of questions focuses on the intellectuals as a social type or formation: How did they mobilize themselves and others differently over the course of the century as the institutional ground shifted beneath their feet, the culture industries multiplied, and the communication revolution unfolded? How should we understand the real and imagined spaces that intellectuals fashioned for themselves and the impact of those geographies upon their identities and ideas? What effects have the changing forms of intellectual collaboration

had on the genesis, refinement, and articulation of ideas in this country? Our second set of questions focuses on some of the ideas, ideologies, paradigms, "imaginaries," and intellectual identities that took hold over the course of the century, with a view toward comparing the different visions in relation to one another and against the circumstances of their efflorescence. One short and one long paper. T 1:30–3:20

AMST 802a/HIST 702a, Readings in Early National America Joanne Freeman
An introduction to the early national period and its scholarship, exploring major themes such as nationalism, national identity, the influence of the frontier, the structure of society, questions of race and gender, and the evolution of political cultures. T 1:30–3:20

AMST 803a/HIST 703a, Research in Early National America Joanne Freeman
A research seminar focused on the early national period of American history, broadly defined. Early weeks familiarize students with sources from the period and discuss research and writing strategies. Students produce a publishable article grounded in primary materials. W 9:25–11:15

AMST 804a/AFAM 802a/HIST 750a, Readings in African American History since 1865 Glenda Gilmore
Students read major secondary works alongside key primary sources on African American history from 1865 to the present. The course covers Reconstruction; the Jim Crow era; the Long Civil Rights Movement, including its classical phase; African American transnationalism; and urban, political, and labor history from the African American perspective. The course emphasizes gender and racial formation. Students read thematically within the course, make class presentations, and write a historiographical paper. W 1:30–3:20

AMST 805a/HSAR 720a/REL 966a/RLST 699a/WGSS 779a, Sensational Materialities: Sensory Cultures in History, Theory, and Method Sally Promey
This interdisciplinary seminar explores the sensory and material histories of (often religious) images, objects, buildings, and performances as well as the potential for the senses to spark contention in material practice. With a focus on American things and religions, the course also considers broader geographical and categorical parameters so as to invite intellectual engagement with the most challenging and decisive developments in relevant fields, including recent literatures on material agencies. The goal is to investigate possibilities for scholarly examination of a robust human sensorium of sound, taste, touch, scent, and sight—and even "sixth senses"—the points where the senses meet material things (and vice versa) in life and practice. Topics include the cultural construction of the senses and sensory hierarchies; investigation of the sensory capacities of things; and specific episodes of sensory contention in and among various religious traditions. In addition, the course invites thinking beyond the "Western" five senses to other locations and historical possibilities for identifying the dynamics of sensing human bodies in religious practices, experience, and ideas. The Sensory Cultures of Religion Research Group meets at 7 p.m. on Tuesdays; class participants are strongly encouraged, but not required, to attend. Prerequisite: permission of the instructor; qualified undergraduates are welcome. M 3:30–5:20

AMST 810a/WGSS 815a, American Public Sculpture: History, Context, and Continuing Significance Laura Wexler
Building on a new partnership between the Smithsonian Institution and Yale University, this course offers a broad-based and multidisciplinary exploration of public sculpture in the United States. Course work includes field trips and digital projects as well as readings in the scholarship of public memory, cultural heritage, conservation, and aesthetics.

AMST 814a/FILM 603a, Historical Methods in Film Study Charles Musser
A range of historiographic issues in film studies, including the roles of technology, exhibition, and spectatorship. Topics include intermediality and intertextuality. Consideration of a range of methodological approaches through a focus on international early cinema and American race cinema of the silent period. Particular attention to the interaction between scholars and archives. T 3:20–6:20

AMST 832a[U] and 833b[U]/FILM 735a[U] and 736b[U], Documentary Film Workshop Charles Musser
This workshop in audiovisual scholarship explores ways to present research through the moving image. Students work within a Public Humanities framework to make a documentary that draws on their disciplinary fields of study. Designed to fulfill requirements for the M.A. with a concentration in Public Humanities. W 12:30–3:20, screenings W 7–9

AMST 834b[U]/FILM 733b[U], Documentary and the Environment Charles Musser
The environmental documentary has emerged as one of cinema's most vital genres of the past ten years (in documentary, its only rivals are probably those concerned with the Second Gulf War). As the world's environment faces a growing crisis, documentary has come to serve as a key means to draw public attention to specific issues. This course combines screenings with readings on documentary such as Bill Nichols's important book *Representing Reality*. Often films have book tie-ins, and we consider how they complement each other and work together to maximize the impact of their message. Readings also focus on news items, debates, Web sites, and other media forms that are employed in conjunction with the films. T 1:30–3:20, screenings M 7

AMST 848b/ENGL 853b, Inventing the Environment in the Anthropocene Michael Warner
Although the concept of the Anthropocene can be dated in various ways, two of the most important benchmarks seem to be the beginning of industrial production in the late eighteenth century and the uptick in carbon dioxide emissions from the mid-nineteenth century (petroleum came into use during the Civil War). The period between these two moments is also that in which the modern language of the environment took shape, from Cuvier's discovery of extinction and Humboldt's holistic earth science to the transformative work of Thoreau and George P. Marsh. This course shuttles between the contemporary debate about the significance and consequences of the Anthropocene and a reexamination of that environmental legacy. We look at the complexity of "nature," beginning with the Bartrams, Jefferson, Cuvier, and the transatlantic literatures of natural history; georgics and other genres of nature writing; natural theology; ambiguities of pastoral in American romantic writing (Bryant, mainly); the impact of Humboldt

(Emerson, Thoreau, Whitman); westward expansion and Native American writing about land; Hudson School painting and landscape architecture. We also think about the country/city polarity and the development of "grid" consciousness in places like New York City. One aim is to assess the formation and legacy of key ideas in environmentalism, some of which may now be a hindrance as much as a foundation. Secondary readings from Leo Marx, Henry Nash Smith, and William Cronon, as well as more recent attempts to reconceive environmental history (Joachim Radkau), ecocriticism (Lawrence Buell), and related fields, as well as science journalism (Elizabeth Kolbert). We attend and discuss Dipesh Chakrabarty's Tanner lectures in February. Students are invited to explore a wide range of research projects; and one assignment is to devise a teaching unit for an undergraduate class on the same topic. TH 1:30–3:20

AMST 866a/HIST 775a/WGSS 712a, Readings in the History of Sexuality
Joanne Meyerowitz
Selected topics in the history of sexuality. Emphasis on key theoretical works and recent historical literature. W 3:30–5:20

AMST 878a/HIST 930a/HSHM 701a, Problems in the History of Medicine and Public Health John Harley Warner
An examination of the variety of approaches to the cultural, social, and intellectual history of medicine, focusing on the United States. Reading and discussion of the recent scholarly literature on medical cultures, public health, and illness experiences from the early national period through the present. Topics include the role of gender, class, ethnicity, race, religion, and region in the experience of health care and sickness and in the construction of medical knowledge; the interplay between lay and professional understandings of the body; the role of the marketplace in shaping professional identities and patient expectations; citizenship, nationalism, and imperialism; and the visual cultures of medicine. W 1:30–3:20

AMST 880a/AFAM 616a/WGSS 616a, Imagined Futures: Species Being, Biotechnologies, and Planetary Relations In Literature, Art, and Music
Hazel Carby
This course interrogates the premises of speculative fiction alongside the futuristic compositions of visual artists and musicians. The theoretical and historical frameworks of the course are shaped by a deep engagement with questions of the possibilities and limits of the human, addressing theoretical and imaginative questions of species being, hybridity, genders and sexualities, racialization, and relationships between biology, technology, and the body. Readings in cultural and postcolonial theory provide an important lens into this material, and students are asked to consider how colonial and imperial pasts and presents inform future imaginings or provide the motivation for creative artists to envision alternative futures. T 2:30–4:30

AMST 900, Independent Research

AMST 901, Directed Reading

AMST 902a and b, Prospectus Workshop
Upon completion of course work, students are required to participate in at least one term of the prospectus workshop, ideally the term before the prospectus colloquium is held. Open to all students in the program and joint departments, the workshop serves as a forum for discussing the selection of a dissertation topic, refining a project's scope, organizing research materials, and evaluating work in progress. The workshop meets once a month. M 12–1:30

AMST 903a[U]/HIST 746a, Introduction to Public Humanities Ryan Brasseaux
What is the relationship between knowledge produced in the university and the circulation of ideas among a broader public, between academic expertise on the one hand and nonprofessionalized ways of knowing and thinking on the other? What is possible? This seminar provides an introduction to various institutional relations and to the modes of inquiry, interpretation, and presentation by which practitioners in the humanities seek to invigorate the flow of information and ideas among a public more broadly conceived than the academy, its classrooms, and its exclusive readership of specialists. Topics include public history, museum studies, oral and community history, public art, documentary film and photography, public writing and educational outreach, the socially conscious performing arts, and fundraising. In addition to core readings and discussions, the seminar includes presentations by several practitioners who are currently engaged in different aspects of the Public Humanities. With the help of Yale faculty and affiliated institutions, participants collaborate in developing and executing a Public Humanities project of their own definition and design. Possibilities might include, but are not limited to, an exhibit or installation, a documentary, a set of walking tours, a Web site, a documents collection for use in public schools. Required for the M.A. with a concentration in Public Humanities. TH 1:30–3:20

AMST 904, Practicum in Public Humanities

AMST 905, Master's Project in Public Humanities

AMST 906a/WGSS 901a, (En)visualizing Knowledge: Text Mining, Mapping, Network Analysis, and Big Data Laura Wexler
Digital media and technology have opened an epochal chasm in our ways of knowing, as books, newspapers, libraries, whole universities, and worlds of scholarship are pulled into the digital realm only to reemerge in different forms. Many scholars have begun to explore how this new convergence alters knowledge production, visual culture, theories of representation and visuality, and the many and varied practices of everyday life. Text mining, mapping, network analysis, and big data visualization are among the most powerful forces now manifesting the everyday life world of the globe. This seminar examines these changes and convergences, investigating the legal, philosophical, scientific, artistic, and social implications of the new modes of creation and transmission of knowledge. Alongside such investigations, we examine existing projects in digital humanities and learn new tools and techniques for research in digital humanities. Students work individually and collaboratively to generate knowledge that can be demonstrated in a final term project. M 4:30–6:30

AMST 910a/AFAM 716a/HIST 764a, Working Group on Latina/o Studies I
Stephen Pitti, Alicia Schmidt Camacho
A continuous workshop for graduate students in American Studies, History, African American Studies, and related fields. This group devotes the fall term to intensive reading and discussion of important interdisciplinary texts in Latina/o studies. Students interested in participating should contact stephen.pitti@yale.edu. F 9:25–11:15

AMST 911b/AFAM 718b/HIST 765b, Working Group on Latina/o Studies II
Stephen Pitti, Alicia Schmidt Camacho
A continuous workshop for graduate students in American Studies, History, African American Studies, and related fields. The spring term focuses on the development of individual research projects and on public history work with the Smithsonian Museums and organizations in New Haven. Students interested in participating should contact stephen.pitti@yale.edu. F 9:25–11:15

AMST 935a,b/ANTH 931a,b, Working Group on Ethnography and Oral History I and II Kathryn Dudley
A continuous workshop for advanced graduate students in Anthropology and American Studies. We discuss fieldwork experiences, analyze recordings of interviews, and share writing in progress to gather feedback and improve techniques. We attend to the methodological, representational, and ethical problems that arise in oral history and ethnography and examine critical theoretical frameworks for understanding our work as collaborative knowledge production. Since 2000, group members' research has shared several themes: a commitment to experimental representational methods; the importance of space, affect, and materiality to ethnographic and historical analysis; and field sites that explore post-industrial economies in the United States and other areas of the world. Prerequisite: permission of the instructor. One-half credit; meets every other week. T 1:30–3:20

ANTHROPOLOGY

10 Sachem Street, 203.432.3670
http://anthropology.yale.edu
M.A., M.Phil., Ph.D.

Chair
Anne Underhill

Director of Graduate Studies
David Watts

Professors Richard Bribiescas, Richard Burger (*on leave* [Sp]), Michael Dove (*Forestry & Environmental Studies*), Kathryn Dudley (*American Studies*), J. Joseph Errington (*on leave* [Sp]), Eduardo Fernandez-Duque, Inderpal Grewal (*Women's, Gender & Sexuality Studies*), Marcia Inhorn (*Middle East Studies; on leave* [Sp]), William Kelly (*on leave* [Sp]), Paul Kockelman, Roderick McIntosh, Catherine Panter-Brick, Eric Sargis, James Scott (*Political Science*), Helen Siu, Kalyanakrishnan Sivaramakrishnan (*on leave* [F]), Anne Underhill, Claudia Valeggia, David Watts

Associate Professors Erik Harms, William Honeychurch (*on leave* [F]), Douglas Rogers (*on leave* [F])

Assistant Professors Oswaldo Chinchilla, Narges Erami (*Middle East Studies*), Louisa Lombard (*on leave* [Sp]), Brian Wood

Fields of Study

The department covers three subfields: archaeology; sociocultural and linguistic anthropology; and physical anthropology. 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, and feminist discourse. Physical anthropology focuses on paleoanthropology, evolutionary theory, human functional anatomy, race and human biological diversity, and 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

There are no required courses or seminars for archaeology and biological anthropology graduate students. However, graduate students in these subfields are expected to confer closely with their primary adviser and faculty to develop the most enriching and cogent

program of courses. In sociocultural anthropology, more than three-fourths of a student's program consists of electives, including course work in other departments. Sociocultural students must take six required courses, with the remainder being electives among Anthropology courses and other departments. Admission to Ph.D. 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. For sociocultural anthropology students, the research proposal requirement takes the form of a field paper of approximately eighty pages in length. Qualifying examinations are normally taken at the end of the second year. For archaeology and biological anthropology subfields, they consist of eight hours written (four hours on one of the subfields, four hours on the student's special interest), and two hours oral. The sociocultural anthropology exam consists of five hours written and approximately one hour oral and is based on the six required courses.

Because of the diversity of our students' training program, the Department does not have a general foreign language requirement, either for admission or for admission to Ph.D. candidacy. Rather, each student's advisory committee must determine the necessary level and nature of foreign language proficiency (including scholarly languages and languages to be used in field research) to be met by the student, as well as any required competencies in statistics and other quantitative or qualitative methods. Advisory committees will stipulate such requirements in writing to the director of graduate studies (DGS) at the earliest possible stage of the student's program of study for approval by the DGS and the Department faculty. Such committee stipulations should specify exactly when and how it will be determined that the student has or has not met the requirements.

Combined Ph.D. Programs

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

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

must be submitted to the directors of graduate study of both departments and approved by the faculty of both. The thesis readers committee must also include at least one faculty member from each department, and the faculties of both departments must approve its composition.

Master's Degrees

M.Phil. See Degree Requirements under Policies and Regulations.

M.A. Applications for a terminal master's degree are not accepted. The M.A. degree is awarded only to students not continuing in the Ph.D. program. The student must complete eight graduate-level term courses approved for credit in the Anthropology department and maintain an average grade of High Pass. Students who are eligible for or who have already received the M.Phil. will not be awarded the M.A.

Contact information: Director of Graduate Studies, Department of Anthropology, Yale University, PO Box 208277, New Haven CT 06520-8277; 203.432.3670; e-mail, anthropology@yale.edu; Web site, http://anthropology.yale.edu.

Courses

ANTH 500a, The Development of the Discipline: Historical Trajectories
William Kelly
The seminar emphasizes the characteristics of anthropology as a discipline and as a profession, and the historical trajectory of sociocultural anthropology from the late nineteenth century to the 1970s. The seminar is reserved for first-year doctoral students in Anthropology. M 9:25–11:15

ANTH 500b, The Development of the Discipline: Contemporary Themes
Kalyanakrishnan Sivaramakrishnan
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. The seminar is reserved for first-year doctoral students in Anthropology, and students are presumed to have taken ANTH 500a in the fall term. TH 9:25–11:15

ANTH 501a, Anthropology and Classical Social Theory Paul Kockelman
Readings of primary texts in classical social theory, especially the writings of Marx, Weber, and Durkheim. Particular emphasis is placed on the role of these theorists in the early development of anthropology and social science more broadly. The course is reserved for first-year graduate students in Anthropology. M 9:25–11:15

ANTH 502a, Research in Sociocultural Anthropology: Design and Methods
Marcia Inhorn
The course offers critical evaluation of the nature of ethnographic research. Research design includes the rethinking of site, voice, and ethnographic authority. T 11:20–2

ANTH 515a[U], Culture, History, Power, and Representation Helen Siu
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. W 10:30–12:20

ANTH 528b[U]/ARCG 528b[U]/EGYP 528b[U], Magic and Ritual in Ancient Egypt
John Darnell, Christina Geisen
Introduction to ancient Egyptian magic and rituals with an overview on the use of magic and discussion of the different rituals and festivals attested in ancient Egypt. T 1:30–3:20

ANTH 531b/ARCG 531b/CLSS 815b/CPLT 547b/HIST 502b/JDST 653b/NELC 533b/RLST 803b, Fakes, Forgeries, and the Making of Antiquity Eckart Frahm, Irene Peirano Garrison
A comparative exploration of notions of forgery and authenticity in the ancient and premodern world, in a variety of civilizations (ancient Greece, Mesopotamia, Egypt, Israel, China, India, etc.) and different political, religious, literary, and artistic contexts. Emphasis is also placed on the pivotal role played by the "authentic" in the modern era in disciplines such as philology and aesthetics, the manipulative uses of ancient history for purposes of modern nation building and identity formation, copies and reconstructions of ancient artifacts, and the role of forgeries in today's antiquities trade. TH 2:30–4:30

ANTH 533a[U], Bilingualism in Social Context J. Joseph Errington
The linguistic phenomenon of bilingualism is presented through broad issues in social description inseparably linked to it: growth and change in bilingual communities; bilingual usage, social identity, and allegiance; and interactional significances of bilingual speech repertoire use. W 1:30–3:20

ANTH 539b[U], Urban Ethnographies of Asia Erik Harms
Introduction to the anthropological study of contemporary Asian cities. Focus on new ethnographies about cities in East, Southeast, and South Asia. Topics include rural-urban migration, redevelopment, evictions, social movements, land grabbing, master-planned developments, heritage preservation, utopian aspirations, social housing, slums and precariousness, and spatial cleansing. TH 9:25–11:15

ANTH 541a/F&ES 836a/HIST 965a/PLSC 779a, Agrarian Societies: Culture, Society, History, and Development Fabian Drixler, Peter Perdue, James Scott
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. W 1:30–5:20

ANTH 560a[U], Representing Iran Narges Erami
This course introduces students to major themes in Iranian history and culture and builds a critical framework for understanding some of the challenges that face modern Iran today. In reading modern fiction, ethnography, historical narratives, primary sources, and theoretical texts covering local and oral history, revolutions, Islam and secularism, democracy and theocracy, and the role of cinema, students examine the Western production of knowledge about Iran and rethink what we know about such categories as history, culture, and gender. T 1:30–3:20

ANTH 561b/F&ES 877b, Anthropology of the Global Economy for Development and Conservation Carol Carpenter

The seminar explores topics in the anthropology of the global economy that are relevant to development and conservation policy and practice. Anthropologists are often assumed to focus on micro- or local-level research, and thus to have limited usefulness in the contemporary, global world of development and conservation policy. In fact, however, they have been examining global topics since at least the 1980s, and very little current anthropological research is limited to the village level. More importantly, the anthropological perspective on the global economy is unique and important. TH 9:30–12:20

ANTH 570b[U], Anthropology of Information Paul Kockelman

This course is about the digital and computational mediation of meaning. In some sense, it is about human-based significance in relation to machine-based sieving. We read classic works in media studies, cybernetics, computer science, semiotics, anthropology, and critical theory. Key topics include the relation between meaning and information; the relation between interpretation and computation; and the relation between interaction and infrastructure. W 9:25–11:15

ANTH 571a[U], Modern Indonesia J. Joseph Errington

Political and cultural dynamics in contemporary Indonesia explored from historical and anthropological perspectives. Major ethnic groups, key historical dynamics, political culture, and interaction between modernization and traditional lifeways. Issues of ethnicity, gender, religion, and economy in situations of rapid social change. W 1:30–3:20

ANTH 572b/F&ES 869b, Disaster, Degradation, Dystopia: Social Science Approaches to Environmental Perturbation and Change Michael Dove

An advanced seminar on the tradition of social science scholarship on environmental perception, perturbation, and disaster. The contents evolve from year to year in keeping with current scholarship. Section I, introduction. Section II, central questions and debates in the field: social dimensions of natural disasters; discursive dimensions of environmental degradation; asymmetries between political power and resource wealth; and anthropological approaches to the study of climate and society. Section III, historic and comparative view of different ways of understanding the environment: the twenty-first-century development of a posthumanist, multispecies ethnography; and the half-millennium tradition of natural history studies. Section IV, classroom presentation of work by the students and teaching fellow. One class is also devoted to student "picks" of the most influential works in the current literature, and there are two or three guest lectures by prominent scholars in the field. Prerequisite: ANTH 517a, 581a, or 597a.

ANTH 575a[U], Hubs, Mobilities, and Global Cities Helen Siu

Analysis of urban life in historical and contemporary societies. Topics include capitalist and postmodern transformations, class, gender, ethnicity, migration, and global landscapes of power and citizenship. T 1:30–3:20

ANTH 581a/F&ES 520a, Society and Environment: Introduction to Theory and Method Michael Dove

An introductory graduate core course on the scope of social scientific contributions to environmental and natural resource issues. Section I presents an overview of the field and

course. Section II deals with the way that environmental problems are initially framed. Case studies focus on placing problems in their wider political context, new approaches to uncertainty and failure, and the importance of how the analytical boundaries to resource systems are drawn. Section III focuses on questions of method, including the dynamics of working within development projects, and the art of rapid appraisal and short-term consultancies. Section IV is concerned with local peoples and the environment, with case studies addressing myths of tropical forest use and abuse development discourse, and with the question of indigenous peoples and knowledge. This is a foundations course for the M.E.M. curriculum and a core course in the curriculum for the combined F&ES/Anthropology doctoral program. Three hours lecture/seminar. Enrollment limited to thirty.

ANTH 583a[U]/GLBL 823a[U], Health Disparities and Health Equity: Biocultural Perspectives Catherine Panter-Brick

A biocultural perspective on debates in medical anthropology and global health that focus on health disparities and equity. The intersection of biological and cultural issues in matters of health research and intervention. Application of theoretical frameworks to case studies in global health inequality. W 3:30–5:20

ANTH 597a/F&ES 839a, Social Science of Conservation and Development Carol Carpenter

This course is designed to provide M.E.M., M.E.Sc., and doctoral students with the opportunity to master the essential social science literature on sustainable development and conservation. Social science makes two contributions to the practice of development and conservation. First, it provides ways of thinking about, researching, and working with social groupings—including rural households and communities, but also development and conservation institutions, states, and NGOs. This aspect includes relations between groups at all these levels, and the role of power in these relations. Second, social science tackles the analysis of the knowledge systems that implicitly shape development and conservation policy and impinge on practice. In other words, we analyze communities but also our own ideas of what communities are. We also examine our ideas about sustainable development and conservation, and we look at development and the institutions that implement it from the perspective of communities. The emphasis throughout is on how these things shape the practice of sustainable development and conservation. Case studies used in the course have been balanced as much as possible between Southeast Asia, South Asia, Africa, and Latin America; most are rural and Third World (largely due to the development and conservation focus). The course includes readings from all noneconomic social sciences. Readings are equally focused on conservation and development. The goal of the course is to stimulate students to apply informed and critical thinking (which means not criticizing others, but questioning our own underlying assumptions) to whatever roles they may come to play in sustainable development and conservation, in order to move toward more environmentally and socially sustainable projects and policies. The course is also designed to help students shape future research by learning to ask questions that build on, but are unanswered by, the social science theory of conservation and development. No prerequisites. This is a requirement for the joint F&ES/Anthropology doctoral program and a prerequisite for some advanced F&ES courses. Open to advanced undergraduates. Three hours lecture/seminar. T 2:30–5:20

ANTH 598b/F&ES 965b, Advanced Readings: Social Science of Conservation and Development Carol Carpenter
An advanced seminar on the social science theory of sustainable development and conservation, designed as an M.E.M. capstone course and to give M.E.Sc. and doctoral students a wider theoretical context for analyzing and writing up their research. The course traces the conceptual history of the social science theory of sustainable development and conservation, focusing on theories of power, governmentality, and capitalism. It examines relations between these theories, alternative theories, and how this history influences the field. The course covers the works of Michel Foucault most relevant to development and conservation, important social scientists who have used Foucault's ideas (e.g., James Ferguson, Timothy Mitchell, Tania Li, Donald Moore, David Mosse), alternative theories of power (e.g., James Scott, Bruno Latour), applications of Foucault's ideas to development (selections change every year), applications of Foucault's ideas to the environment (especially Arun Agrawal, Timothy Luke, Bruce Braun), theories of resistance (Michel Foucault, James Scott), and Foucault-influenced views of the economy and capitalism (Mitchell, Ferguson, Aiwa Ong, Li, Anna Tsing, among others). Students are expected to use the course to develop, and present in class, their own research and writing. Prerequisite: ANTH 561b, 582a, or 597a. Enrollment limited to twelve. T 2:30–5:20

ANTH 601b[U], Meaning and Materiality Paul Kockelman
This course is about the relation between meaning and materiality. We read classic work at the intersection of biosemiosis, technocognition, and sociogenesis. And we use these readings to understand the relation between significance, selection, sieving, and serendipity. M 9:25–11:15

ANTH 638b[U], Culture, Power, Oil Douglas Rogers
The course analyzes the production, circulation, and consumption of petroleum in order to explore key topics in recent social and cultural theory, including globalization, empire, cultural performance, natural resource extraction, and the nature of the state. Case studies from the United States, Saudi Arabia, Nigeria, Venezuela, and the former Soviet Union, among others. W 9:25–11:15

ANTH 639a[U]/AFST 639a[U], Political Anthropology and Africa Louisa Lombard
A historical-anthropological study of politics in Africa. How have anthropologists made sense of the workings of African politics, both those of state and nonstate actors? This course charts how African states came into being, how they operate, and how state agents and the people they govern negotiate legitimacy, authority, and belonging. W 3:30–5:20

ANTH 651a[U]/WGSS 651a[U], Intersectionality and Women's Health Marcia Inhorn
This interdisciplinary seminar explores how the intersections of race, class, gender, and other axes of "difference" (age, sexual orientation, disability status, nation, religion) affect women's health, primarily in the contemporary United States. Recent feminist approaches to intersectionality and multiplicity of oppressions theory are introduced. In addition, the course demonstrates how anthropologists studying women's health issues have contributed to social and feminist theory at the intersections of race, class, and gender. T 9:25–11:15

ANTH 710b/ARCG 710b, Settlement Patterns and Landscape Archaeology
Oswaldo Chinchilla
An introduction to the archaeological study of ancient settlements and landscapes. Topics include an overview of method and theory in settlement and landscape archaeology; field methods of reconnaissance, survey, and remote sensing; studies of households and communities; studies of ancient agricultural landscapes; regional patterns; roads and networks of communication; urbanism and ancient cities; and symbolic interpretations of ancient landscapes. T 9:25–11:15

ANTH 717a[U]/ARCG 717a[U], Ancient Maya Writing Oswaldo Chinchilla
Introduction to the ancient Maya writing system. Contents of the extant corpus, including nametags, royal and ritual commemorations, dynastic and political subjects, and religious and augural subjects; principles and methods of decipherment; overview of the Maya calendar; comparison with related writing systems in Mesoamerica and elsewhere in the ancient world. TH 9:25–11:15

ANTH 720b[U]/ARCG 720b[U]/NELC 720b[U], Babylon to Bush Harvey Weiss
Analysis of Mesopotamian transformations from the earliest agriculture villages to the earliest cities, states, and civilization, to the earliest empires, as well as the region-wide collapses that punctuated these developments. Forces that drove these uniquely early Mesopotamian developments. Essential archaeological questions, including why each transformation happened, developed, and evolved. The end of the Ottoman empire and the British (1917) and American (1991, 2003) invasions. TH 1:30–3:20

ANTH 743b/ARCG 743b, Archaeological Research Design and Proposal Development
William Honeychurch
An effective proposal requires close consideration of all steps of research design, from statement of the problem to data analysis. The course is designed to provide an introduction to the principles by which archaeological research projects are devised and proposed. Students receive intensive training in the preparation of a research proposal with the expectation that the final proposal will be submitted to national and international granting agencies for consideration. The course is structured around the creation of research questions; hypothesis development and statement of expectations; and the explicit linking of expectations to material patterning, field methods, and data analysis. Students review and critique examples of funded and nonfunded research proposals and comment extensively on each other's proposals. In addition to developing one's own research, learning to constructively critique the work of colleagues is imperative for becoming a responsible anthropological archaeologist. F 9:25–11:15

ANTH 771a/ARCG 771a, Early Complex Societies Richard Burger,
Roderick McIntosh
A consideration of theories and methods developed by archaeologists to recognize and understand complex societies in prehistory. Topics include the nature of social differentiation and stratification as applied in archaeological interpretation; emergence of complex societies in human history; case studies of societies known ethnographically and archaeologically. MW 9–10:15

ANTH 772a[U]/ARCG 772a[U], Cities in Antiquity: The Archaeology of Urbanism
Anne Underhill, Oswaldo Chinchilla
Archaeological studies of ancient cities and urbanism. Topics include the origin and growth of cities; the economic, social, and political implications of urban life; and archaeological methods and theories for the study of ancient urbanism. Case studies include ancient cities around the world. T 9:25–11:15

ANTH 773b[U]/ARCG 773b[U]/F&ES 793b/NELC 588b[U], Abrupt Climate Change and Societal Collapse Harvey Weiss
Collapse documented in the archaeological and early historical records of the Old and New Worlds, including Mesopotamia, Mesoamerica, the Andes, and Europe. Analysis of politicoeconomic vulnerabilities, resiliencies, and adaptations in the face of abrupt climate change, anthropogenic environmental degradation, resource depletion, "barbarian" incursions, or class conflict. TH 3:30–5:20

ANTH 779b[U]/ARCG 779b[U], Anthropology of Mobile Societies
William Honeychurch
The social and cultural significance of the ways that hunter-gatherers, pastoral nomads, maritime traders, and members of our own society traverse space. The impact of mobility and transport technologies on subsistence, trade, interaction, and warfare from the first horse riders of five thousand years ago to jet-propulsion tourists of today. W 3:30–5:20

ANTH 782b[U]/ARCG 782b[U], Advanced Archaeological Theory Roderick McIntosh
Review of the intellectual history of archaeology, with readings from the Enlightenment to the present. Emphasis on the tension between science, mysticism, and nationalism in the interpretation of prehistoric processes. W 7–8:50

ANTH 785a[U]/ARCG 785a[U], Archaeological Ceramics I Anne Underhill
Ceramics are a rich source of information about a range of topics including ancient technology, cooking practices, craft specialization, regional trade, and religious beliefs. This course provides a foundation for investigating such topics and gaining practical experience in archaeological analysis of ceramics. Students have opportunities to focus on ceramics of particular interest to them, whether these are low-fired earthen wares, or porcelains. We discuss ancient pottery production and use made in diverse contexts ranging from households in villages to workshops in cities. In addition we refer to the abundant ethnoarchaeological data about traditional pottery production. TH 1:30–3:20

ANTH 787b[U]/ARCG 787b[U]/HSAR 804b, East Asian Objects and Museums: Collection, Curation, and Display Anne Underhill, Youn-mi Kim
This course explores the East Asian art and anthropological collections at Yale's museums and at other major museums in North America and East Asia. Students study collections and their histories; gain experience in museum practices; and learn from specialists through class visits to other relevant museums in the United States and an associated international conference, Material Culture and Everyday Life before the Korean War: Workshop on the Korean Art and Photograph Collections at the Yale Peabody Museum, sponsored by the Council on East Asian Studies. Opportunities for a student-curated exhibition at Yale are being developed. W 9:25–11:15

ANTH 801a, Sexual Selection and Parental Investment Eduardo Fernandez-Duque
Critical evaluation of the current state of theory and empirical research on sexual selection and parental investment in evolutionary ecology through discussion of reviews and empirical studies. Evidence that sexual selection and parental investment have played and continue to play key roles in the evolution and maintenance of particular features of morphology, behavior, and social organization. T 1:30–3:20

ANTH 835b[U]/E&EB 842b[U], Primate Diversity and Evolution Eric Sargis
The diversity and evolutionary history of living and extinct primates. Focus on major controversies in primate systematics and evolution, including the origins and relationships of several groups. Consideration of both morphological and molecular studies. Morphological diversity and adaptations explored through museum specimens and fossil casts. W 1:30–3:20

ANTH 847b[U]/ARCG 847b[U], Hunter-Gatherers Brian Wood
The vast majority of the human experience centered around one way of making a living: hunting and gathering. Yet today, hunter-gatherers make up a small and diminishing proportion of human societies. This class is a broad survey of the ecology, economics, political, and social organization of recent hunter-gatherers and a review of anthropological inquiry into foraging societies. T 1:30–3:20

ANTH 857b[U], Topics and Issues in Evolutionary Theory Eric Sargis, Brian Wood
Focus on classic and current literature in theoretical evolutionary biology, intended to give students intensive training in critical analysis of theoretical concepts and in scientific writing. W 1:30–3:20

ANTH 859b, Ethnopediatrics Claudia Valeggia
Cross-cultural study of the relation between biology and culture and its influence on children's well-being. Ways in which the health, growth, and development of children are shaped by the interactions of human evolutionary biology, ecology, and local cultural patterns. TH 1:30–3:20

ANTH 864b[U]/ARCG 864b[U], Human Osteology Eric Sargis
A lecture and laboratory course focusing on the characteristics of the human skeleton and its use in studies of functional morphology, paleodemography, and paleopathology. Laboratories familiarize students with skeletal parts; lectures focus on the nature of bone tissue, its biomechanical modification, sexing, aging, and interpretation of lesions. TTH 2:30–3:45

ANTH 876b[U], Observing and Measuring Behavior Eduardo Fernandez-Duque
The primary subject matter of the course is the methods used for the systematic observation and measurement of the behavior of living organisms and the quantification and analyses of the information collected. T 9:25–11:15

ANTH 931a,b/AMST 935a,b, Working Group on Ethnography and Oral History I and II Kathryn Dudley
A continuous workshop for advanced graduate students in Anthropology and American Studies. We discuss fieldwork experiences, analyze recordings of interviews, and share writing in progress to gather feedback and improve techniques. We attend to the

methodological, representational, and ethical problems that arise in oral history and ethnography and examine critical theoretical frameworks for understanding our work as collaborative knowledge production. Since 2000, group members' research has shared several themes: a commitment to experimental representational methods; the importance of space, affect, and materiality to ethnographic and historical analysis; and field sites that explore postindustrial economies in the United States and other areas of the world. Prerequisite: permission of the instructor. One-half credit; meets every other week. T 1:30–3:20

ANTH 950a and b, Directed Research: Preparation for Qualifying Exam
By arrangement with faculty.

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

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

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

ANTH 954a and b, Directed Research in Biological Anthropology
By arrangement with faculty.

APPLIED MATHEMATICS

A. K. Watson Hall, 203.432.1278
http://applied.math.yale.edu
M.S., M.Phil., Ph.D.

Director of Graduate Studies
Peter Jones

Professors Andrew Barron (*Statistics*), Joseph Chang (*Statistics*), Ronald Coifman (*Mathematics; Computer Science*), Stanley Eisenstat (*Computer Science*), Michael Fischer (*Computer Science*), Peter Jones (*Mathematics*), David Pollard (*Statistics*), Nicholas Read (*Physics; Applied Physics; Mathematics*), Vladimir Rokhlin (*Computer Science; Mathematics*), Martin Schultz (*Emeritus, Computer Science*), Mitchell Smooke (*Mechanical Engineering & Materials Science; Applied Physics*), Daniel Spielman (*Computer Science*), Van Vu (*Mathematics*), Günter Wagner (*Ecology & Evolutionary Biology*), John Wettlaufer (*Geology & Geophysics; Mathematics; Physics*), Huibin Zhou (*Statistics*), Steven Zucker (*Computer Science; Biomedical Engineering*)

Associate Professors John Emerson (*Statistics*), Thierry Emonet (*Molecular, Cellular & Developmental Biology; Physics*), Josephine Hoh (*Public Health*), Yuval Kluger (*Pathology*), Michael Krauthammer (*Pathology*), Sekhar Tatikonda (*Electrical Engineering; Statistics; Computer Science*)

Assistant Professors Xiuyuan Cheng, Alexander Cloninger, Manas Rachh, Guy Wolf

Fields of Study

The graduate Program in Applied Mathematics comprises the study and application of mathematics to problems motivated by a wide range of application domains. Areas of concentration include the analysis of data in very high-dimensional spaces, the geometry of information, computational biology, and randomized algorithms. 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, cryptography, 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 (in algebra, analysis, and probability and statistics) by the end of their second year; (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. Prior to registering for a second year of study, and in addition to all other academic requirements, students must successfully complete MATH 991a, Ethical Conduct of Research, or another approved course on responsible conduct in research. Teaching is considered an integral part of training at Yale University, so all students are expected to complete two terms of teaching within their first two years. The normal time for completion of the Ph.D. program is four years.

Requirement (1) normally includes four core courses in each of the 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.

In addition to the above, all first-year students (including terminal M.S. students) must successfully complete one course on the responsible conduct of research (e.g., MATH 991 or CPSC 991) and AMTH 525, Seminar in Applied Mathematics.

Honors Requirement

Students must meet the Graduate School's Honors requirement by the end of the fourth term of full-time study.

Master's Degrees

M. Phil. See Degree Requirements under Policies and Regulations.

M.S. (en route to the Ph.D.) The M.S. degree is a terminal degree and is not awarded en route to the Ph.D. Students who withdraw from the Ph.D. program may be eligible for the M.S. if they meet the requirements of the terminal master's degree program (below). Students who are eligible for or who have already received the M.Phil. will not be awarded the M.S.

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

More information is available on the program's Web site, http://applied.math.yale.edu.

Courses

AMTH 525, Seminar in Applied Mathematics
This course consists of weekly seminar talks given by a wide range of speakers. Required of all first-year students.

[**AMTH 561a/CPSC 662a, Spectral Graph Theory**]

[**AMTH 562a^{U}/CPSC 562a^{U}, Graphs and Networks**]

AMTH 605a/ENAS 503a/STAT 667a, Probabilistic Networks, Algorithms, and Applications Sekhar Tatikonda

This course examines probabilistic and computational methods for the statistical modeling of complex data. The emphasis is on the unifying framework provided by graphical models, a formalism that merges aspects of graph theory and probability theory. Graphical models: Markov random fields, Bayesian networks, and factor graphs. Algorithms: filtering, smoothing, belief-propagation, sum-product, and junction tree. Variational techniques: mean-field and convex relaxations. Markov processes on graphs: MCMC, factored HMMs, and Glauber dynamics. Some statistical physics techniques: cavity and replica methods. Applications to error-correcting codes, computer vision, bio-informatics, and combinatorial optimization.

AMTH 666a/ASTR 666a/G&G 666a, Classical Statistical Thermodynamics John Wettlaufer

Classical thermodynamics is derived from statistical thermodynamics. Using the multiparticle nature of physical systems, we derive ergodicity, the central limit theorem, and the elemental description of the second law of thermodynamics. We then develop kinetics, transport theory, and reciprocity from the linear thermodynamics of irreversible processes. Topics of focus include Onsager reciprocal relations, the Fokker-Planck equation, stability in the sense of Lyapunov, and time invariance symmetry. We explore phenomena that are of direct relevance to astrophysical and geophysical settings. No quantum mechanics is necessary as a prerequisite.

[**AMTH 667b/CPSC 576b^{U}/ENAS 576b^{U}, Advanced Computational Vision**]

AMTH 702a/MATH 702a, Numerical Solution of Ordinary and Partial Differential Equations Vladimir Rokhlin

This course includes (1) review of the classical qualitative theory of ODEs; (2) Cauchy problem: elementary numerical methods, stiff systems of ODEs, Richardson extrapolation and deferred corrections; (3) boundary value problems: elementary theory; (4) introduction to PDES: counterexamples, Cauchy-Kowalevski theorem, classification of second-order PDEs, separation of variables; (5) numerical methods for elliptic PDEs; (6) numerical methods for parabolic PDEs; and (7) numerical methods for hyperbolic PDEs. Prerequisites: advanced calculus; knowledge of FORTRAN or C.

AMTH 745b/CB&B 745b/CPSC 745b, Advanced Topics in Machine Learning and Data Mining Alexander Cloninger, Smita Krishnaswamy, Guy Wolf

An overview of advances in the past decade in machine learning and automatic data-mining approaches for dealing with the broad scope of modern data-analysis challenges, including deep learning, kernel methods, dictionary learning, and bag of words/features. This year, the focus is on a broad scope of biomedical data-analysis tasks, such as single-cell RNA sequencing, single-cell signaling and proteomic analysis, health care assessment, and medical diagnosis and treatment recommendations. The seminar is based on student presentations and discussions of recent prominent publications from leading

journals and conferences in the field. Prerequisite: basic concepts in data analysis (e.g., CPSC 545 or 563) or permission of the instructor. W 2:30–5:15

AMTH 765b/CB&B 562b/ENAS 561b/INP 562b/MB&B 562b^{U}/MCDB 562b^{U}/ PHYS 562b, Dynamical Systems in Biology Damon Clark, Jonathon Howard
This course covers advanced topics in computational biology. How do cells compute, how do they count and tell time, how do they oscillate and generate spatial patterns? Topics include time-dependent dynamics in regulatory, signal-transduction, and neuronal networks; fluctuations, growth, and form; mechanics of cell shape and motion; spatially heterogeneous processes; diffusion. This year, the course spends roughly half its time on mechanical systems at the cellular and tissue level, and half on models of neurons and neural systems in computational neuroscience. Prerequisite: MCDB 561a or equivalent, or a 200-level biology course, or permission of the instructor. TTH 2:30–3:45

APPLIED PHYSICS

Becton Center, 203.432.2210
http://appliedphysics.yale.edu
M.S., M.Phil., Ph.D.

Chair
Charles Ahn

Director of Graduate Studies
Hui Cao (309 BCT, hui.cao@yale.edu)

Professors Charles Ahn, Sean Barrett (*Physics*), Hui Cao, Richard Chang (*Emeritus*), Michel Devoret, Paul Fleury (*Emeritus*), Steven Girvin (*Physics*), Leonid Glazman (*Physics*), Victor Henrich, Sohrab Ismail-Beigi, Marshall Long (*Mechanical Engineering & Materials Science*), Tso-Ping Ma (*Electrical Engineering*), Simon Mochrie, Daniel Prober, Nicholas Read, Mark Reed (*Electrical Engineering*), Robert Schoelkopf, Ramamurti Shankar (*Physics*), Mitchell Smooke (*Mechanical Engineering & Materials Science*), A. Douglas Stone, Hongxing Tang (*Electrical Engineering*), Robert Wheeler (*Emeritus*), Werner Wolf (*Emeritus*)

Associate Professors Jack Harris (*Physics*), Corey O'Hern (*Mechanical Engineering & Materials Science*)

Assistant Professors Michael Choma (*Biomedical Engineering*), Liang Jiang, Owen Miller, Peter Rakich

Fields of Study

Fields include areas of theoretical and experimental condensed-matter and materials physics, optical and laser physics, quantum engineering, and nanoscale science. Specific programs include surface and interface science, first principles electronic structure methods, photonic materials and devices, complex oxides, magnetic and superconducting artificially engineered systems, quantum computing and superconducting device research, quantum transport and nanotube physics, quantum optics, and random lasers.

Special Admissions Requirements

The prerequisites for work toward a Ph.D. degree in Applied Physics include a sound undergraduate training in physics and a good mathematical background. The GRE General Test is required, and the Subject Test in Physics is strongly recommended.

Integrated Graduate Program in Physical and Engineering Biology (PEB)

Students applying to the Ph.D. program in Applied Physics may also apply to be part of the PEB program. See the description under Non-Degree-Granting Programs, Councils, and Research Institutes for course requirements, and http://peb.yale.edu for more information about the benefits of this program and application instructions.

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. These courses must be full-credit graduate courses with clear technical, scientific, or mathematical focus. These twelve courses must include seven core courses. The first core course satisfies the math requirement; must be fulfilled in the first year; and is met by taking Mathematical Methods of Physics (PHYS 506a) (preferred), or, with permission of the DGS, Mathematical Methods I (APHY 500a). The remaining six core courses are Solid State Physics I (APHY 548a) and II (APHY 549b), Quantum Mechanics I (PHYS 508a) and II (PHYS 608b), Electromagnetic Theory I (PHYS 502b), and Statistical Physics I (PHYS 512b). It is expected that most of these six core courses will be taken in the first year; no more than two may be taken in the second year. No more than two of the twelve courses can be Special Investigations, and at least two must be outside the area of the dissertation.

Well-prepared students may be able to place out of the seven required core courses after demonstrating equivalent training and competence by passing an exam in the relevant subject.

Students must take Responsible Conduct in Research for Physical Scientists (APHY 590), which discusses ethics and responsible conduct in scientific research and fulfills the requirement stipulated by the National Science Foundation for all students and for all postdoctoral researchers funded by the NSF. Note that APHY 590 may not be used to fulfill the twelve-course requirement.

Each term, the faculty review the overall performance of the student and report their findings to the director of graduate studies (DGS), who determines whether the student may continue toward the Ph.D. degree. By the end of the second term, it is expected that a faculty member has agreed to accept the student as a research assistant. By December 5 of the third year, an area examination must be passed and a written prospectus submitted before dissertation research is begun. These events result in the student's admission to candidacy. Subsequently, the student will report orally each year to the full advisory committee on progress. When the research is nearing completion, but before the thesis writing has commenced, the full advisory committee will advise the student on the thesis plan. A final oral presentation of the dissertation research is required to be given during term time.

There is no foreign language requirement.

Teaching experience is regarded as an integral part of the graduate training program at Yale University, and all Applied Physics graduate students are required to serve as a Teaching Fellow for one term, typically during year two. Teaching duties normally involve assisting in laboratories or discussion sections and grading papers and are not expected to require more than ten hours per week. Students are not permitted to teach during the first year of study. Students whose advisers experience disruption in funding may require additional support from Yale. In these cases, students will be required to teach for up to an additional two terms, but would not be required to teach more than three terms over their first five years.

If a student was admitted to the program having earned a score of less than 26 on the Speaking Section of the Internet-based TOEFL, the student will be required to take an English as a Second Language (ESL) course each term at Yale until the Graduate School's Oral English Proficiency standard has been met. This must be achieved by the end of the third year in order for the student to remain in good standing.

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 Degree Requirements under Policies and Regulations.

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.

Terminal 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., although there are no core course requirements for students in this program. 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.

Program materials are available upon request to the Director of Graduate Studies, Department of Applied Physics, Yale University, PO Box 208267, New Haven CT 06520-8267; e-mail, applied.physics@yale.edu; Web site, http://appliedphysics.yale.edu.

Courses

The list of courses may be slightly modified by the time the term begins. Please check the Web site http://students.yale.edu/oci for the most up-to-date course listing.

APHY 500a/ENAS 500a, Mathematical Methods I J. Rimas Vaisnys
A beginning, graduate-level introduction to ordinary and partial differential equations, vector analysis, linear algebra, and complex functions. Laplace transform, series expansion, Fourier transform, and matrix methods are given particular attention. Applications to problems frequently encountered in engineering practice are stressed throughout. TTH 9–10:15

APHY 506a[U], Basic Quantum Mechanics Sohrab Ismail-Beigi
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. TTH 2:30–3:45

APHY 548a[U] and 549b[U]/ENAS 850a[U] and 851b[U]/PHYS 548a[U] and 549b[U], Solid State Physics I and II Victor Henrich [F], Michel Devoret [Sp]
A two-term sequence covering the principles underlying the electrical, thermal, magnetic, and optical properties of solids, including crystal structures, phonons, energy bands, semiconductors, Fermi surfaces, magnetic resonance, phase transitions, and superconductivity. Fall: TTH 1–2:15; Spring: TTH 1–2:15

APHY 590b/PHYS 590b, Responsible Conduct in Research for Physical Scientists
Required seminar for all first-year students.

[**APHY 601b/PHYS 601b, Quantum Information and Computation**]

APHY 610b/PHYS 610b, Quantum Many-Body Theory Leonid Glazman
Identical particles and second quantization. Electron tunneling and spectral function. General linear response theory. Approximate methods of quantum many-body theory. Dielectric response, screening of long-range interactions, electric conductance, collective modes, and photon absorption spectra. Fermi liquid; Cooper and Stoner instabilities; notions of superconductivity and magnetism. BCS theory, Josephson effect, and Majorana fermions in condensed matter; superconducting qubits. Bose-Einstein condensation; Bogoliubov quasiparticles and solitons. TTH 11:35–12:50

APHY 628a/PHYS 628a, Statistical Physics II Leonid Glazman
An advanced course in statistical mechanics. Topics may include mean field theory of and fluctuations at continuous phase transitions; critical phenomena, scaling, and introduction to the renormalization group ideas; topological phase transitions; dynamic correlation functions and linear response theory; quantum phase transitions; superfluid and superconducting phase transitions; cooperative phenomena in low-dimensional systems. TTH 2:30–3:45

[**APHY 633b/PHYS 633b, Introduction to Superconductivity**]

[**APHY 634a/PHYS 634a, Mesoscopic Physics I**]

[**APHY 650a/PHYS 650a, Theory of Solids I**]

APHY 675a[U]/PHYS 675a[U], Principles of Optics with Applications Hui Cao
Introduction to the principles of optics and electromagnetic wave phenomena with applications to microscopy, optical fibers, laser spectroscopy, nanophotonics, plasmonics, and metamaterials. Topics include propagation of light, reflection and refraction, guiding light, polarization, interference, diffraction, scattering, Fourier optics, and optical coherence. TTH 11:35–12:50

APHY 676a/PHYS 676a, Introduction to Light-Matter Interactions Peter Rakich
Optical properties of materials and a variety of coherent light-matter interactions are explored through the classical and quantum treatments. The role of electronic, phononic, and plasmonic interactions in shaping the optical properties of materials is examined using generalized quantum and classical coupled-mode theories. The dynamic response of media to strain, magnetic, and electric fields is also treated. Modern topics are explored, including optical forces, photonic crystals, and metamaterials; multi-photon absorption;

and parametric processes resulting from electronic, optomechanical, and Raman interactions. TTH 1–2:15

APHY 677a/PHYS 677a, Noise, Dissipation, Amplification, and Information
Michel Devoret
Graduate-level non-equilibrium statistical physics applied to noise phenomena, both classical and quantum. The aim of the course is to explain the fundamental link between the random fluctuations of a physical system in steady state and the response of the same system to an external perturbation. Several key examples in which noise appears as a resource rather than a limitation are treated: spin relaxation in nuclear magnetic resonance (motional narrowing), Johnson-Nyquist noise in solid state transport physics (noise thermometry), photon correlation measurements in quantum optics (Hanbury Brown-Twiss experiment), and so on. The course explores both passive and active systems. It discusses the ultimate limits of amplifier sensitivity and speed in physics measurements. MW 9–10:15

[**APHY 679b/PHYS 679b, Nonlinear Optics and Lasers**]

APHY 691b/PHYS 691b, Quantum Optics Liang Jiang
Quantization of the electromagnetic field, coherence properties and representation of the electromagnetic field, quantum phenomena in simple nonlinear optics, atom-field interaction, stochastic methods, master equation, Fokker-Planck equation, Heisenberg-Langevin equation, input-output formulation, cavity quantum electrodynamics, quantum theory of laser, trapped ions, light forces, quantum optomechanics, Bose-Einstein condensation, quantum measurement and control. MW 9–10:15

APHY 725b^{U}/ENAS 725b^{U}, Advanced Synchrotron Techniques and Electron Spectroscopy of Materials Charles Ahn
This course provides descriptions of advanced concepts in synchrotron X-ray and electron-based methodologies for studies of a wide-range of materials at atomic and nano-scales. Topics include X-ray and electron interactions with matter, X-ray scattering and diffraction, X-ray spectroscopy and inelastic methods, time-resolved applications, X-ray imaging and microscopy, photo-electron spectroscopy, electron microscopy and spectroscopy, among others. Emphasis is on applying the fundamental knowledge of these advanced methodologies to real-world materials studies in a variety of scientific disciplines. T 1:30–3:20

[**APHY 816a/PHYS 816a, Techniques of Microwave Measurements and RF Design**]

APHY 990a and 990b, Special Investigations

[**APHY 993a, Topics in DFT and First Principle Methods**]

ARCHAEOLOGICAL STUDIES

10 Sachem Street, 203.432.3670
www.yale.edu/archaeology
M.A.

Chair and Director of Graduate Studies
Richard Burger (*Anthropology; on leave* [Sp])

Acting Chair and Director of Graduate Studies [Sp]
William Honeychurch (*Anthropology*)

Professors Richard Burger (*Anthropology; on leave* [Sp]), Edward Cooke, Jr. (*History of Art*), John Darnell (*Near Eastern Languages & Civilizations*), Stephen Davis (*Religious Studies*), Eckart Frahm (*Near Eastern Languages & Civilizations*), Diana Kleiner (*Classics; History of Art*), Roderick McIntosh (*Anthropology*), J.G. Manning (*Classics; History; on leave*), Mary Miller (*History of Art*), Eric Sargis (*Anthropology*), Ronald Smith (*Geology & Geophysics*), Anne Underhill (*Anthropology*), Harvey Weiss (*Near Eastern Languages & Civilizations; on leave* [F])

Associate Professors Milette Gaifman (*History of Art; Classics*), William Honeychurch (*Anthropology; on leave* [F])

Assistant Professors Oswaldo Chinchilla (*Anthropology*), Andrew Johnston (*Classics; History*)

Lecturers Thomas Fenn (*Anthropology*), Karen Foster (*Near Eastern Languages & Civilizations*)

The aims of the program are to give students the academic background needed for careers in museums, cultural resource management, and teaching in community colleges and secondary schools. It also provides the opportunity for teachers, curators, and administrators to refresh themselves on recent developments in archaeology. In addition, the program allows some of our students to strengthen their background in archaeology before applying to Ph.D. programs. The program is administered by Yale's Council on Archaeological Studies, with faculty from the departments of Anthropology, Classics, Geology & Geophysics, History, History of Art, Near Eastern Languages & Civilizations, and Religious Studies.

Special Admissions Requirements

The GRE General Test; an archaeology background is recommended but not required.

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 the archeological laboratory overview; at least one additional laboratory course; a course related to archaeology in two of the following three groups: (1) Anthropology; (2) Classics, History, History of

Art, Near Eastern Languages & Civilizations, or Religious Studies; (3) Ecology & Evolutionary Biology, Forestry & Environmental Studies, or Geology & Geophysics; and four electives. All students are required to participate in an approved summer field project. 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.

For further information, visit the Archaeological Studies Web site, www.yale.edu/archaeology. Inquiries may be directed to Director of Graduate Studies, c/o Registrar, Archaeological Studies, Department of Anthropology, Yale University, PO Box 208277, New Haven CT 06520-8277, or via e-mail, cynthia.dreier@yale.edu.

Courses

ARCG 528b^{U}/ANTH 528b^{U}/EGYP 528b^{U}, Magic and Ritual in Ancient Egypt John Darnell, Christina Geisen
Introduction to ancient Egyptian magic and rituals with an overview on the use of magic and discussion of the different rituals and festivals attested in ancient Egypt. T 1:30–3:20

ARCG 531b/ANTH 531b/CLSS 815b/CPLT 547b/HIST 502b/JDST 653b/NELC 533b/RLST 803b, Fakes, Forgeries, and the Making of Antiquity Eckart Frahm, Irene Peirano Garrison
A comparative exploration of notions of forgery and authenticity in the ancient and premodern world, in a variety of civilizations (ancient Greece, Mesopotamia, Egypt, Israel, China, India, etc.) and different political, religious, literary, and artistic contexts. Emphasis is also placed on the pivotal role played by the "authentic" in the modern era in disciplines such as philology and aesthetics, the manipulative uses of ancient history for purposes of modern nation building and identity formation, copies and reconstructions of ancient artifacts, and the role of forgeries in today's antiquities trade. TH 2:30–4:30

ARCG 601b/RLST 601b, New Testament and Ancient Christianity: Early Christian Archaeology Stephen Davis
Required of doctoral students in New Testament studies and ancient Christianity. The topic and instructor change yearly. Topic for spring 2017 is early Christian archaeology. W 3:30–5:20

ARCG 710b/ANTH 710b, Settlement Patterns and Landscape Archaeology Oswaldo Chinchilla
An introduction to the archaeological study of ancient settlements and landscapes. Topics include an overview of method and theory in settlement and landscape archaeology; field methods of reconnaissance, survey, and remote sensing; studies of households and communities; studies of ancient agricultural landscapes; regional patterns; roads and networks of communication; urbanism and ancient cities; and symbolic interpretations of ancient landscapes. T 9:25–11:15

ARCG 717a^{U}/ANTH 717a^{U}, Ancient Maya Writing Oswaldo Chinchilla
Introduction to the ancient Maya writing system. Contents of the extant corpus, including nametags, royal and ritual commemorations, dynastic and political subjects, and

religious and augural subjects; principles and methods of decipherment; overview of the Maya calendar; comparison with related writing systems in Mesoamerica and elsewhere in the ancient world. TH 9:25–11:15

ARCG 720b[U]/ANTH 720b[U]/NELC 720b[U], Babylon to Bush Harvey Weiss
Analysis of Mesopotamian transformations from the earliest agriculture villages to the earliest cities, states, and civilization, to the earliest empires, as well as the region-wide collapses that punctuated these developments. Forces that drove these uniquely early Mesopotamian developments. Essential archaeological questions, including why each transformation happened, developed, and evolved. The end of the Ottoman empire and the British (1917) and American (1991, 2003) invasions. TH 1:30–3:20

ARCG 743b/ANTH 743b, Archaeological Research Design and Proposal Development William Honeychurch
An effective proposal requires close consideration of all steps of research design, from statement of the problem to data analysis. The course is designed to provide an introduction to the principles by which archaeological research projects are devised and proposed. Students receive intensive training in the preparation of a research proposal with the expectation that the final proposal will be submitted to national and international granting agencies for consideration. The course is structured around the creation of research questions; hypothesis development and statement of expectations; and the explicit linking of expectations to material patterning, field methods, and data analysis. Students review and critique examples of funded and nonfunded research proposals and comment extensively on each other's proposals. In addition to developing one's own research, learning to constructively critique the work of colleagues is imperative for becoming a responsible anthropological archaeologist. F 9:25–11:15

[**ARCG 744b[U]/NELC 509b[U], The Age of Akhenaton**]

[**ARCG 746a[U]/NELC 567a[U], Ancient Civilizations of Nubia**]

ARCG 749a/CLSS 846a/HSAR 570a, Becoming Hadrian: Autobiography and Art in the Second-Century A.D. Diana Kleiner
Marguerite Yourcenar's famed fictional *Memoirs of Hadrian* serves as the starting point for an exploration of Hadrian and the art he commissioned in Rome and abroad. Hadrian's passion for life, quest after peace, romantic wanderlust, veneration of Greek culture, and craving for love, along with his acceptance of death's inexorableness, led him to commission some of Rome's greatest monuments. The emperor's flair for leadership and talent as an amateur architect inform student projects on the sculpture, mosaics, and buildings of the age, among them the portraiture of Hadrian's lover Antinous, the Pantheon, and Hadrian's Wall in Britain. Qualified undergraduates who have taken HSAR 250a and/or HSAR 252a may be admitted with permission of the instructor. T 1:30–3:20

ARCG 762b[U]/EMD 548b/F&ES 726b/G&G 562b[U], Observing Earth from Space Xuhui Lee
A practical introduction to satellite image analysis of Earth's surface. Topics include the spectrum of electromagnetic radiation, satellite-borne radiometers, data transmission and storage, computer image analysis, the merging of satellite imagery with GIS and

applications to weather and climate, oceanography, surficial geology, ecology and epidemiology, forestry, agriculture, archaeology, and watershed management.

ARCG 771a/ANTH 771a, Early Complex Societies Richard Burger, Roderick McIntosh
A consideration of theories and methods developed by archaeologists to recognize and understand complex societies in prehistory. Topics include the nature of social differentiation and stratification as applied in archaeological interpretation; emergence of complex societies in human history; case studies of societies known ethnographically and archaeologically. MW 9–10:15

ARCG 772a[U]/ANTH 772a[U], Cities in Antiquity: The Archaeology of Urbanism Anne Underhill, Oswaldo Chinchilla
Archaeological studies of ancient cities and urbanism. Topics include the origin and growth of cities; the economic, social, and political implications of urban life; and archaeological methods and theories for the study of ancient urbanism. Case studies include ancient cities around the world. T 9:25–11:15

ARCG 773b[U]/ANTH 773b[U]/F&ES 793b/NELC 588b[U], Abrupt Climate Change and Societal Collapse Harvey Weiss
Collapse documented in the archaeological and early historical records of the Old and New Worlds, including Mesopotamia, Mesoamerica, the Andes, and Europe. Analysis of politicoeconomic vulnerabilities, resiliencies, and adaptations in the face of abrupt climate change, anthropogenic environmental degradation, resource depletion, "barbarian" incursions, or class conflict. TH 3:30–5:20

ARCG 779b[U]/ANTH 779b[U], Anthropology of Mobile Societies William Honeychurch
The social and cultural significance of the ways that hunter-gatherers, pastoral nomads, maritime traders, and members of our own society traverse space. The impact of mobility and transport technologies on subsistence, trade, interaction, and warfare from the first horse riders of five thousand years ago to jet-propulsion tourists of today. W 3:30–5:20

ARCG 782b[U]/ANTH 782b[U], Advanced Archaeological Theory Roderick McIntosh
Review of the intellectual history of archaeology, with readings from the Enlightenment to the present. Emphasis on the tension between science, mysticism, and nationalism in the interpretation of prehistoric processes. W 7–8:50

ARCG 785a[U]/ANTH 785a[U], Archaeological Ceramics I Anne Underhill
Ceramics are a rich source of information about a range of topics including ancient technology, cooking practices, craft specialization, regional trade, and religious beliefs. This course provides a foundation for investigating such topics and gaining practical experience in archaeological analysis of ceramics. Students have opportunities to focus on ceramics of particular interest to them, whether these are low-fired earthen wares, or porcelains. We discuss ancient pottery production and use made in diverse contexts ranging from households in villages to workshops in cities. In addition we refer to the abundant ethnoarchaeological data about traditional pottery production. TH 1:30–3:20

ARCG 787b[U]/ANTH 787b[U]/HSAR 804b, East Asian Objects and Museums: Collection, Curation, and Display Anne Underhill, Youn-mi Kim
This course explores the East Asian art and anthropological collections at Yale's museums and at other major museums in North America and East Asia. Students study collections and their histories; gain experience in museum practices; and learn from specialists through class visits to other relevant museums in the United States and an associated international conference, Material Culture and Everyday Life before the Korean War: Workshop on the Korean Art and Photograph Collections at the Yale Peabody Museum, sponsored by the Council on East Asian Studies. Opportunities for a student-curated exhibition at Yale are being developed. W 9:25–11:15

ARCG 847b[U]/ANTH 847b[U], Hunter-Gatherers Brian Wood
The vast majority of the human experience centered around one way of making a living: hunting and gathering. Yet today, hunter-gatherers make up a small and diminishing proportion of human societies. This class is a broad survey of the ecology, economics, political, and social organization of recent hunter-gatherers and a review of anthropological inquiry into foraging societies. T 1:30–3:20

ARCG 864b[U]/ANTH 864b[U], Human Osteology Eric Sargis
A lecture and laboratory course focusing on the characteristics of the human skeleton and its use in studies of functional morphology, paleodemography, and paleopathology. Laboratories familiarize students with skeletal parts; lectures focus on the nature of bone tissue, its biomechanical modification, sexing, aging, and interpretation of lesions. TTH 2:30–3:45

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

ARCHITECTURE

Rudolph Hall, 203.432.2288
www.architecture.yale.edu/phd
M.Phil., Ph.D.

Dean
Deborah Berke

Director of Doctoral Studies
Alan Plattus (710 Rudolph, 203.432.2290, alan.plattus@yale.edu)

Professors Michelle Addington, Deborah Berke, Peggy Deamer, Keller Easterling, Peter Eisenman, Kurt Forster, Kathleen James-Chakraborty, Alan Plattus, Robert A. M. Stern, Anthony Vidler

Associate Professors Alexander Felson, Mark Foster Gage, Kyoung Sun Moon, Eeva-Liisa Pelkonen, Elihu Rubin

Adjunct Faculty Sunil Bald, Kent Bloomer, Turner Brooks, Alexander Garvin, Steven Harris, John Jacobson, Bimal Mendis, Edward Mitchell, Joel Sanders

Fields of Study

The doctoral program prepares candidates for careers in university teaching, cultural advocacy and administration, museum curatorship, and publishing. It aims chiefly, however, to educate teachers capable of effectively instructing future architects in the history of their own field and its manifold connections with the culture at large. The program forges a unique combination of professional knowledge with a historical and analytical grasp of key phases in the history of architecture, especially those that have a demonstrable share in the field's current state and the critical issues it faces.

The program secures sound training in historical study and historiography, imparting technical knowledge and awareness of intellectual trends that inform the reception and role of architecture around the world. The history of science and technology (as well as its reception in popular culture and the arts), the history of media, and an understanding of architectural practice are as important as the fine arts and literature.

Admission Requirements

Applicants must have appropriate academic credentials (a master's degree or equivalent in Architecture, Engineering, Environmental Design, or, exceptionally, in a related field) and two years of professional work in an architecture office. The Graduate Record Examination (GRE) General Test taken no more than five years prior to application is required. All applicants whose native language is not English are required to take the Internet-based Test of English as a Foreign Language (TOEFL iBT), a test that includes a section on spoken English. The TOEFL requirement may be waived only for applicants who, prior to matriculation at Yale, will have received a baccalaureate degree or its international equivalent from a college or university where English is the primary language of instruction. Applicants must have studied in residence at the baccalaureate institution

for at least three years to receive the waiver. A waiver will not be granted on the basis of an advanced degree (such as M.A., M.S., or Ph.D.) from any institution.

In addition to meeting qualifying criteria, candidates are required as part of the application to submit a portfolio of their own architectural work, a writing sample in the form of a substantial research paper or publication, and an explanation of their motivation for engaging in this course of study. Qualified applicants may be invited to interview with a member of the doctoral faculty.

The portfolio should be a well-edited representation of the applicant's creative work. Portfolios may not contain videos. Anything submitted that is not entirely the applicant's own work must be clearly identified as such.

The portfolio is submitted digitally as a single pdf document optimized not to exceed 20mb; it will need to be uploaded to the online application. Pages of the pdf portfolio should be uploaded as spreads. The digital portfolio will be viewed on computer screens, so resolution above 150 dpi is not necessary.

The Ph.D. program is administered by the Yale Graduate School of Arts and Sciences. For questions regarding admissions, please contact graduate.admissions@yale.edu.

School of Architecture Summer Preparation Courses for Incoming Ph.D. Students

In the week before the beginning of the School of Architecture fall term, the School of Architecture offers two preparation courses that are required of incoming Ph.D. students.

- Summer Digital Media Orientation Course. This half-day orientation covers accessing the School's servers, use of the School's equipment, and the School's digital media policies and procedures.
- Arts Library Research Methodology Course. This course covers research methodologies and tools specific to the Ph.D. curriculum.

Special Requirements for the Ph.D. Degree

Entering students with sound professional preparation engage in a concerted course of study that leads directly to dissertation research and a doctoral degree.

Students are required to be full-time and in residence in the New Haven area during the first two academic years (see the Bulletin of the Graduate School of Arts and Sciences, *Programs and Policies*). Students take twelve graduate and Ph.D. seminars for credit, including a Ph.D. seminar taught in each of the first four terms by a member of the School of Architecture faculty that introduces the student to various methodologies and areas of study. Some seminars encourage primary research on a narrow topic or focus on producing a collective body of work. Others offer a broader survey of historiographies or focus on the close reading of a body of texts. These four required seminars form the methodological core of the program.

Students are encouraged to take courses related to their specific areas of interest outside the School of Architecture. For example, a student working on Italian modernism would be encouraged to take a course in Italian history or literature. Typically, at least two of the eight elective seminars would be in related fields. Students can also opt to do independent readings with individual faculty members on their specific areas of interest.

Not later than the end of their second year, students are also expected to demonstrate competence in at least one foreign language relevant to their field of study. Language competence is more than a formality and requires some acquaintance with the literature in the chosen language. Competency may be determined by a grade of B or better in a yearlong intermediate-level language course, or through examination.

The student's field of interest is defined by the end of the second year, at which time the director of doctoral studies assigns the student an adviser, who may or may not be from the School of Architecture. At the end of the second year and after the student has taken the three oral examinations, the director of doctoral studies, in consultation with the student's adviser, appoints a dissertation committee for the student. The dissertation committee consists of the student's adviser plus two additional faculty members. One of the dissertation committee members should be from outside the School of Architecture, with selection based on the student's area of interest. The dissertation committee guides and monitors the student's progress in writing the dissertation and evaluates the dissertation upon completion.

By the end of their second year, doctoral students normally complete all course and language requirements. Oral examinations are taken on topics relevant to the student's doctoral research. Examiners question the candidate in the presence of the director of doctoral studies and the thesis adviser.

During the third year, candidates present and defend a preliminary proposal for a dissertation topic, consisting of a topic statement, detailed program of research, and an annotated bibliography. By the end of the third year, students begin dissertation research and writing, submitting drafts of the dissertation chapters as they are completed.

While this is a five-year program, if the dissertation has not been completed by the end of year five and, at that time, the program certifies that the candidate will complete the dissertation by August of the following academic year, the candidate may be eligible in year six for a teaching position and funding for up to an additional nine months.

Graduate Research Assistant and Teaching Fellow Experience

The program in Architecture considers teaching to be an important part of graduate training. Students in the Ph.D. program in Architecture, therefore, are expected to teach for four terms, normally in their third and fourth years. During these four terms, it is anticipated that a Ph.D. student teach in two history and theory survey courses in the student's area of study at the School of Architecture or elsewhere in the University and teach in two design studios at the School of Architecture. Each teaching assignment shall be under the direct supervision of senior faculty.

Master's Degree

M.Phil. The Master of Philosophy degree is awarded en route to the Ph.D. The minimum requirements for this degree are that a student has completed all requirements for the Ph.D., except the teaching fellow assignments and the dissertation.

Required Courses

ARCH 551a, Ph.D. Seminar I
1 credit. (Required in, and limited to, Ph.D. first year, fall term.) This seminar centers on a thorough examination of fundamental ideas of historiography, centering on Rome and exploring aspects of geology, culture, mapping, site development, the establishment of institutions, and the construction of buildings across several millennia, as well as a study of literature on the *urbs* and its worldwide impact.

ARCH 552b, Ph.D. Seminar II
1 credit. (Required in, and limited to, Ph.D. first year, spring term.) This seminar centers on concepts of history and their application to architecture from Jacob Burckhardt to the present and a close reading of historiographic theories, including ethnography, modernity, and the emergence of the profession of architecture in the light of present-day critique.

ARCH 553a, Ph.D. Seminar III
1 credit. (Required in, and limited to, Ph.D. second year, fall term.)

ARCH 554b, Dissertation Preparation
1 credit. (Required in, and limited to, Ph.D. second year, spring term.) Ph.D. tutoring in preparation for oral examinations and formulation of a thesis topic.

ASTRONOMY

52 Hillhouse Avenue, 203.432.3000
http://astronomy.yale.edu
M.S., M.Phil., Ph.D.

Chair
Sarbani Basu

Director of Graduate Studies
Jeffrey Kenney (203.432.3013, jeff.kenney@yale.edu)

Professors Charles Bailyn, Charles Baltay (*Physics*), Sarbani Basu, Paolo Coppi, Pierre Demarque (*Emeritus*), Debra Fischer, Marla Geha, Jeffrey Kenney, Richard Larson (*Emeritus*), Priyamvada Natarajan, C. Megan Urry (*Physics*), William van Altena (*Emeritus*), Pieter van Dokkum, Robert Zinn

Associate Professors Héctor Arce, Daisuke Nagai (*Physics*), Nikhil Padmanabhan (*Physics*), Frank van den Bosch

Fields of Study

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

Special Admissions Requirements

Applicants are expected to have a strong undergraduate preparation in physics and mathematics. Although some formal training in astronomy is useful, it is by no means a prerequisite for admission. Applicants are required to take the General GRE as well as the subject test in Physics.

Special Requirements for the Ph.D. Degree

A typical program of study includes twelve courses taken during the first four terms, and must include the core courses listed below:

The Physics of Astrophysics (ASTR 500), Computational Methods in Astrophysics and Geophysics (ASTR 520), Observational Astronomy (ASTR 555), Interstellar Matter and Star Formation (ASTR 560), either Stellar Populations (ASTR 510) or Stellar Astrophysics (ASTR 550), and either Galaxies (ASTR 530) or The Evolving Universe (ASTR 565). ASTR 620 or PHYS 678 may be substituted for ASTR 520 with the permission of the director of graduate studies (DGS).

Students require the permission of the instructor and the DGS to skip a core class if they think that they have sufficient knowledge of the field. Students will be required to demonstrate their knowledge of the field before they are allowed to skip any core class.

Two of the twelve courses must be research credits, each earned by working in close collaboration with a faculty member. Of the two research credits, one must be earned doing a theoretical project and one doing an experimental research project. The students

need to present the results of the project as a written report and will be given an evaluation of their performance.

The choice of the four remaining courses depends on the candidate's interest and background and must be decided in consultation with the DGS and/or the prospective thesis adviser. Advisers may require students to take particular classes and obtain a specified minimum grade in order for a student to work with them for their thesis. Students must take any additional course that their supervisors require even after their fourth term. In addition, all students, regardless of their term of study, have to attend Professional Seminar (ASTR 710) every term. Students must also take Responsible Conduct in Research for Physical Scientists (PHYS 590), which discusses ethics and responsible conduct in scientific research and fulfills the requirement stipulated by the National Science Foundation for all students and for all postdoctoral researchers funded by the NSF. Note that ASTR 710 and PHYS 590 may not be used to fulfill the twelve-course requirement.

Students are encouraged to take graduate courses in physics or related subjects. 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 standard courses. To achieve both breadth and depth in their education, students are encouraged to take a few courses beyond their second year of study.

There is no foreign language requirement. A 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. Particular attention will be paid to the student's performance in the field in which the student plans to do research. An oral examination, held a few weeks after the written examination, is based on the student's chosen field of research. Satisfactory performance in these examinations, 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 importantly, 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 required to serve as teaching fellows for four terms. Both the level of teaching assignments and the scheduling of teaching are variable and largely determined by the needs of the department. Most students will teach in each of their first three terms and complete their fourth teaching assignment sometime after the qualifying exam.

Honors Requirement

Students must earn a grade of Honors in at least three classes by the end of the fourth term of full-time study and have a grade average of High Pass.

Master's Degrees

M.Phil. Upon application, the department will recommend for the award of the M.Phil. degree any student who has completed all the requirements of the Ph.D. degree except the oral qualifying exam and the Ph.D. dissertation. A written master's thesis containing original astronomical research is also required. Students are not admitted for this degree.

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 taken at least ten courses (not including ASTR 710), including at least one research project (ASTR 580). The student should have a grade average of High Pass in the courses and a grade of High Pass or above in the research project.

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 500a, The Physics of Astrophysics Priyamvada Natarajan
Primarily for incoming students in the Ph.D. program in Astronomy. The basic physics and related mathematics needed to take the advanced graduate courses. Topics in mechanics, thermodynamics and statistical mechanics, fluid mechanics, special relativity, and electrodynamics with applications to astrophysical systems are covered. Open to undergraduates with permission of the instructor. MW 9–10:15

[**ASTR 510a[U], Stellar Populations**]

[**ASTR 518b, Stellar Dynamics**]

ASTR 520a/G&G 538a, Computational Methods in Astrophysics and Geophysics Paolo Coppi
The analytic and numerical/computational tools necessary for effective research in astronomy, geophysics, and related disciplines. Topics include numerical solutions to differential equations, spectral methods, and Monte Carlo simulations. Applications are made to common astrophysical and geophysical problems including fluids and N-body simulations.

[**ASTR 525a, Advanced Statistical Methods for Astronomy**]

[**ASTR 530a[U], Galaxies**]

[**ASTR 540b[U]/G&G 501b[U], Radiative Processes in Astrophysics/Stellar Atmospheres**]

ASTR 550a[U], Stellar Astrophysics Sarbani Basu
An introduction to the physics of stellar atmospheres and interiors. The basic equations of stellar structure, nuclear processes, stellar evolution, white dwarfs, and neutron stars.

ASTR 555b[U], Observational Astronomy Robert Zinn
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 560a, Interstellar Matter and Star Formation Héctor Arce
The composition, extent, temperature, and density structure of the interstellar medium (ISM). Excitation and radiative processes; the properties of dust; the cold and hot ISM in the Milky Way and other galaxies. Dynamics and evolution of the ISM, including interactions between stars and interstellar matter. Physics and chemistry of molecular clouds and the process of star formation.

[ASTR 565b[U], The Evolving Universe]

[ASTR 570a/PHYS 570a, High-Energy Astrophysics]

[ASTR 575b, Exoplanets]

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

[ASTR 585b, Radio Astronomy]

[ASTR 590b[U], Solar Physics]

ASTR 600b[U]/PHYS 600b, Cosmology Priyamvada Natarajan
A comprehensive introduction to cosmology at the graduate level. The standard paradigm for the formation, growth, and evolution of structure in the universe is covered in detail. Topics include the inflationary origin of density fluctuations; the thermodynamics of the early universe; assembly of structure at late times and current status of observations. The basics of general relativity required to understand essential topics in cosmology are covered. Advanced undergraduates may register for the course with permission of the instructor.

ASTR 610b, The Theory of Galaxy Formation Frank van den Bosch
The physical processes of galaxy formation and evolution. Topics include Newtonian perturbation theory, the spherical collapse model, formation and structure of dark matter haloes, cooling and feedback processes, star formation, stellar population synthesis, chemical enrichment, and the statistical treatment of the large-scale distribution of galaxies.

ASTR 620b, Advanced Programming Tutorial for Astronomy Paolo Coppi
Students meet individually with the instructor to ensure they have the computational skills necessary to carry out their research projects. The first part of the course is based on weekly programming and reading assignments, tailored to the level of each student. The second part of the course focuses on putting together a substantial programming project that is directly related to the student's research interests, ideally in consultation with the student's likely research supervisor. 3 HTBA

ASTR 666a/AMTH 666a/G&G 666a, Classical Statistical Thermodynamics
John Wettlaufer
Classical thermodynamics is derived from statistical thermodynamics. Using the multiparticle nature of physical systems, we derive ergodicity, the central limit theorem, and the elemental description of the second law of thermodynamics. We then develop kinetics, transport theory, and reciprocity from the linear thermodynamics of irreversible processes. Topics of focus include Onsager reciprocal relations, the Fokker-Planck equation, stability in the sense of Lyapunov, and time invariance symmetry. We explore phenomena that are of direct relevance to astrophysical and geophysical settings. No quantum mechanics is necessary as a prerequisite.

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

BIOMEDICAL ENGINEERING

Dunham Laboratory, 203.432.4252
M.S., M.Phil., Ph.D.

Chair
Jay Humphrey

Director of Graduate Studies
Richard Carson (richard.carson@yale.edu)

Professors Richard Carson, Nicholas Christakis, James Duncan, Karen Hirschi, Jay Humphrey, Fahmeed Hyder, Themis Kyriakides (*Pathology*), Andre Levchenko, Laura Niklason, Douglas Rothman, W. Mark Saltzman, Martin Schwartz, Fred Sigworth, Brian Smith, Lawrence Staib, Hemant Tagare, Paul Van Tassel, Steven Zucker (*Computer Science*)

Associate Professors Joerg Bewersdorf (*Cell Biology*), Robin de Graaf, Tarek Fahmy, Rong Fan, Anjelica Gonzalez, Evan Morris, Xenophon Papademetris, Corey Wilson

Assistant Professors Stuart Campbell, Michael Choma, Chi Liu, Kathryn Miller-Jensen, Michael Murrell, Steven Tommasini, Jiangbing Zhou

Fields of Study

Fields include biological devices, biological signals and sensors, biomaterials, biomechanics, biophotonics, computer vision, digital image analysis and processing, drug delivery, modeling in mechanobiology, MRI, MRS, PET and modeling, the physics of image formation (MRI, optics, ultrasound, nuclear medicine, and X-ray), physiology and human factors engineering, systems biology, systems medicine, and tissue engineering and regenerative medicine.

For admissions and degree requirements, and for course listings, see Engineering & Applied Science.

CELL BIOLOGY

Sterling Hall of Medicine C207, 203.737.5603
www.cellbiology.yale.edu
M.S., M.Phil., Ph.D.

Chair
James Rothman

Director of Graduate Studies
Karin Reinisch (SHM C214a, 203.785.6469, karin.reinisch@yale.edu)

Professors Christopher Burd, Michael Caplan (*Cellular & Molecular Physiology*), Lynn Cooley (*Genetics*), Peter Cresswell (*Immunobiology*), Pietro De Camilli, Jorge Galán (*Microbial Pathogenesis*), Fred Gorelick, Carl Hashimoto, James Jamieson, Diane Krause (*Laboratory Medicine*), Thomas Lentz (*Emeritus*), Haifan Lin, Vincent Marchesi (*Pathology*), Mark Mooseker (*Molecular, Cellular & Developmental Biology*), Michael Nathanson (*Internal Medicine/Digestive Diseases*), Karla Neugebauer (*Molecular Biophysics & Biochemistry*), Thomas Pollard (*Molecular, Cellular & Developmental Biology; on leave* [F]), Karin Reinisch, James Rothman, Martin Schwartz (*Internal Medicine/Cardiology*), Michael Simons (*Internal Medicine/Cardiology*), Sandra Wolin

Associate Professors Joerg Bewersdorf, Jonathan Bogan (*Internal Medicine/Endocrinology*), David Calderwood (*Pharmacology*), Daniel Colón-Ramos, Valentina Greco (*Genetics*), Megan King, Thomas Melia, Christian Schlieker (*Molecular Biophysics & Biochemistry*), Derek Toomre, Yongli Zhang

Assistant Professors David Baddeley, Topher Carroll, Shawn Ferguson, Shangqin Guo, Chenxiang Lin, Patrick Lusk, Malaiyalam Mariappan, Peter Takizawa, Jie Yao

Fields of Study

Fields include membrane traffic and protein sorting, organelle biogenesis, epithelial cell polarity, membrane function in the nervous system (synapse formation and function), neural circuit development, cell biology of protozoan parasites and of pathogen/host interactions, cell biology of the immune response, mRNA biogenesis and localization, RNA folding, non-coding RNAs, stem cells, the cytoskeleton, nuclear structure and dynamics, DNA nanostructures, cellular signaling and motility, cytokinesis. Approaches to these topics include biochemistry, biophysics, molecular biology, and crystallography; bacterial, yeast, *Drosophila, C. elegans,* and mouse genetics; immunocytochemistry and electron microscopy; live cell and super-resolution imaging.

Special Admissions Requirements

An undergraduate major in the biological sciences is recommended. GRE General Test is required; GRE Subject Test is recommended (in Biology or in Biochemistry, Cell and Molecular Biology).

To enter the Ph.D. program, students apply to an interest-based track, usually the Molecular Cell Biology, Genetics, and Development (MCGD) track or the Biochemistry,

Biophysics, and Structural Biology (BBSB) track, within the interdepartmental graduate program in Biological and Biomedical Sciences (BBS), http://bbs.yale.edu.

Special Requirements for the Ph.D. Degree

Students are required to take at least five graduate-level courses. No specific curriculum of courses is required, but CBIO 602a (Molecular Cell Biology) is recommended for all students to attain a solid foundation in molecular cell biology. Also recommended is a seminar course, such as CBIO 603a (Seminar in Molecular Cell Biology), in which students can develop the skill for critical analysis of research papers. Students design their own curriculum of courses to meet individual interests and needs, in consultation with the director of graduate studies. During the first year, students 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 an oral qualifying examination by the end of the third term. In order to be admitted to candidacy, students must have met the Graduate School Honors requirement, maintained a High Pass average in course work, passed the qualifying examination, submitted an approved prospectus, and received a positive evaluation of their laboratory work from the thesis committee. All students are required to present a talk at the departmental progress report series each year after passing the qualifying exam. 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 levels. Ph.D. students are required to participate in two terms (or the equivalent) of teaching. Students are not expected to teach during their first year.

In addition to all other requirements, students must successfully complete CBIO 901b, First-Year Introduction to Research—Ethics: Scientific Integrity in Biomedical Research, prior to the end of their first year of study. In their fourth year of study, all students must successfully complete B&BS 503b, RCR Refresher for Senior BBS Students.

M.D./Ph.D. Students

M.D./Ph.D. students are required to take a total of five graduate-level courses for a grade, including Molecules to Systems (CBIO 502), Molecular Cell Biology (CBIO 602a), and a seminar course that involves the reading and class discussion of research papers. The remaining courses can be in areas such as Genetics, Neuroscience, Immunology, Microbiology, Pharmacology, and Physiology. Students must meet the Graduate School requirement of a grade of Honors in two courses, if necessary taking additional courses beyond the five required in the department to fulfill this requirement. Students must also maintain an average grade of High Pass in all courses. One term of teaching is required.

Master's Degrees

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

M.S. This degree is normally granted only to students who are withdrawing from the Ph.D. program. To be eligible for the degree, a student must have completed at least five graduate-level term courses at Yale, including CBIO 602a (Molecular Cell Biology) and a seminar course, with a grade of Pass and at least one grade of Honors or three of High Pass. In addition to these five courses, the student must have received a Satisfactory grade in the following five courses: CBIO 900a (First-Year Introduction to Research—Grant Writing and Scientific Communication), CBIO 901b (First-Year Introduction to Research—Ethics: Scientific Integrity in Biomedical Research), CBIO 911a (First Laboratory Rotation), CBIO 912b (Second Laboratory Rotation), and CBIO 913b (Third Laboratory Rotation). Students who are eligible for or who have already received the M.Phil. will not be awarded the M.S.

Prospective applicants are encouraged to visit the BBS Web site (http://bbs.yale.edu), MCGD and BBSB tracks. Program materials are available upon request to the Director of Graduate Studies, Department of Cell Biology, Yale University, PO Box 208002, New Haven CT 06520-8002.

Courses

CBIO 502, Molecules to Systems Peter Takizawa, Fred Gorelick, James Jamieson, Thomas Lentz, and faculty

This 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 structure and organization of cells; regulation of the cell cycle and mitosis; protein biosynthesis and membrane targeting; cell motility and the cytoskeleton; signal transduction; cell adhesion; cell and tissue organization of organ systems. 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 an understanding of exploring cell and tissue structure. The course is offered only to M.D. and M.D./Ph.D. students. It runs for three terms from September to December of the next academic year to coincide with the School of Medicine curriculum. Registration and the release of grades takes place in the third term. The course is equivalent to two graduate credits.

CBIO 601a/b, Molecular and Cellular Basis of Human Disease Fred Gorelick, James Jamieson, and faculty

The course emphasizes the connections between diseases and basic science using a lecture and seminar format. It is designed for students who are committed to a career in medical research, those who are considering such a career, or students who wish to explore scientific topics in depth. The first half of the course is organized in four- to five-week blocks that topically parallel CBIO 502a/b. Examples of blocks from past years include "Diseases of protein folding" and "Diseases of ion channels." Each topic is introduced with a lecture given by the faculty. The lecture is followed by sessions in which students

review relevant manuscripts under the supervision of a faculty mentor. The second half of the course focuses on the relationship of basic science to disease processes while emphasizing translational and clinical research. In addition, sessions are devoted to academic careers and cover subjects such as obtaining an academic position, promotions, and grant writing. The course is open to M.D. and M.D./Ph.D. students who are taking or have taken CBIO 502a/b. Student evaluations are based on attendance, participation in group discussions, formal presentations, and a written review of an NIH proposal. The course runs from September to mid-May and is equivalent to two graduate credits. M 4–5:30

CBIO 602a/MB&B 602a/MCDB 602a, Molecular Cell Biology Sandra Wolin, Michael Caplan, Topher Carroll, Craig Crews, Pietro De Camilli, Megan King, Thomas Melia, In-Hyun Park, James Rothman, Martin Schwartz

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. MW 1:45–3

CBIO 603a/MCDB 603a, Seminar in Molecular Cell Biology Megan King, Michael Caplan, Topher Carroll, Craig Crews, Pietro De Camilli, Thomas Melia, James Rothman, Martin Schwartz, Sandra Wolin

A graduate-level seminar course in modern cell biology. The class is devoted to the reading and critical evaluation of classical and current papers. The topics are coordinated with the CBIO 602a lecture schedule. Thus, concurrent enrollment in CBIO 602a is required. TH 9–11

CBIO 604b, Systems Cell Biology Carl Hashimoto, Daniel Colón-Ramos, and faculty

Introduction to the organization and function of cells within complex multicellular systems as encountered in the human body. Covers major tissues and organs as well as the cardiovascular, immune, and nervous systems, with special emphasis on the molecular and cellular bases of developmental processes and human diseases. Lectures supplemented by electronic-based tutorials on the histology of tissues and organs. T 9:30–10:30, TH 9:30–11

CBIO 606b, Advanced Topics in Cell Biology Patrick Lusk, Christopher Burd, Shawn Ferguson

This seminar course, which meets once weekly, covers advanced topics in cell biology. Each topic is spread over two or three sessions, which start with an introductory overview and are followed by a discussion of key papers led by an expert in the field. T 4:15–6

CBIO 611b, Vascular Cell Biology Martin Schwartz and faculty

This course introduces the structure and organ-level physiology of the vascular system, then covers in greater depth the development, regulation, mechanics, and pathology of blood vessels. The major focus is on cellular and molecular mechanisms. The course includes both lectures and reading and discussion of recent literature. WF 1:30–2:30

CBIO 655a/GENE 655a, Stem Cells: Biology and Application In-Hyun Park, Haifan Lin, and faculty
This course is designed for first-year or second-year students to learn the fundamentals of stem cell biology and to gain familiarity with current research in the field. The course is presented in a lecture and discussion format based on primary literature. Topics include stem cell concepts, methodologies for stem cell research, embryonic stem cells, adult stem cells, cloning and stem cell reprogramming, and clinical applications of stem cell research. Prerequisites: undergraduate-level cell biology, molecular biology, and genetics. TH 1:30–3

CBIO 701b, Illuminating Cellular Function Derek Toomre, Joerg Bewersdorf, and faculty
Introduction to the principles and practical methods of live cell imaging. Covers principles of fluorescent microscopy (including genetically encoded probes and physiological indicators), image formation, image detection, and image analysis. Includes hands-on demonstrations of state-of-the-art instrumentation, such as video-rate confocal and super-resolution "nanoscopes." TTH 11–12:30

CBIO 900a/GENE 900a/MCDB 900a, First-Year Introduction to Research—Grant Writing and Scientific Communication Scott Holley and faculty
Grant writing, scientific communication, and laboratory rotation talks for Molecular Cell Biology, Genetics, and Development track students. M 4–5:30

CBIO 901b/GENE 901b/MCDB 901b, First-Year Introduction to Research—Ethics: Scientific Integrity in Biomedical Research Joerg Bewersdorf
Ethics and laboratory rotation talks for Molecular Cell Biology, Genetics, and Development track students. TH 4:15–5:45

CBIO 903a or b, Reading Course in Cell Biology Karin Reinisch
Independent study of specific topics in cell biology through directed reading of the literature under faculty supervision. Student may choose any topic and any Yale faculty subject to approval by the Cell Biology DGS. Open to Cell Biology students, and to students in other departments with approval from their respective DGS. Term paper required.

CBIO 911a/GENE 911a/MCDB 911a, First Laboratory Rotation
First laboratory rotation for Molecular Cell Biology, Genetics, and Development track students.

CBIO 912b/GENE 912b/MCDB 912b, Second Laboratory Rotation Craig Crews
Second laboratory rotation for Molecular Cell Biology, Genetics, and Development track students.

CBIO 913b/GENE 913b/MCDB 913b, Third Laboratory Rotation Craig Crews
Third laboratory rotation for Molecular Cell Biology, Genetics, and Development track students.

CELLULAR AND MOLECULAR PHYSIOLOGY

Sterling Hall of Medicine B147, 203.785.4041
http://physiology.yale.edu
M.S., M.Phil., Ph.D.

Chair
Michael Caplan

Director of Graduate Studies
David Zenisek (SHM B114, 203.785.6474, david.zenisek@yale.edu)

Professors Peter Aronson (*Internal Medicine/Nephrology*), Angelique Bordey (*Neurosurgery*), Emile Boulpaep, Thomas Brown (*Psychology*), Cecilia Canessa, Lloyd Cantley (*Internal Medicine/Nephrology*), Michael Caplan, Nancy Carrasco, Lawrence Cohen, Marie Egan (*Pediatrics*), Barbara Ehrlich (*Pharmacology*), Anne Eichmann (*Internal Medicine/Cardiology*), Biff Forbush III, John Geibel (*Surgery*), Leonard Kaczmarek (*Pharmacology*), George Lister (*Pediatrics*), Pramod Mistry (*Pediatrics*), Michael Nitabach, Vincent Pieribone, Patricia Preisig (*Internal Medicine/Nephrology*), W. Mark Saltzman (*Biomedical Engineering*), Joseph Santos-Sacchi (*Surgery/Otolaryngology*), Gerald Shulman (*Internal Medicine/Endocrinology*), Fred Sigworth, Carolyn Slayman (*Genetics*), Clifford Slayman, Susumu Tomita, Fred Wright (*Internal Medicine/Nephrology*), Lawrence Young (*Internal Medicine/Cardiology*), David Zenisek, Z. Jimmy Zhou (*Ophthalmology & Visual Science*)

Associate Professors Nadia Ameen (*Pediatrics*), Ivan de Arajuo (*Psychiatry*), Jonathan Demb (*Ophthalmology & Visual Science*), Richard Kibbey (*Internal Medicine/Endocrinology*), Alda Tufro (*Pediatrics*), Xiaoyong Yang (*Comparative Medicine*)

Assistant Professors Nii Addy (*Psychiatry*), Sviatoslav Bagriantsev, Stuart Campbell (*Biomedical Engineering*), Jean-Ju Chung, Guillaume de Lartigue, Tore Eid (*Laboratory Medicine*), Elena Gracheva, Shuta Ishibe (*Internal Medicine/Nephrology*), Kristopher Kahle (*Neurosurgery*), Erdem Karatekin, Jesse Rinehart, Satinder Singh, Carson Thoreen

Fields of Study

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

Special Admissions Requirements

We welcome applications from students with backgrounds in the biological, chemical, and/or physical sciences. These include majors in biology, biochemistry, physiology, genetics, chemistry, physics, mathematics, engineering, computer science, and psychology. Courses in biology, biochemistry, organic and physical chemistry, and mathematics

through calculus are recommended. The GRE General Test is required. To enter the Ph.D. program, students will apply to the Molecular Medicine, Pharmacology, and Physiology track within the interdepartmental graduate program in Biological and Biomedical Sciences (BBS), http://bbs.yale.edu.

Special Requirements for the Ph.D. Degree

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

Students are expected to design a suitable program of courses in consultation with a faculty adviser. The director of graduate studies (DGS) will provide general oversight of the course selections. These courses will provide a coherent background for the expected area of thesis research and also satisfy the department's subject and proficiency requirements. Students must satisfactorily pass at least six graduate-level courses, including C&MP 550a, 560b, and 630a. Also during the first two terms, each student should explore research projects by performing rotations in at least three laboratories to create an informed basis upon which to select a thesis project by the end of the first year. There is no foreign language requirement. The qualifying examination, which must be passed by the end of the student's fourth term, will cover areas of physiology that complement the student's major research interest.

An important dimension of graduate training in Cellular and Molecular Physiology is the acquisition of teaching skills through participation in courses appropriate for the student's academic interests. Ph.D. students are expected to participate in two terms (or the equivalent) of teaching, at a TF level 20. Students are not expected to teach before passing the qualifying examination.

In addition to all other requirements, students must successfully complete C&MP 650, The Responsible Conduct of Research, prior to the end of their first year of study; and, in their fourth year of study, all students must successfully complete B&BS 503b, RCR Refresher for Senior BBS Students.

After satisfying the departmental predissertation requirements, passing the qualifying examination, submitting a satisfactory thesis prospectus, and presenting a satisfactory report to the appropriate thesis advisory committee, students are admitted to candidacy. The completed dissertation must describe original research making a significant contribution to knowledge.

Honors Requirement

Students must meet the Graduate School's Honors requirement by the end of the fourth term of full-time study. Students must also maintain an overall High Pass average. Student progress toward these goals is reviewed at the end of the second term.

Special Requirements for M.D./Ph.D. Students

M.D./Ph.D. students must pass at least three graduate-level courses that are not part of the Yale School of Medicine's regular M.D. program, including at least one C&MP course, preferably C&MP 560b.

Courses taken toward the M.D. degree can be counted toward the Graduate School's Honors requirement provided that the course carries a graduate course number and the student has registered for it as a graduate course.

Two laboratory rotations, each lasting five weeks, are required. One term of teaching is required.

Master's Degrees

M.Phil. See Degree Requirements under Policies and Regulations. Awarded to students who have fulfilled all the requirements for the Ph.D. except the prospectus, teaching requirement, and dissertation, normally at the end of the second year. 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 (i.e., passing of at least four graduate-level courses, including two Honors grades, and three successful laboratory rotations). Students are not admitted for this degree. Students who are eligible for or who have already received the M.Phil. will not be awarded the M.S.

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

Courses

C&MP 550a^{U}/ENAS 550a^{U}/MCDB 550a^{U}/PHAR 550a, Physiological Systems

Emile Boulpaep, Stuart Campbell

The course develops a foundation in human physiology by examining the homeostasis of vital parameters within the body, and the biophysical properties of cells, tissues, and organs. Basic concepts in cell and membrane physiology are synthesized through exploring the function of skeletal, smooth, and cardiac muscle. The physical basis of blood flow, mechanisms of vascular exchange, cardiac performance, and regulation of overall circulatory function are discussed. Respiratory physiology explores the mechanics of ventilation, gas diffusion, and acid-base balance. Renal physiology examines the formation and composition of urine and the regulation of electrolyte, fluid, and acid-base balance. Organs of the digestive system are discussed from the perspective of substrate metabolism and energy balance. Hormonal regulation is applied to metabolic control and to calcium, water, and electrolyte balance. The biology of nerve cells is addressed with emphasis on synaptic transmission and simple neuronal circuits within the central nervous system. The special senses are considered in the framework of sensory transduction. Weekly discussion sections provide a forum for in-depth exploration of topics. Graduate students evaluate research findings through literature review and weekly meetings with the instructor. MWF 9:25–10:15

C&MP 560b[U]/ENAS 570b[U]/MCDB 560b[U]/PHAR 560b, Cellular and Molecular Physiology: Molecular Machines in Human Disease Emile Boulpaep, Fred Sigworth

The course focuses on understanding the processes that transfer molecules across membranes at the cellular, molecular, biophysical, and physiological levels. Students learn about the different classes of molecular machines that mediate membrane transport, generate electrical currents, or perform mechanical displacement. Emphasis is placed on the relationship between the molecular structures of membrane proteins and their individual functions. The interactions among transport proteins in determining the physiological 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. MWF 9:25–10:15

C&MP 570b/NBIO 570b, Sensory Physiology David Zenisek, Joseph Santos-Sacchi, Z. Jimmy Zhou

The course provides an overview of the mammalian special sensory systems, including molecular and cellular bases of vision, audition, taste, olfaction, and somatosensation. Faculty with focus in those areas lead presentations and discussions on peripheral and central mechanisms. Psychophysical aspects of sensation are introduced. TTH 2:30–3:45

C&MP 600, Medical Physiology Case Conferences Nancy Carrasco and staff

Two-term course taught in groups of ten to twelve students by the same group leader(s) throughout the year. Workshop format permits students to apply basic concepts of physiology to clinical syndromes and disease processes. Students are expected to participate actively in a weekly discussion of a clinical case that illustrates principles of human physiology and pathophysiology at the whole-body, system, organ, cellular, or molecular level. Prerequisites: C&MP 550a and permission of the instructor. Credit for full year only.

C&MP 610, Medical Research Scholars Program: Mentored Clinical Experience Erica Herzog, Michael Caplan

The goals of the course are to introduce MRSP students to aspects of clinically important human diseases. Students explore each disease over three one-and-one-half-hour sessions led by a clinician-scientist who is an expert in the relevant organ system. Students explore two disease processes per term. The first of the three sessions is devoted to a discussion of the clinical presentation, natural history, pathology, epidemiology, treatment, and prognosis of the disease process. During this session students have the opportunity to view gross or microscopic specimens of diseased tissue in association with members of the Pathology faculty. Students are assigned readings in pathology, pathophysiology, and clinical texts to prepare for the first class session. The second session focuses on translational aspects of the disease process. Students read and present papers relevant to the molecular basis of the disease and cutting-edge approaches to its therapy. In the third session students meet with patients who have experienced the disease and/or visit and explore facilities associated with diagnosis and treatment of the disease process. Prior to the third session students receive guidance as to what they will observe and how to approach the experience; and at the end of the session, the group discusses its thoughts

and impressions. Students are expected to prepare for sessions, to participate actively, and to be scrupulously respectful of patients and patient facilities.

C&MP 620b/NBIO 610b, Fundamentals in Neurophysiology Vincent Pieribone, Fred Sigworth

The 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.

C&MP 630a/PATH 680a/PHAR 502a, Seminar in Molecular Medicine, Pharmacology, and Physiology Don Nguyen, Titus Boggon, Susumu Tomita

Readings and discussion on a diverse range of current topics in molecular medicine, pharmacology, and physiology. The class emphasizes analysis of primary research literature and development of presentation and writing skills. Contemporary articles are assigned on a related topic every week, and a student leads discussions with input from faculty who are experts in the topic area. The overall goal is to cover a specific topic of medical relevance (e.g., cancer, neurodegeneration) from the perspective of three primary disciplines (i.e., physiology: normal function; pathology: abnormal function; and pharmacology: intervention).

C&MP 650/PATH 660/PHAR 580, The Responsible Conduct of Research Barbara Ehrlich, Demetrios Braddock

Organized to foster discussion, the course is taught by faculty in the Pharmacology, Pathology, and Physiology departments and two or three senior graduate students. Each session is based on case studies from primary literature, reviews, and two texts: Francis Macrina's *Scientific Integrity* and Kathy Barker's *At the Bench*. Each week, students are required to submit a reaction paper discussing the reading assignment. Students take turns leading the class discussion; a final short paper on a hot topic in bioethics is required. TH 11–12:15

C&MP 710b/MB&B 710b4, Electron Cryo-Microscopy for Protein Structure Determination Fred Sigworth, Charles Sindelar

Understanding cellular function requires structural and biochemical studies at an ever-increasing level of complexity. The course is an introduction to the concepts and applications of high-resolution electron cryo-microscopy. This rapidly emerging new technique is the only method that allows biological macromolecules to be studied at all levels of resolution from cellular organization to near atomic detail. Counts as 0.5 credit. TTH 9–10:15

CHEMICAL & ENVIRONMENTAL ENGINEERING

Dunham Laboratory, 203.432.4252
M.S., M.Phil., Ph.D.

Chair
Jaehong Kim

Director of Graduate Studies
Eric Altman

Professors Eric Altman, Michelle Bell, Gaboury Benoit, Ruth Blake, Menachem Elimelech, Thomas Graedel, Gary Haller (*Emeritus*), Edward Kaplan, Michael Loewenberg, Robert McGraw (*Adjunct*), Andrew Miranker, Lisa Pfefferle, Joseph Pignatello (*Adjunct*), Daniel Rosner (*Emeritus*), James Saiers, W. Mark Saltzman, Udo Schwarz, T. Kyle Vanderlick, Paul Van Tassel, Kurt Zilm

Associate Professors Tarek Fahmy, Jaehong Kim, Chinedum Osuji, Jordan Peccia, André Taylor, Corey Wilson, Julie Zimmerman

Assistant Professors Drew Gentner, Shu Hu, Desirée Plata, Mingjiang Zhong

Fields of Study

Fields include nanomaterials, soft matter, interfacial phenomena, biomolecular engineering, energy, water, and sustainability.

For admissions and degree requirements, and for course listings, see Engineering & Applied Science.

CHEMISTRY

Sterling Chemistry Laboratory, 203.432.3913
www.chem.yale.edu
M.S., Ph.D.

Chair
Gary Brudvig (1 SCL, 203.432.3912, chemistry.chair@yale.edu)

Director of Graduate Studies
Elsa Yan (elsa.yan@yale.edu)

Professors Victor Batista, Jerome Berson (*Emeritus*), Gary Brudvig, Robert Crabtree, Craig Crews (*Molecular, Cellular & Developmental Biology; on leave* [F]), R. James Cross, Jr. (*Emeritus*), Jonathan Ellman, John Faller (*Emeritus*), Gary Haller (*Emeritus*), Seth Herzon, Patrick Holland, Francesco Iachello (*Physics*), Mark Johnson, William Jorgensen, J. Patrick Loria, James Mayer, J. Michael McBride, Scott Miller, Peter Moore (*Emeritus*), Anna Pyle (*Molecular, Cellular & Developmental Biology*), Lynne Regan (*Molecular Biophysics & Biochemistry*), James Rothman (*Cell Biology*), Martin Saunders, Alanna Schepartz, Charles Schmuttenmaer, Dieter Söll (*Molecular Biophysics & Biochemistry*), David Spiegel, Thomas Steitz (*Molecular Biophysics & Biochemistry*), Scott Strobel (*Molecular Biophysics & Biochemistry*), John Tully (*Emeritus*), Patrick Vaccaro, Kenneth Wiberg (*Emeritus*), Elsa Yan, Frederick Ziegler (*Emeritus*), Kurt Zilm

Associate Professor Nilay Hazari

Assistant Professors Richard Baxter, Jason Crawford, Ziad Ganim, Sarah Slavoff, Timothy Newhouse, Hailiang Wang

Fields of Study

Fields include bio-inorganic chemistry, bio-organic chemistry, biophysical chemistry, chemical biology, chemical physics, inorganic chemistry, materials chemistry, organic chemistry, physical chemistry, physical-inorganic 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 is required. The GRE Subject Test is strongly recommended though not required. Students whose native language is not English are required to take the Test of English as a Foreign Language (TOEFL).

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. 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 one oral examination (preparative chemistry students) or two oral examinations (physical chemistry 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 a formal proposal (inorganic, organic, and chemical biology 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 a TF level 20. Students may be required by their advisers to teach in additional terms, but would not be required to teach more than five terms over their first five years. All students are required to take CHEM 590a, Ethical Conduct and Scientific Research, in the fall term of their first year of study.

Master's Degree

M.S. (en route to the Ph.D.) A student must pass at least five graduate-level term courses in the Chemistry department exclusive of seminars and research. In addition, an overall average (exclusive of seminars and research) of High Pass must be maintained in all 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 505a, Alternative Energy Robert Crabtree
Design principles for molecular components of alternative energy devices. Climate change and our alternative energy future. Light energy conversion, energy transfer, and charge separation in photosynthesis. Dioxygen evolution in photosystem II. Biofuels: bioethanol, biodiesel, hydrogenase. Interaction of light with semiconductors. Fast spectroscopy to probe interfacial electron transfer. Computational design and characterization. Solar cells for electricity, photo-catalysis, biomimetic water oxidation. Hydrogen economy. Team-taught.

CHEM 518a[U], Advanced Organic Chemistry William Jorgensen
Concise overview of structure, properties, thermodynamics, kinetics, reactions, and intermolecular interactions for organic molecular systems. TTH 11:35–12:50

CHEM 521a[U], Chemical Biology Jason Crawford, Sarah Slavoff
A one-term introduction to the origins and emerging frontiers of chemical biology. Discussion of the key molecular building blocks of biological systems and the history of macromolecular research in chemistry. MW 9–10:15

[CHEM 522b, Chemical Biology II]

CHEM 523a[U], Synthetic Methods in Organic Chemistry Seth Herzon
This course surveys practical methods in synthetic organic chemistry with an emphasis on learning how to acquire new information and understand chemical reactivity from a fundamental and mechanistic perspective. Memorization is deemphasized. Undergraduates are encouraged to enroll. MW 11:35–12:50

[CHEM 524b, Advanced Synthetic Methods in Chemistry]

[CHEM 525b[U], Spectroscopic Methods of Structure Determination]

[CHEM 526b, Computational Chemistry and Biochemistry]

[CHEM 528a, Natural Products Synthesis]

CHEM 529b, Special Topics in Chemical Biology Alanna Schepartz
Current topics at the interface of chemistry, biology, and medicine with an emphasis on synthetic biology approaches. TTH 11:35–12:50

CHEM 530a[U], Statistical Methods and Thermodynamics Victor Batista
The fundamentals of statistical mechanics 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. MWF 9:25–10:15

CHEM 531b, Special Topics in Organic Chemistry Seth Herzon, William Jorgensen
Current topics in organic chemistry. MW 11:35–12:50

CHEM 537a, Chemistry of Isotopes Martin Saunders
Advanced applications of isotopes to chemical problems and the theory associated with them, including kinetic and equilibrium isotope effects, tracer applications, and dating. MWF 9:25–11:15

CHEM 540a[U], Molecules and Radiation I Kurt Zilm
An integrated treatment of quantum mechanics and modern spectroscopy. Basic wave and matrix mechanics, perturbation theory, angular momentum, group theory, time-dependent quantum mechanics, selection rules, coherent evolution in two-level systems, line shapes, and NMR spectroscopy. MWF 8:20–9:10

CHEM 542b[U], Molecules and Radiation II Charles Schmuttenmaer
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. MW 11:35–12:50

[CHEM 547b, Electron Paramagnetic Resonance]

[CHEM 548b, Nuclear Magnetic Resonance in Liquids]

CHEM 549a, Materials Chemistry Hailiang Wang
This course covers fundamental principles in materials chemistry including basic solid-state chemistry; structures, properties, and applications of metals, semiconductors, polymers, and nanomaterials; and material characterization techniques. Special topics at research frontiers of materials chemistry are also covered, including graphene and carbon nanotubes, nanomaterials for batteries, nanomaterials for catalysis, etc. This course aims to serve graduate and senior undergraduate students from various academic departments who are interested in advanced chemistry and nanoscience for materials research. TTH 9–10:15

[**CHEM 550b^{U}, Physical Methods in Inorganic Chemistry**]

[**CHEM 551b, Biophysics I**]

CHEM 552a^{U}, Organometallic Chemistry Nilay Hazari
A survey of the organometallic chemistry of the transition elements and of homogeneous catalysis. TTH 9–10:15

CHEM 553b, Small Molecule X-ray Crystallography Brandon Mercado, Nilay Hazari
This course provides an introduction to small molecule crystallography. It covers both theoretical and applied concepts and includes hands-on experience on how to solve and refine the structure of small molecules. MW 11:35–12:50

[**CHEM 554b, Bio-Inorganic Chemistry**]

[**CHEM 555b, Inorganic Mechanisms**]

CHEM 556b, Biochemical Rates and Mechanisms J. Patrick Loria
An advanced treatment of enzymology. Topics include transition state theory and derivation of steady-state and pre-steady-state rate equations. The role of entropy and enthalpy in accelerating chemical reactions is considered, along with modern methods for the study of enzyme chemistry. These topics are supplemented with in-depth analysis of the primary literature. TTH 9–10:15

CHEM 557a^{U}, Modern Coordination Chemistry Nilay Hazari
The principles of modern inorganic chemistry. Main group and transition element chemistry: reactions, bonding, structure, and spectra. MWF 8:20–9:15

[**CHEM 558a, Biophysics II: Biophysical Spectroscopy**]

CHEM 559b, Biophysics Richard Baxter, Elsa Yan
A two-part discussion of structural and spectroscopic techniques used to study the properties of biological macromolecules. Part I covers structural methods including light scattering and analytical ultracentrifugation, X-ray crystallography and small-angle X-ray scattering, and electron microscopy. Part II covers optical spectroscopy, such as Raman, infrared, single-molecule, fluorescence, and ultrafast spectroscopy. Emphasis is placed on the physical chemistry that underlies both the execution of such experiments and the interpretation of the resulting data.

CHEM 560La, Advanced Instrumentation Laboratory I Mark Johnson
A laboratory course introducing physical chemistry tools used in the experimental and theoretical investigation of large and small molecules. Modules include electronics, vacuum technology, optical spectroscopy and lasers, and computer programming.

[**CHEM 561Lb, Advanced Instrumentation Laboratory II**]

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 565L, Introduction to Glass Blowing Patrick Vaccaro, Daryl Smith
The course provides a basic introduction to the fabrication of scientific apparatus from glass. Topics covered include laboratory setup, the fundamental skills and techniques of glass blowing, the operation of glass fabrication equipment, and requisite safety procedures.

CHEM 570b[U], Quantum Chemistry Victor Batista
The elements of quantum mechanics developed and illustrated with applications in chemistry and chemical physics. TTH 9–10:15

[CHEM 572a, Advanced Quantum Mechanics]

CHEM 590a, Ethical Conduct and Scientific Research Jonathan Parr
A survey of ethical questions relevant to the conduct of research in the sciences with particular emphasis on chemistry. A variety of issues, including plagiarism, the falsification of data, and financial malfeasance, are discussed, using as examples recent cases of misconduct by scientists. Enrollment is restricted to graduate students in chemistry. M 5–5:50

CHEM 600–670, Research Seminars
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 and Chemical Biology Graduate Students J. Patrick Loria, Craig Crews

CHEM 720a,b, Current Topics in Organic Chemistry Seth Herzon [Sp]
A seminar series based on invited speakers in the general area of organic chemistry.

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

CHEM 990, Research
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, 203.432.0977
www.yale.edu/classics
M.A., M.Phil., Ph.D.

Chair
Emily Greenwood

Director of Graduate Studies
Irene Peirano Garrison (307A Phelps, 203.432.8536)

Professors Egbert Bakker, Victor Bers (*on leave* [Sp]), Kirk Freudenburg (*on leave* [Sp]), Emily Greenwood (*Classics; African American Studies*), Verity Harte (*Classics; Philosophy*), Brad Inwood (*on leave* [Sp]), Diana Kleiner (*Classics; History of Art*), Christina Kraus, Noel Lenski (*Classics; History; on leave* [F]), J.G. Manning (*Classics; History; on leave*)

Associate Professors Milette Gaifman (*Classics; History of Art*), Pauline LeVen, Irene Peirano Garrison

Assistant Professor Andrew Johnston

Lecturers Ann Hanson, Jessica Lamont (*Visiting*), Timothy Robinson, Barbara Shailor (*Senior Research Scholar*), Joseph Solodow

Affiliated Faculty and Secondary Appointments Harold Attridge (*Divinity School*), Adela Yarbro Collins (*Divinity School; Emerita*), John J. Collins (*Divinity School*), Dimitri Gutas (*Near Eastern Languages & Civilizations; on leave* [Sp]), John Hare (*Divinity School*), Dale Martin (*Religious Studies; on leave*), Susan Matheson (*Curator of Ancient Art, Art Gallery*), David Quint (*English; on leave* [Sp]), Kathryn Slanski (*Humanities; Near Eastern Languages & Civilizations*), George Syrimis (*Hellenic Studies*)

Fields of Study

The degree programs in Classics seek 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 of classical antiquity.

Admission Requirements

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

Grading and Good Standing

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

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

Requirements for the Ph.D. Degree in Classical Philology

1. Diagnostic sight translations in Greek and Latin (these are taken before the beginning of the first and third terms and are meant to assess the student's proficiency and progress in both languages).
2. A proseminar offering an introduction to the discipline of Classics and its various subdisciplines.
3. Departmental reading examinations in French (or Italian) and German. The first (in either language) is to be passed by the end of the first year, the second by the end of the second year in residence.
4. A minimum of fourteen term courses: (i) two yearlong survey courses in the history of Greek and Latin literature (four courses in total); (ii) at least four seminars, of which two have to be literary seminars in one language, and one in the other; (iii) one course in historical or comparative linguistics; (iv) one course in ancient history (either an 800-level seminar or a 600-level materials course), and one in classical art and archaeology; (v) of these fourteen courses, twelve must be taken in the first two years of study; the last two, which must be 800-level seminars, are to be taken in the third year, normally one in each term.
5. Greek and Latin composition (this requirement may but need not be satisfied by courses taken under [4] above).
6. Oral examinations in Greek and Latin literature, based on the syllabus covered by the survey courses, drawn from the Classical Philology Ph.D. reading list. These are to be taken closely following the surveys in the respective literatures, as follows: the first, at the end of the second term (May of the first year), the second at the end of the fourth term (May of the second year).
7. Translation examinations in Greek and Latin, based on the Classical Philology Ph.D. reading list, by the beginning of the fifth term in residence.
8. Special fields oral examinations will occur at the beginning of the sixth term, and consist of four areas of special concentration selected by the candidate in consultation with the DGS. One of the special fields should be related to the student's chosen dissertation topic; the three other fields are in each of the two ancient languages/cultures; one historical topic, or a topic with historical potential, is advised. In addition to the oral exam, the student will be asked to write a short summary of the dissertation topic and submit this summary and a working dissertation title to the special fields examiners and to the dissertation adviser (who may or may not have worked on the project as a "special topic" with the student). The summary should discuss where the student's work stands at the beginning of the term and how the student expects the research will progress over the course of the sixth term as he or she writes the formal dissertation prospectus.
9. A dissertation prospectus by the end of the sixth term in residence.

10. A dissertation. All students at the end of each term of dissertation research and writing will present their work in progress in a "chapter colloquium," which will mimic the prospectus defense in format (i.e., a discussion with interested faculty of a presubmitted chunk of written work). If no chapter or written work is presentable at the time of the colloquium, the student would have to justify this.

Requirements for the Ph.D. Degree in Classical Art and Archaeology

The program is designed to give a general knowledge of the development of art and architecture in the classical world from the Bronze Age to Late Antiquity, combined with a detailed study of one particular period and area; and an acquaintance with the contribution made by field archaeology. The program has a strong art historical component, and it is expected that each student will take advantage of available opportunities to visit the major sites and monuments.

1. Diagnostic sight translations in Greek and Latin (these are taken before the beginning of the first and third terms and are meant to assess the student's proficiency and progress in both languages).
2. A proseminar offering an introduction to the discipline of Classics and its various subdisciplines.
3. Departmental reading examinations in Italian (or French) and German. The first (in either language) is to be passed by the end of the first year, the second by the end of the second year in residence.
4. A minimum of fourteen term courses: (i) a minimum of six courses should be in Greek and/or Roman art and/or archaeology (at least four must be seminars); (ii) a minimum of two courses should be in a related field of the history of art, for example Medieval or Renaissance; (iii) a minimum of two courses should be in Greek or Roman history, numismatics, or papyrology; (iv) students must demonstrate a competence in Greek and Latin, usually by passing at least one 400/700-level course in each language; (v) of the remaining four courses, at least two should be seminars in Greek or Latin literature.
5. A written examination in classical art and archaeology, by the beginning of the sixth term. The examination consists of identifications of works of art and architecture, essays, and a twenty-four-hour research paper, followed by an oral exam in four areas of Greek and Roman art and architecture (time period, locale, genre, free choice), with specific topics within those categories agreed upon in advance by the candidate, adviser, and the DGS in Classics. Consideration is normally given to the probable dissertation topic and the way in which preparation for the orals might enhance the writing of the dissertation prospectus.
6. A dissertation prospectus, normally by the end of the sixth term in residence.
7. A dissertation. All students at the end of each term of dissertation research and writing will present their work in progress in a "chapter colloquium," which will mimic the prospectus defense in format (i.e., a discussion with interested faculty of a presubmitted chunk of written work). If no chapter or written work is presentable at the time of the colloquium, the student would have to justify this.

Combined Programs

CLASSICS AND COMPARATIVE LITERATURE

Admission requirements Prerequisites for admission through the Department of Classics: same as for Classical Philology. (For admission requirements in the Department of Comparative Literature, consult the DGS of that department.) After admission to the Department of Classics, qualified students may apply to be admitted to this combined program, normally during the first term of residence; the directors of graduate studies of both departments should be consulted before application to the combined program is made.

Requirements for the Ph.D. degree in Classics and Comparative Literature

1. Diagnostic sight translations in Greek and Latin (these are taken before the beginning of the first and third terms and are meant to assess the student's proficiency and progress in both languages).
2. A proseminar offering an introduction to the discipline of Classics and its various subdisciplines.
3. A minimum of fourteen term courses: (i) at least seven in Classics; (ii) including two yearlong surveys (four courses) in the history of Greek and Latin literature; (iii) two 800-level seminars; (iv) at least six courses in Comparative Literature; (v) including the departmental proseminar; (vi) of these at least four courses should be on postclassical European literature; (vii) of these fourteen courses, twelve must be taken in the first two years of study; the last two, which must be Classics 800-level seminars, are to be taken in the third year, normally one in each term; (viii) the course work across the two programs should include at least two courses on literary theory or methodology, and at least one course each in poetry, narrative fiction, and drama.
4. Literary proficiency in German and in one other modern language, to be demonstrated by the end of the second year in residence.
5. Oral examinations in Greek and Latin literature, based on the syllabus covered by the survey courses, drawn from the Classical Philology Ph.D. reading list. These are to be taken closely following the surveys in the respective literatures, as follows: the first, at the end of the second term (May of the first year), the second at the end of the fourth term (May of the second year).
6. Translation examinations in Greek and Latin, based on the Classical Philology Ph.D. reading list, by the beginning of the fifth term in residence.
7. An oral examination in the Comparative Literature department on six topics appropriate to both disciplines, selected in consultation with the two directors of graduate studies, balancing a range of kinds of topics and including poetry, narrative fiction, and drama, and at least one significant cluster of postclassical texts, by the middle of the sixth term. One of the topics studied will be related to the student's dissertation topic.
8. A dissertation prospectus, by the end of the sixth term in residence. The prospectus must be approved by the DGS in each department (and by the Comparative Literature prospectus committee) by the end of the sixth term in residence. At least one dissertation director must come from the Comparative Literature core faculty.

9. A dissertation. All students at the end of each term of dissertation research and writing will present their work in progress in a "chapter colloquium," which will mimic the prospectus defense in format (i.e., a discussion with interested faculty of a presubmitted chunk of written work). If no chapter or written work is presentable at the time of the colloquium, the student would have to justify this.

CLASSICS AND HISTORY

The combined degree program in Classics and History, with a concentration in Ancient History, is offered by the Departments of Classics and History for students wishing to pursue graduate study in the history of the ancient Mediterranean and western Eurasia. Prospective students may apply through either the Department of History or the Department of Classics.

The combined degree in Classics and History offers students a comprehensive education in the fundamental skills and most current methodologies in the study of the ancient Greek and Roman Mediterranean and its interaction with Eurasian and African cultures and landscapes. Its object is to train leaders in research and teaching by preparing them to handle the basic materials of ancient history through mastery of the traditional linguistic and technical skills. At the same time the combined degree in Classics and History encourages students to rediscover, reshape, and repurpose traditional and nontraditional source materials using the most up-to-date and sophisticated tools at the historian's disposal.

Students are called on to complete course work in two ancient languages, historical theory, intra- and interdisciplinary skills, and fundamental research seminars. Interdisciplinary expertise is fostered through the annual seminar coordinated through the Yale Initiative for the Study of Antiquity and the Premodern World (YISAP) and through required study in ancillary fields. Exams are rigorous and aimed at helping students hone skills and explore new terrain in ancient studies. Students are encouraged to take advantage of Yale's superior collections and library resources in order to explore new avenues in their learning and approaches to historical problems. Yale's outstanding faculty in Classics, History, and related disciplines, such as Near Eastern languages and cultures, religious studies, art history, and anthropology, work together to ensure broad and deep learning that will enable our students to become world leaders in the field.

Admission requirements Prerequisites for admission through the Department of Classics are the same as for admission to the Classics degree program, i.e., the equivalent of three years (four preferred) of college training in one of the classical languages and two years (three preferred) in the other. Prerequisites for admission through the Department of History are the equivalent of three years (four preferred) of college training in one of the classical languages and two years in another ancient language, not necessarily Greek or Latin.

Requirements for the combined Ph.D. degree in Classics and History

1. A minimum of fourteen term courses, including: (i) the historical methods and theory course, Approaching History (HIST 500); (ii) YISAP core seminar (CLSS 815 or equivalent); (iii) two graduate-level courses in two separate ancient languages. For students who are admitted in Classics, these must be Greek and Latin. Students who

are admitted in History must study either Greek or Latin, and they may study both but may also choose another ancient language to fulfill this requirement. The surveys of Greek and Latin literature offered by Classics are encouraged but not mandatory for fulfillment of this requirement; (iv) two skills courses. These may include topics selected from epigraphy (epigraphy courses may be used to fulfill the language requirement concurrently); archaeology; art history; papyrology; numismatics; digital data, GIS, digital humanities, vel sim.; an advanced course in a non-classical ancient language (no more than one such course may be used in fulfillment of this requirement). Students are also encouraged to take advantage of educational opportunities outside of Yale (American Numismatic Society Summer Seminar; an archaeological excavation, e.g., the Gabii project); (v) four courses (at least two of which must be research seminars) in the history of the ancient Mediterranean world; historical courses that have a heavy skill component may be used concurrently to fulfill the skills requirement; (vi) two courses outside of ancient Mediterranean history that cover two separate disciplinary areas. These courses will be in the history of different periods or different regions, or in other disciplines of the humanities or social sciences outside of history, or in the physical sciences. Possibilities include (but are not limited to): social sciences (economics, anthropology, sociology, environmental science, statistics); religion (religious studies, Divinity School, Jewish studies); law (history of law, comparative law, international law); Near Eastern languages and civilizations (Egyptian language, Hebrew, Aramaic, Syriac, Arabic); anthropology and archaeology (cultural anthropology, archaeological sciences); physical and biological sciences (paleoclimatology, ecology and forestry, genetics, medicine).

2. Classics proseminar offering an introduction to the discipline of Classics and its various subdisciplines, to be taken in the first year in residence (not for credit).
3. Reading examinations in German, and in either French or Italian. The first (in either language) is to be passed by the end of the second term in residence, the second by the end of the fourth term in residence.
4. Translation examinations in two ancient languages. For students admitted through Classics, these must be Greek and Latin. For students admitted through History, at least one must be either Greek or Latin. Greek and Latin examinations will be based on the Ancient History Greek and Latin reading lists and will consist of four passages in each language, at least one of which will be poetry and one documentary (epigraphy/papyrology). Some History students may find that expertise in another language—such as Hebrew, Aramaic/Syriac, Demotic, Coptic, Classical Armenian, or Sanskrit—is most beneficial for their research and teaching trajectory. Reading lists for these non-classical languages will be devised by the student in collaboration with the faculty adviser and other relevant member(s) of the Yale faculty, and fixed in writing no later than the end of the fourth term in residence. Examinations in these languages will also consist of four passages to be set and evaluated by faculty expert in the given language. Translation exams in all languages must be taken at the beginning of the fifth term in residence.
5. A general examination in Ancient History during the third year and no later than the end of the sixth term in residence. This is to be broken into one major and two minor fields. For the major field students must prepare an 8,000-word essay in advance of

the oral examination. For each of the minor fields, students must prepare a syllabus for an undergraduate class. The written essays and syllabi must be submitted by a fixed date, typically on the Friday before Thanksgiving or spring break. Oral exams will be completed shortly afterward to ensure time for the completion of the dissertation prospectus.

6. A dissertation prospectus by the end of the sixth term in residence.
7. By the end of their ninth term, students are required to submit a chapter of their dissertation, which will be discussed with the student by the committee in a chapter conference.

CLASSICS AND PHILOSOPHY

The Classics and Philosophy Program is a combined program, offered by the Departments of Classics and Philosophy, for students wishing to pursue graduate study in ancient philosophy. Suitably qualified students may apply for entry to the program either through the Classics department for the Classics track, details of which are given below, or through the Philosophy department for the Philosophy track, details of which may be found at http://philosophy.yale.edu/graduate-program/classics-and-philosophy-program. Applicants to the combined program are strongly encouraged to submit a writing sample on a topic in ancient philosophy.

Applicants for the Classics track of the combined program must satisfy the general requirements for admission to the Classics graduate program, in addition to the requirements of the Classics track of the combined program. Applicants for the Philosophy track of the combined program must satisfy the general requirements for admission to the Philosophy graduate program, in addition to the requirements of the Philosophy track of the combined program.

The combined program is overseen by an interdepartmental committee currently consisting of Verity Harte, David Charles, and Brad Inwood together with the DGS in Classics and the DGS in Philosophy.

Requirements of the Classics track of the Classics and Philosophy Program

1. Diagnostic sight translations in Greek and Latin (these are taken before the beginning of the first and third terms and are meant to assess the student's proficiency and progress in both languages).
2. A proseminar offering an introduction to the discipline of Classics and its various subdisciplines.
3. Departmental reading examinations in French (or Italian) and German. The first (in either language) is to be passed by the end of the first year, the second by the end of the second year in residence.
4. A minimum of fourteen term courses, of which (i) at least four should be in ancient philosophy, including at least two involving original language work; (ii) of ten remaining courses, five should be in Classics, five in Philosophy, including (a) of five in Classics, either two terms of history of Greek literature or two terms of history of Latin literature are required, and two courses at 700/800-level in Greek or Latin; and (b) of five in Philosophy, one in history of philosophy other than ancient philosophy, three in nonhistorical philosophy. It is recommended that students without formal training in logic take a logic course appropriate to their philosophical background.

5. Translation examinations in Greek and Latin, based on the Classics and Philosophy Ph.D. reading list for the Classics track of the program, by the beginning of the fifth term in residence.
6. Oral examinations in Greek and Latin literature, based on the Classics and Philosophy Ph.D. reading list for the Classics track of the program, by the end of the fifth term in residence and consisting of one hourlong oral examination on nonphilosophical Greek and Latin works from the list (which may be taken in two parts, one half-hour exam on Greek and one half-hour exam on Latin) and one hourlong oral examination on philosophical Greek and Latin works from the list, to be completed by the end of the fifth term in residence. Students may choose to take the nonphilosophical Greek and/or Latin half-hour component of their oral examination in conjunction with taking the history of Greek or Latin literature, along with the Classical Philology cohort, in May of the year in which the corresponding history is taken.
7. One of the two qualifying papers required for the Ph.D. in Philosophy by the end of the sixth term in residence; this paper should be on a philosophical topic other than ancient philosophy.
8. Oral examinations/special fields in two areas of concentration selected by the candidate in consultation with the DGS in Classics and the program committee, one of which must be in ancient philosophy and which will in addition include a written component, while the other must cover a classical topic other than ancient philosophy, by the end of the sixth term in residence.
9. A dissertation prospectus, by the end of the seventh term in residence.
10. A dissertation. All students at the end of each term of dissertation research and writing will present their work in progress in a "chapter colloquium," which will mimic the prospectus defense in format (i.e., a discussion with interested faculty of a presubmitted chunk of written work). If no chapter or written work is presentable at the time of the colloquium, the student would have to justify this.

CLASSICS AND RENAISSANCE STUDIES

Admission requirements Same as for Classical Philology. Applications should be submitted directly to Classics with an indication that the student wishes to apply for the combined degree in Classics and Renaissance Studies.

Requirements for the Ph.D. degree in Classics and Renaissance Studies

1. Diagnostic sight translations in Greek and Latin (these are taken before the beginning of the first and third terms and are meant to assess the student's proficiency and progress in both languages).
2. A proseminar offering an introduction to the discipline of Classics and its various subdisciplines.
3. Sixteen term courses, divided equally between Classics and Renaissance Studies: (i) eight courses in Classics; (ii) including two yearlong surveys (four courses) of Greek and Latin literature; (iii) at least three seminars; (iv) eight courses in Renaissance Studies; (v) two terms of the Renaissance Studies Core Course; (vi) six additional term courses to be taken in at least two disciplines (such as literature, history, history of art, music, religious studies, etc.); one of these courses should meet the normal Classics requirements of a course in classical art or archaeology; (vii) of these sixteen

courses, fourteen must be taken in the first two years of study; the last two, which must be Classics 800-level seminars, are to be taken in the third year, normally one in each term.

4. Literary proficiency in Italian, as examined by Renaissance Studies, and in a second language, normally German or French.
5. Oral examinations in Greek and Latin literature, based on the syllabus covered by the survey courses, drawn from the Classics and Renaissance Studies Ph.D. reading list. These are to be taken closely following the surveys in the respective literatures, as follows: the first, at the end of the second term (May of the first year), the second at the end of the fourth term (May of the second year).
6. Translation examinations in Greek and Latin, based on the Classics and Renaissance Studies Ph.D. reading list, by the end of the fifth term in residence.
7. Oral examinations on special fields appropriate to both disciplines, by the beginning of the sixth term. Seventy-five minutes on three or four topics in classical Greek and Latin literature; and forty-five minutes (three fifteen-minute questions) on Renaissance topics to be divided between at least two disciplines, i.e., literature, history, history of art, etc., selected in consultation with the directors of graduate studies in both disciplines. One of the fields studied will be related to the student's dissertation topic. In addition to the oral exam, the student will be asked to write a short summary of his or her dissertation topic and submit this summary and a working dissertation title to the special fields examiners and to the dissertation adviser (who may or may not have worked on the project as a "special topic" with the student). The summary should discuss where the student's work stands at the beginning of the term and how the student expects the research will progress over the course of the sixth term as he or she writes the formal dissertation prospectus.
8. A dissertation prospectus, by the end of the sixth term in residence.
9. A dissertation. All students at the end of each term of dissertation research and writing will present their work in progress in a "chapter colloquium," which will mimic the prospectus defense in format (i.e., a discussion with interested faculty of a presubmitted chunk of written work). If no chapter or written work is presentable at the time of the colloquium, the student would have to justify this.

For information about the Ph.D. program in Greco-Arabic Studies, please contact Professor Gutas, Department of Near Eastern Languages and Civilizations.

YISAP Graduate Qualification

The Yale Initiative for the Study of Antiquity and the Premodern World (YISAP) offers a graduate qualification. For further information, see YISAP, under Non-Degree-Granting Programs, Councils, and Research Institutes.

Master's Degrees

M.Phil. See Degree Requirements under Policies and Regulations.

M.A. The Department of Classics does not admit students for a terminal master's degree, nor does it award an M.A. en route to the Ph.D. degree. If, however, a student admitted for the Ph.D. leaves the program prior to completion of the doctoral degree,

he or she may be eligible to receive a terminal master's degree upon completion of eight 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 719b[U], Helen after Troy Pauline LeVen
Focus on the representation of Helen of Troy in Homer, Sappho, and other lyric poets. Readings from Gorgias's *Encomium of Helen,* Euripides' *Helen,* and Longus. Attention to problems of aesthetics, rhetoric, and poetics. MW 1–2:15

GREK 761a[U], Ancient Greek Wisdom Poetry Egbert Bakker
Study and interpretation of archaic Greek poetry that is explicitly addressed to its audience, in the form of advice, exhortation, or general instruction. The course focuses on Hesiod's *Works and Days,* the traditional prototype of "didactic poetry," and on archaic Greek elegy (Solon, Theognis, Tyrtaeus). Issues to be addressed include questions of genre, occasion, and performance context as well as the relation of this kind of poetry to the epic tradition. MW 11:35–12:50

GREK 790a[U], Greek Syntax and Stylistics Victor Bers
Stylistics analysis and extended prose composition in imitation of particular genres and "subgenres," concentrating on classical Attic prose. Students enrolled in this course are normally required to attend and do the work in GREK 390a, a review of accidence and syntax, elementary composition, and stylistic analysis of Greek prose of the fifth and fourth centuries B.C., including a comparison of "prosaic" and "poetic" syntax. TTH 9–10:15, TH 10:30–11:20

LATN 721b[U], Vergil's *Aeneid* Christina Kraus
An in-depth study of Vergil's *Aeneid* within its political context. TTH 9–10:15

LATN 724a[U]/CPLT 594a, Latin Lyric Christina Kraus
Reading and analysis of selections from the canon of Latin lyric poetry. Focus on Horace's *Odes,* with some attention to his *Epodes* and to works by Catullus and lesser-known Republican poets. Emphasis on literary interpretation. MW 9–10:15

LATN 763a[U], Ciceronian Invective Irene Peirano Garrison
A close reading of Cicero's *Philippic* 2 and selections from the *In Pisonem;* selected readings from other representatives of the genre of Roman invective. Emphasis on Cicero's language, style, and rhetorical technique, and on invective as a literary genre. MW 1–2:15

LATN 785b[U], Poetry and Monarchy at Rome Andrew Johnston
The monarchy at Rome from the Augustan age through late antiquity, as illuminated by the writings of poets who variously flattered and subverted the "*principes*" and emperors, collaborating with their ideological programs or problematizing their position within the republic. Study of bucolic, epic, didactic, panegyric, epigram, and lyric poetry from the ages of Augustus, the Flavians, and Theodosius. Topics include questions of tradition and innovation, further voices, society and patronage, and revision and erasure. TTH 11:35–12:50

LATN 790b[U], Latin Syntax and Stylistics Joseph Solodow
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. For students with some experience reading Latin literature who desire a better foundation in forms, syntax, idiom, and style. MW 2:30–3:45

CLSS 601a[U]/MDVL 571a, Introduction to Latin Paleography Raymond Clemens
Latin paleography from the fourth century C.E. to ca. 1500. Topics include the history and development of national hands; the introduction and evolution of Caroline minuscule, pre-gothic, gothic, and humanist scripts (both cursive and book hands); the production, circulation, and transmission of texts (primarily Latin, with reference to Greek and Middle English); advances in the technical analysis and digital manipulation of manuscripts. Seminars are based on the examination of codices and fragments in the Beinecke Library; students select a manuscript for class presentation and final paper. M 3:30–5:20

CLSS 602b[U]/MDVL 563b, Advanced Latin Paleography Barbara Shailor
The challenges of using hand-produced Latin manuscripts in research, with an emphasis on texts from the late Middle Ages. Gothic cursive scripts and book hands ca. 1200–ca. 1500; fragments of unidentified codices; complex or composite codices with heavy interlinear and marginal annotations. Manuscripts and fragments selected largely from collections in the Beinecke Library. Prerequisite: CLSS 601a or permission of the instructor. M 3:30–5:20

CLSS 605b[U], Greek Papyrology Ann Hanson
Literary and documentary papyri of Greek and Roman Egypt, concentrating on documents housed in the Beinecke Library from the late Ptolemaic and Roman periods. Topics include using papyri as sources for social and other histories; gaining familiarity with the language of the papyri; and the reading of literary and documentary hands. F 2:30–4:20

CLSS 609b[U]/PHIL 609b[U], Plato's *Philebus* Verity Harte
Discussion of Plato's *Philebus* (in translation), the late work in which he examines the competing claims of pleasure and reason to be the basis of human happiness and in which he provides a portrait of the best human life. M 1:30–3:20

CLSS 620b[U]/PHIL 607b[U], The Central Books of Aristotle's *Metaphysics* David Charles
Examination of Aristotle's *Metaphysics*. Discussion of substance and essence in the central books, Z, H, and Θ, and assessment of recent attempts to interpret his account. Prerequisites: previous study of ancient philosophy and permission of the instructor. W 3:30–5:20

CLSS 803a, Problems in the History of the Late Republic Andrew Johnston
This seminar explores a range of key questions and problems in the history of the late Roman Republic (from the death of G. Gracchus to the death of Cicero): growing anxieties over the definition(s) of Roman identity; the relationship of Rome to the Latins and Italians; attitudes toward Greek culture and imperial policy in the East; the nature of Republican imperialism in the western Mediterranean; the politics of elite self-representation; antiquarianism, intellectual culture, and the transformation of religion; social memory and the representation of the past; oratory, popular politics, and

mass communication; retrospective views of the "Republic" from the empire; and others. The course takes a thematic approach, tackling a new question/problem each week, each building on the previous one. Discussion of trends in modern scholarship, both foundational works (Syme, Gruen, Taylor) as well as the cutting edge and important new directions. Close engagement with primary sources and their problems, especially Cicero and Caesar, as well as the fragments of Roman historiography and oratory, and inscribed documents; the use of archaeological evidence to answer historical questions. TH 2:30–4:20

CLSS 815b/ANTH 531b/ARCG 531b/CPLT 547b/HIST 502b/JDST 653b/NELC 533b/RLST 803b, Fakes, Forgeries, and the Making of Antiquity Eckart Frahm, Irene Peirano Garrison

A comparative exploration of notions of forgery and authenticity in the ancient and premodern worlds, in a variety of civilizations (ancient Greece, Mesopotamia, Egypt, Israel, China, India, etc.) and different political, religious, literary, and artistic contexts. Emphasis is also placed on the pivotal role played by the "authentic" in the modern era in disciplines such as philology and aesthetics, the manipulative uses of ancient history for purposes of modern nation building and identity formation, copies and reconstructions of ancient artifacts, and the role of forgeries in today's antiquities trade. TH 2:30–4:30

CLSS 843a/PHIL 733a, Readings in Greek Philosophy: Plato's *Phaedo* Verity Harte, Brad Inwood

The course reads and discusses the Greek text of Plato's *Phaedo,* set on the last day of Socrates' life. The *Phaedo* is notable for a series of arguments for the immortality of soul and for discussions of the Forms, the acquisition of knowledge, philosophical method, and the value of philosophy. This is a core course for the combined Ph.D. program in Classics and Philosophy. Prerequisite: the course is open to all Classics or Philosophy graduate students who have suitable preparation in Attic Greek and some prior study of ancient philosophy. Others interested in taking or attending the class must have the permission of the instructor. W 3:30–5:20

CLSS 846a/ARCG 749a/HSAR 570a, Becoming Hadrian: Autobiography and Art in the Second-Century A.D. Diana Kleiner

Marguerite Yourcenar's famed fictional *Memoirs of Hadrian* serves as the starting point for an exploration of Hadrian and the art he commissioned in Rome and abroad. Hadrian's passion for life, quest after peace, romantic wanderlust, veneration of Greek culture, and craving for love, along with his acceptance of death's inexorableness, led him to commission some of Rome's greatest monuments. The emperor's flair for leadership and talent as an amateur architect inform student projects on the sculpture, mosaics, and buildings of the age, among them the portraiture of Hadrian's lover Antinous, the Pantheon, and Hadrian's Wall in Britain. Qualified undergraduates who have taken HSAR 250a and/or HSAR 252a may be admitted with permission of the instructor. T 1:30–3:20

CLSS 864b/HSAR 563b, Art and Ritual in Greek Antiquity Milette Gaifman

The relationship between art and ritual has received much scholarly attention in various fields, particularly classics, history of art, religious studies, and anthropology. Greek antiquity offers an ideal context for considering the intricate ties between visual culture

and religious practices, for much of what is known today as ancient Greek art and architecture was originally related to rituals; artifacts and architectural monuments such as painted pottery, sculptural reliefs, and temples served as settings for worship and ceremonial events and featured representations of activities such as libations and sacrifices. The seminar explores how works of art and architecture shaped ancient practices and theologies. While examining closely ancient artifacts and monuments, students consider the most recent theoretical frames related to the subject from various schools of thought such as the Paris school, British anthropology, and *Bildwissenschaft*. W 2:30–4:20

CLSS 873a, The Satiric Worlds of Martial and Juvenal Kirk Freudenburg
This course takes up the two most famous writers of critical poetry in the period that saw the Flavian dynasty give way to the age of "good emperors," such as Nerva and Trajan. We look at how Martial writes from both sides of that great divide, and how Juvenal in his *Satires* writes about deplorable events that have already been "workshopped" by Martial in his *Epigrams*. We look at the kinds of "free speech acts" that each puts on, and the valence that these acts had, or did not have, as politically engaged (and risky) speech. Effort is invested in finding "horizontal" structures from which to make sense of these poems in Flavian and early second-century Rome. F 9:25–11:15

CLSS 881a, Proseminar: Classical Studies Irene Peirano Garrison
An introduction to the bibliography and disciplines of classical scholarship. Faculty address larger questions of method and theory, as well as specialized subdisciplines such as linguistics, papyrology, epigraphy, paleography, and numismatics. Required of all entering graduate students. T 11:35–12:50

CLSS 896a, History of Greek Literature I Pauline LeVen
A comprehensive treatment of Greek literature from Homer to the imperial period, with an emphasis on archaic and Hellenistic poetry. The course prepares for the comprehensive oral qualifying examinations. The student is expected to read extensively in the original language, working toward familiarity with the range and variety of the literature. MW 2:30–3:45, M 1:30–2:20

CLSS 897b, History of Greek Literature II Egbert Bakker
A continuation of CLSS 896a. MW 9–10:15, 1 HTBA

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

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

COMPARATIVE LITERATURE

451 College Street, Rm. 202, 203.432.2760
http://complit.yale.edu
M.A., M.Phil., Ph.D.

Chair
Martin Hägglund

Director of Graduate Studies
Marta Figlerowicz [F]
Ayesha Ramachandran [Sp]

Professors Dudley Andrew, Katerina Clark, Roberto González Echevarría, Martin Hägglund, Hannan Hever, Carol Jacobs (*on leave* [F]), David Quint, Katie Trumpener (*on leave* [F]), Jing Tsu

Associate Professor Moira Fradinger

Assistant Professors Robyn Creswell (*on leave* [F]), Marta Figlerowicz, Ayesha Ramachandran (*on leave* [F])

Lecturers Peter Cole, Jan Hagens

Emeritus Peter Brooks, Peter Demetz, Shoshana Feldman, Michael Holquist, Rainer Nägele

Affiliated Faculty Rolena Adorno (*Spanish & Portuguese*), R. Howard Bloch (*French*), Rüdiger Campe (*German; on leave* [F]), Francesco Casetti (*Film & Media Studies; on leave* [Sp]), Kang-I Sun Chang (*East Asian Languages & Literatures*), Michael Denning (*American Studies*), Wai Chee Dimock (*English*), Paul Fry (*English; on leave* [F]), Karsten Harries (*Philosophy*), Pericles Lewis (*Yale-NUS College*), Tinu Lu (*East Asian Languages & Literatures*), John MacKay (*Slavic Languages & Literatures; on leave* [F]), Giuseppe Mazzotta (*Italian; on leave*), Christopher Miller (*French; on leave* [Sp]), Joseph Roach (*English*), Maurice Samuels (*French*), Henry Sussman (*Visiting; German*), Ruth Bernard Yeazell (*English*)

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 visual and material culture, linguistics, film, psychology, law, and philosophy. The comparative perspective invites the exploration of such transnational phenomena as literary or cultural periods and trends (Renaissance, Romanticism, Modernism, postcolonialism) or genres and modes of discourse. Students may specialize in any cultures or languages, to the extent that they are sufficiently covered at Yale. The Ph.D. degree qualifies the candidate to teach comparative literature as well as the national literature(s) of her or his specialization.

Special Admissions Requirements

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

Special Requirements for the Ph.D. Degree

Students must successfully complete fourteen term courses, including the departmental proseminar and at least six further courses 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) at least one course each in poetry, narrative fiction, and drama; (4) course work that deals with texts from three literatures, one of which may be English or American; and (5) a substantive focus on one or two national or language-based literatures. 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, Greek, Biblical Hebrew, Classical Arabic, Classical Chinese, Provençal). 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 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 examination consists of six topics that include texts from at least three national literatures and several historical periods (at least one modern and one before the Renaissance). The texts discussed should also include representatives of the three traditional literary genres (poetry, drama, narrative fiction).

Ph.D. dissertation Supervised by a dissertation director (or directors)—at least one from the core or affiliate departmental faculty—and approved by the departmental faculty at large, the dissertation completes the degree. Its initial step is a dissertation prospectus, to be submitted and approved by the dissertation director and a standing faculty committee no later than halfway through the seventh term of study. Admission to candidacy for the Ph.D. is granted after six terms of residence and the completion of all requirements (courses, languages, orals, prospectus) except the dissertation.

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

Combined Ph.D. Programs

COMPARATIVE LITERATURE AND CLASSICS

Course work Students concentrating in Comparative Literature and Classics are required to complete fourteen graduate term courses (plus the Classics proseminar). In Classics, at least seven courses, including the Classics proseminar and four courses (two year-long sequences) in the history of Greek and Latin literature (usually taken in successive years, each to be followed by the respective oral in that field) and two 800-level Classics seminars (generally taken in each term of the third year). In Comparative Literature, the departmental proseminar and at least five further Comparative Literature courses, including at least four courses in postclassical European literature. The course work across the two programs should also include at least two courses in literary theory or methodology, and at least one course each in poetry, narrative fiction, and drama. At least two courses, excluding directed readings, need to receive the grade of Honors. At least thirteen of the fifteen required courses are to be taken in the first two years; the last two, which must be Classics 800-level seminars, are to be taken in the third year, normally one in each term.

Languages To assess each student's proficiency and progress in both key languages, two sight translation examinations each in Greek and Latin (taken before the beginning of the first and third terms). During the first two years, literary proficiency, demonstrated in course work, in Greek, Latin, and English, as well as reading proficiency in German and one other modern language (usually French).

Orals *Classics:* Oral examinations in Greek and Latin literature, based on the Classics Ph.D. reading list. These are to be taken closely following the surveys in the respective literatures, as follows: the first, at the end of the second term (May of the first year), the second at the end of the fourth term (May of the second year). By the end of the fifth term, translation examinations in Greek and Latin literature, based on the Classics Ph.D. reading list. *Comparative Literature:* oral examination (six topics appropriate to both disciplines, balancing a range of kinds of topics and including poetry, narrative fiction, and drama, and at least one significant cluster of postclassical texts), to be taken by the middle of the sixth term. Lists will be worked out with individual examiners, primarily under the guidance of the Comparative Literature DGS, but also with the approval of the Classics DGS. One of the topics studied will be relevant to the student's planned dissertation topic.

Prospectus and dissertation The prospectus must be approved by the DGS in each department (and by the Comparative Literature prospectus committee) by the end of the sixth term in residence. At least one dissertation director must come from the Comparative Literature core faculty. At the end of each term, each dissertation student will presubmit, then discuss their work in progress in a Classics "chapter colloquium" discussion with interested faculty.

COMPARATIVE LITERATURE AND FILM AND MEDIA STUDIES

Applicants to the combined program must indicate on their application that they are applying both to the program in Film and Media Studies and to Comparative Literature. All documentation within the application should include this information.

Course work Students in the combined program are required to complete fifteen graduate term courses. In Comparative Literature, the proseminar and at least five further courses, including at least one course in literary theory or methodology beyond the proseminar; at least one course each in poetry, narrative fiction, and drama; two courses before 1900, including at least one before 1800; a wide range of courses with a focus on one or two national or language-based literatures; and at least two courses with the grade of Honors. In Film and Media Studies, two core seminars (FILM 601 and FILM 603) and four additional seminars.

Languages At least two languages (besides English) with excellent reading ability (normally one of these languages is French).

Orals Students must pass the Film and Media Studies oral examination. They must also pass the six-field Comparative Literature oral examination, with at least one examiner from the core Comparative Literature faculty; at least three fields involving literary topics, and readings including poetry, fiction, and drama; the other topics may be on film or film-related subjects; some lists may combine film and literature.

Prospectus and dissertation At least one dissertation director must be from Comparative Literature and at least one from Film and Media Studies (in some cases, a single adviser may fulfill both roles). The prospectus must be approved by the Comparative Literature subcommittee and ratified by the Film and Media Studies faculty. The dissertation must pass a presubmission Public Defense of Work (with at least one examiner from the graduate Film and Media Studies committee, and at least one member from Comparative Literature).

COMPARATIVE LITERATURE AND RENAISSANCE STUDIES

Course work Students are required to complete sixteen graduate term courses, at least seven of these (including the Comparative Literature proseminar) in the Department of Comparative Literature. Students must take at least ten courses in the field of Renaissance Studies (offered in several departments), including two terms of the Renaissance Studies core seminar and three courses in two disciplines other than literature (such as history, history of art, or religious studies). At least three of a student's overall list of courses must be in literary theory, criticism, or methodology; at least one course each in poetry, narrative fiction, and drama; and at least one course each in ancient or medieval literature and Enlightenment or modern literature. At least two courses must be completed with the grade of Honors. In general, students should take a wide range of courses with a focus on one or two national or language-based literatures.

Languages Latin and Italian, as set by Renaissance Studies — one hour of Renaissance Latin prose; one hour of sixteenth-century Italian prose, one of modern Italian scholarship — and two additional languages, at least one of them European.

Orals The joint oral examination will consist of seven twenty-minute questions (two topics in Renaissance literature from a comparative perspective; three on non-Renaissance literature, including at least one theoretical or critical question; and two questions on Renaissance topics in nonliterary disciplines). Orals should be completed no later than the end of the sixth term.

Prospectus and dissertation The prospectus should be completed in September of the fourth year. Procedures regarding the dissertation will follow departmental practice, although the final readers will normally include at least one member of the Renaissance Studies Executive Committee.

Master's Degrees

M.Phil. See Degree Requirements under Policies and Regulations. Additionally, students in Comparative Literature are eligible to pursue a supplemental M.Phil. degree in Medieval Studies. For further details, see Medieval Studies.

M.A. (en route to the Ph.D.) Students enrolled in the Ph.D. program may receive the M.A. upon completion of ten courses with at least two grades of Honors and a maximum of three grades of Pass, and the demonstration of proficiency in two of the languages, ancient or modern, through course work or departmental examinations. No student is admitted to a terminal M.A.

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

Courses

CPLT 511b[U], Introduction to Theory of Literature Martin Hägglund
An examination of concepts and assumptions in contemporary views of literature. Theories of meaning, interpretation, and representation. Critical analysis of formalist, psychoanalytic, structuralist, poststructuralist, Marxist, and feminist approaches to theory and to literature. MW 3:30–4:20

CPLT 513a/FREN 933a, One Hundred Years of *Swann's Way* Alice Kaplan
The first volume of Proust's *Recherche* has inspired generations of literary critics, psychoanalysts, philosophers, historians, translators, and critical theorists. Reading *Du côté de chez Swann* in light of their responses to the novel allows us to construct an intellectual and literary history of a century of reading Proust. TH 9:25–11:15

CPLT 515b, Proseminar in Comparative Literature Katie Trumpener
Introductory proseminar for all first-year students in Comparative Literature (and other interested graduate students). Reflections and exercises that aim to grasp the roots and follow developments of this discipline, such as philology, thematics, historical poetics, hermeneutics, deconstruction, translation theory, comparative arts, world literature. Offered every other year. M 1–3

CPLT 521a/FILM 609a, Issues in World Literature and Cinema Dudley Andrew
Can there be disciplinary areas named "World Literature" and "World Cinema," or does the adjective "world" defy perimeters? What about competing adjectives like international, transnational, global, planetary, etc.? Undergraduate courses and textbooks with "world" in their titles have proliferated this century, but what are they aiming to define, organize, and explore? What topics, principles, methods, and conundrums do they address? This seminar aims to quickly survey the history of the "world quest" of literary studies from Goethe to Moretti, and to see if the more recent shift from International to

World Cinema marks a parallel quest or something entirely different. Students debate positions taken by literary scholars (Damrosch, Casanova, Spivak, Prendergast, et al.) and by a phalanx of film scholars. We investigate infrastructure (festivals, translation, subtitles, prizes) via the kind of collaborative effort often required by the scale of this "area." Meanwhile each student develops an essay on one problem lurking today in literary or film history as these fields are pushed to their geographical limit. Questions could concern corpus, system, distribution, influence, translation, mediation, genre, etc. W 9:25–11:15

CPLT 546a/EALL 846a, Philology and Sinology Jing Tsu
In this course we examine the history and theoretical foundations of non-Western philology in relation to Western philology and linguistics. We study how they interacted and the development of comparative methods based on notions of sameness and difference. T 1:30–3:20

CPLT 547b/ANTH 531b/ARCG 531b/CLSS 815b/HIST 502b/JDST 653b/NELC 533b/RLST 803b, Fakes, Forgeries, and the Making of Antiquity Eckart Frahm, Irene Peirano Garrison
A comparative exploration of notions of forgery and authenticity in the ancient and premodern world, in a variety of civilizations (ancient Greece, Mesopotamia, Egypt, Israel, China, India, etc.) and different political, religious, literary, and artistic contexts. Emphasis is also placed on the pivotal role played by the "authentic" in the modern era in disciplines such as philology and aesthetics, the manipulative uses of ancient history for purposes of modern nation building and identity formation, copies and reconstructions of ancient artifacts, and the role of forgeries in today's antiquities trade. TH 2:30–4:30

CPLT 560b[U]/GMAN 559b[U], Rilke and Yeats Carol Jacobs
Study of the works of two twentieth-century authors who, in very different ways, challenge conventional modes in which to think about the relationship between literature and what we tend to call reality. We ask how to think about the performance of art and its implicit theorizations as crucial to this issue, and ponder the difference between the commitment to and lack of interest in a thematics of lived life. The nature and purpose of the course are to practice close reading as a mode of thinking and a path to theorizing. We explore how that theorization of the text takes place, not in a separate sphere, but out of the details and performance of individual literary works. Although our classes settle on individual works, students are expected to read much more widely in the corpus of the two poets.

CPLT 582a/ENGL 545a/FREN 802a, Medieval Translation Ardis Butterfield
Using modern postcolonial as well as medieval theories of translation, memory, and bilingualism we explore how texts are transformed, cited, and reinvented in the medieval period. What happens to language under the pressure of crosslingual reading practices? How can the freedom and inventiveness of medieval poetic practices illuminate modern theories of translation? Texts include material in French, English, Latin, and Italian. Proficiency in any one or more of these languages is welcome, but every effort will be made to use texts available in modern English translation, so as to include as wide a participation as possible in the course. W 9:25–11:15

CPLT 594a/LATN 724a[U], Latin Lyric Christina Kraus
Reading and analysis of selections from the canon of Latin lyric poetry. Focus on Horace's *Odes,* with some attention to his *Epodes* and to works by Catullus and lesser-known Republican poets. Emphasis on literary interpretation. MW 9–10:15

CPLT 622a,b/AMST 622a/623b, Working Group on Globalization and Culture Michael Denning
A continuing collective research project, a cultural studies "laboratory," that has been running since the fall of 2003. The group, made up of graduate students and faculty from several disciplines, meets regularly to discuss common readings, to develop collective and individual research projects, and to present that research publicly. The general theme for the working group is globalization and culture, with three principal aspects: (1) the globalization of cultural industries and goods, and its consequences for patterns of everyday life as well as for forms of fiction, film, broadcasting, and music; (2) the trajectories of social movements and their relation to patterns of migration, the rise of global cities, the transformation of labor processes, and forms of ethnic, class, and gender conflict; (3) the emergence of and debates within transnational social and cultural theory. The specific focus, projects, and directions of the working group are determined by the interests, expertise, and ambitions of the members of the group, and change as its members change. There are a small number of openings for second-year graduate students. Students interested in participating should contact michael.denning@yale.edu. M 1:30–3:20

CPLT 651b[U]/GMAN 647b[U]/PHIL 606b[U], Systems and Their Theory Henry Sussman
Conceptual systems that have, since the outset of modernity, furnished a format and platform for rigorous thinking at the same time that they have imposed on language the attributes of self-reflexivity, consistency, repetition, purity, and dependability. Texts by Kant, Hegel, Bergson, Kafka, Proust, and Borges.

CPLT 670a/ENGL 548a/ITAL 601a, Ariosto and Cervantes David Quint
The year 2016 marks the 500th anniversary of the *Orlando furioso* and the 400th anniversary of the death of Cervantes. This course reads the *Orlando furioso,* Ariosto's *Cinque canti,* and *Don Quijote* as depictions of the crisis of chivalry, and it charts, in the case of *Don Quijote,* the birth of the modern novel. It examines the use in these works of mirroring episodes—*entrelacement*—and interpolated tales. It also looks at similar techniques in Apuleius's *The Golden Ass,* in the *Thousand and One Nights,* and in Sir Philip Sidney's *New Arcadia*. T 10:30–12:20

CPLT 678b[U]/AFAM 660b[U]/AFST 678b[U]/ENGL 938b[U]/JDST 678b[U], The Literatures of Blacks and Jews in the Twentieth Century Marc Kaplan
This seminar compares representative writings by African, Caribbean, and African American authors of the past one hundred years, together with European, American, and South African Jewish authors writing in Yiddish, Hebrew, French, and English. This comparison examines the paradoxically central role played by minority, "marginal" groups in the creation of modern literature and the articulation of the modern experience. TH 1:30–3:20

CPLT 682b^{U}/JDST 851b^{U}/NELC 854b^{U}, Cultural Critique and Israel Hannan Hever
An overview of the poetics, culture, history, and political dynamics of modern Hebrew literature as a national literature over the past three hundred years. No background in Jewish literature and Jewish culture is required. All readings in English. T 1:30–3:20

CPLT 685b^{U}/JDST 850b^{U}/NELC 853b^{U}, Literature at the Limit: Palestine and Israel Hannan Hever, Robyn Creswell
Readings and films from post-1948 Palestine and Israel, with special attention to historical and political contexts. This course focuses on Hebrew- and Arabic-language culture produced in Palestine and Israel since the year of the Palestinian Haqba and the Jewish War of Independence. These poems, novels, and films consistently probe the figure of the limit—in the geographical sense of borders and checkpoints, as well as in the existential sense of extremity and trauma. What are the limits of one's political and linguistic community? What is the role of culture in defining, deconstructing, or bridging those borders? The course is intended to serve as an introduction to canonical texts of both national traditions, as well as the methods of comparative literature. Readings include works by Darwish, Yehoshua, Kanafani, Oz, Habibi, Ballas, and Shammas. All readings in English. W 2:30–4:20

CPLT 687a^{U}/JDST 849a^{U}/RLST 823a^{U}, Ethnicity, Religion, and Nationality in Modern Jewish Culture Hannan Hever, Eliyahu Stern
This course explores the nature of identity politics in modern Europe, the Middle East, and America through the idea of the Jew. It introduces students to scholarly texts focused on the nature of identity politics as well as short stories, novels, and films addressing the fluidity of identity as it pertain to Jews in the modern period. W 3:30–5:30

CPLT 690a^{U}/JDST 838a^{U}/RLST 762a^{U}, Politics of Modern Hebrew Literature Hannan Hever
An overview of the poetics, culture, history, and political dynamics of modern Hebrew literature over the past 250 years. No background in Jewish literature and Jewish culture is required. All readings in English. T 2:30–4:20

CPLT 699a, Heidegger's *Being and Time* Martin Hägglund
A systematic, chapter-by-chapter study of Heidegger's *Being and Time,* arguably the most important work of philosophy of the twentieth century. All the major themes of the book are addressed in detail, with a particular emphasis on care, time, death, and the meaning of being. T 1:30–3:20

CPLT 728b/FREN 929b, Chance and Constraints in Literature Morgane Cadieu
The course explores experimental prose in the twentieth and twenty-first centuries by focusing on 'pataphysics, surrealism, Oulipo, the Situationists, New Novel, and post-exoticism. Topics include inspiration and creativity; automatic writing and constrained literature; determinism and free will; the aesthetics of randomness; exceptions to the rule; materialism and atomism. Works by Jarry, Duchamp, Breton, Debord, Perec, Queneau, Garréta, Beckett, Calle, Volodine. Theoretical readings by Lucretius, Spinoza, Althusser, Derrida, Serres, Nancy. Conducted in French. TH 1:30–3:20

CPLT 841a[U]/RUSS 776a[U], The Danube River in Literature and Film
Marijeta Bozovic
The Danube is Europe's second longest river: it flows through or borders ten countries, while its watershed covers four more. From ancient Rome to the present, the Danube has served both as a connector and a contested terrain: from its beginnings in the German Black Forest to the Romanian and Ukrainian shores of the Black Sea, the Danube flows through a region that has emerged black and blue from imperial aspirations of domination, hostilities in the wake of the Cold War, and civil war. The southeastern portion of the river constitutes Europe's Other—the "Barbaropa" within the continent's own geographic boundaries—and faces the expansion of another super-political entity in the European Union. This seminar turns to the physical, historical, and metaphoric uses of the great river. At a time of tenuous unification in Europe, "Danube studies" seek to remap the region by focusing on the river's peoples and their cultural imaginaries and interactions from antiquity to the present, exposing the Danube as a quintessential site of cross-cultural engagement. We study the region's geography and history, engage theoretical paradigms for understanding cultural differences and their negotiation, draw on film theory and cultural studies, and examine transnational cinema, artwork and literary texts from various Danubian cultural traditions. Through a focus on works of creative and imaginative culture—primarily, on literature and film—the course foregrounds the aesthetic mediation of actual and possible communities, in search of utopian promise even amidst and in the wake of historical atrocities. TTH 2:30–3:45

CPLT 842b, Imperialist Modernism Katerina Clark
Modernism emerged at the height of the imperialist era, and many of its major names were themselves implicated in imperialism, whether as agents of imperialist powers or through family connections. This course explores the role of imperialism in modernist culture and its relationship to exoticism. The approach is multidisciplinary, and the class looks at literary texts, films, and paintings. Works by Camus, Conrad, Leonard and Virginia Woolf, Gauguin, Victor Segalen, Kafka, T.S. Eliot, E.M. Forster, James Joyce, Pierre Loti, and ethnographic films. TH 1:30–3:20

CPLT 870b/HIST 670b/WGSS 860b, Gender Theories and Their Politics
Moira Fradinger
A historical survey of the intellectual tradition that takes for its object the interrogation and theorization of systems of power whereby inequality is associated with gender, sex, and sexuality. These categories are studied in terms of the politics of location that created them: we read from the corpus written in the context of movements such as classical liberal and radical feminism, anarchism, and socialism; the psychoanalytic international community; or institutional academic settings such as the fields of film studies, women's studies, and gay and lesbian studies. Authors include Sor Juana Inés de la Cruz, Flora Tristán, Emma Goldman, Simone de Beauvoir, Maria Mies, Heidi Hartmann, Audre Lorde, Adrienne Rich, Hortense Spillers, Gayle Rubin, Jacqueline Rose, Juliet Mitchell, Eve K. Sedgwick, Luce Irigaray, Monique Wittig, Teresa de Lauretis, Rosi Braidotti, Luisa Muraro, Adriana Cavarero, Chandra Mohanty, Gloria Anzaldúa, Nira Yuval-Davis, Gayatri Chakravorty Spivak, and Maxine Molyneux. W 7–9

CPLT 899a/FREN 893a, Realism and Naturalism Maurice Samuels
This seminar interrogates the nineteenth-century French Realist and Naturalist novel in light of various efforts to define its practice. How does critical theory constitute Realism as a category? How does Realism articulate the aims of theory? And how do nineteenth-century Realist and Naturalist novels intersect with other discourses besides the literary? In addition to several works by Balzac, novels to be studied include Stendhal's *Le Rouge et le Noir,* Sand's *Indiana,* Flaubert's *Madame Bovary,* and Zola's *Nana*. Some attention also paid to Realist painting. Reading knowledge of French required. T 1:30–3:20

CPLT 900a, Directed Reading

CPLT 900b, Directed Reading

CPLT 901a, Individual Research

CPLT 901b, Individual Research

CPLT 905b[U]/FILM 760b[U]/GMAN 760b[U], Intermediality in Film Brigitte Peucker
Film is a hybrid medium, the meeting point of several others. This course focuses on the relationship of film to theater and painting, suggesting that where two media are in evidence, there is usually a third. Topics include space, motion, color, theatricality, tableau vivant, ekphrasis, spectatorship, and new media. Readings feature art historical and film theoretical texts as well as essays pertinent to specific films. Films by Fassbinder, Bergman, Murnau, von Trier, Rohmer, Godard, Kiarostami, and others, concluding with three films by Peter Greenaway. T 3:30–5:20

CPLT 925b[U], The Practice of Literary Translation Peter Cole
Intensive readings in the history and theory of translation paired with practice in translating. Case studies from ancient languages (the Bible, Greek and Latin classics), medieval languages (classical Arabic literature), and modern languages (poetic texts). T 1–2:50

CPLT 930b/FILM 624b/ITAL 785b/JDST 843b, The Holocaust in Italian Literature and Film Millicent Marcus
Though Italy was among the Nazi-occupied countries with the highest survival rate of its Jewish population, the Holocaust has continued to haunt the Italian literary and cinematic imagination in ways that warrant close critical scrutiny. The aesthetic and moral problem of how to represent this event in art gains special urgency in the Italian context, where a realist tradition dating back to Dante and Giotto joins forces with a postwar neorealist impulse to create a series of compelling literary treatments (Primo Levi's above all), as well as cinematic works. In keeping with the Holocaust's invitation to interdisciplinary study, the course examines the intersection of a number of discourses—historical, literary, cinematic—viewed from a variety of perspectives—feminist, generic, philosophical, theological, and historiographic. Since several of the authors are women, the question of the "voce femminile" and its creation of an alternative, or anti-history, is also raised. W 3:30–5:20, screenings M 7:30

CPLT 949b/AFAM 723b/AMST 645b/WGSS 645b, Caribbean Diasporic Intellectuals
Hazel Carby

This course examines work by writers of Caribbean descent from different regions of the transatlantic world. In response to contemporary interest in issues of globalization, the premise of the course is that in the world maps of these black intellectuals we can see the intertwined and interdependent histories and relations of the Americas, Europe, and Africa. Thinking globally is not a new experience for black peoples, and we need to understand the ways in which what we have come to understand and represent as "Caribbeanness" is a condition of movement. Literature is most frequently taught within the boundaries of a particular nation, but this course focuses on the work of writers who shape the Caribbean identities of their characters as traveling black subjects and refuse to restrain their fiction within the limits of any one national identity. We practice a new and global type of cognitive mapping as we read and explore the meanings of terms like black transnationalism, migrancy, globalization, and empire. Diasporic writing embraces and represents the geopolitical realities of the modern, modernizing, and postmodern worlds in which multiple racialized histories are inscribed on modern bodies. T 2:30–4:20

CPLT 952b[U]/EALL 586b[U], Modern Novel in Japan and Brazil Seth Jacobowitz

Brazilian and Japanese novels from the late nineteenth century to the present. Representative texts from major authors are read in pairs to explore their commonalities and divergences. Topics include nineteenth-century realism and naturalism, the rise of mass culture and the avant-garde, and existentialism and postmodernism. W 1:30–3:30

CPLT 962a[U], Latin American Intellectual Debates of the Nineteenth and Twentieth Centuries Moira Fradinger

This seminar looks at central cultural debates in the region over two centuries, mainly through the literary and political form of the essay. It explores polemics over the idea of America; debates around the Indian question; issues of cultural hybridity, transculturation, negritude; and the discussion of the region's modernity and postmodernity. Authors include de Hostos, Alberdi, Bello, Martí, Sarmiento, Rodó, Ortiz, Vasconcelos, Reyes, González Prada, Mariátegui, Mañach, Cabrera, Zea, Roumain, Césaire, Fanon, Damas, Chamoiseau, Rama, Retamar, Benítez Rojo, Ribeiro, Cornejo Polar, García Canclini, Viñas, and Schwarz.

CPLT 989a/AFAM 851a/FREN 943a, Creole Identities and Fictions
Christopher Miller

Focusing on the French and English Caribbean, the course analyzes the quintessential but ambiguous American condition: that of the "Creole." Encompassing all non-native cultures, this term is inseparable from issues of race and slavery. Readings of historical and literary texts: Moreau de Saint-Méry, Bernardin de Saint-Pierre, Madame de Staël, Charlotte Brontë (and reinventions of *Wuthering Heights* by Jean Rhys and Maryse Condé), the Créolistes of Martinique. Attention to Louisiana and to the Haitian Revolution. Reading knowledge of French required. TH 1:30–3:20

COMPUTATIONAL BIOLOGY AND BIOINFORMATICS

300 George Street, Suite 501, 203.737.6029
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M.S., Ph.D.

Directors of Graduate Studies
Mark Gerstein (Bass 432A, 203.432.6105, mark.gerstein@yale.edu)
Hongyu Zhao (300 George St., Suite 503, 203.785.3613, hongyu.zhao@yale.edu)

Professors James Aspnes (*Computer Science*), Joseph Chang (*Statistics*), Ronald Coifman (*Mathematics; Computer Science*), Xing-Wang Deng (*Molecular, Cellular & Developmental Biology*), Donald Engelman (*Molecular Biophysics & Biochemistry*), Richard Flavell (*Immunobiology*), Alison Galvani (*Public Health*), Mark Gerstein (*Biomedical Informatics; Molecular Biophysics & Biochemistry; Computer Science*), Antonio Giraldez (*Genetics*), Murat Gunel (*Neurosurgery; Genetics*), William Jorgensen (*Chemistry*), Douglas Kankel (*Molecular, Cellular & Developmental Biology*), Kenneth Kidd (*Genetics; Ecology & Evolutionary Biology*), Haifan Lin (*Cell Biology; Genetics*), Elias Lolis (*Pharmacology*), Andrew Miranker (*Molecular Biophysics & Biochemistry*), Anna Pyle (*Molecular Biophysics & Biochemistry*), Lynne Regan (*Molecular Biophysics & Biochemistry; Chemistry*), Gordon Shepherd (*Neuroscience*), Abraham Silberschatz (*Computer Science*), Dieter Söll (*Molecular Biophysics & Biochemistry; Chemistry*), Günter Wagner (*Ecology & Evolutionary Biology*), Heping Zhang (*Public Health; Statistics; on leave* [Sp]), Hongyu Zhao (*Public Health; Genetics*), Steven Zucker (*Computer Science; Electrical Engineering; Biomedical Engineering*)

Associate Professors Kei-Hoi Cheung (*Anesthesiology; Computer Science; Genetics*), Thierry Emonet (*Molecular, Cellular & Developmental Biology*), Steven Kleinstein (*Pathology*), Yuval Kluger (*Pathology*), Michael Krauthammer (*Pathology*), Jun Lu (*Genetics*), Steven Ma (*Public Health*), James Noonan (*Genetics*), Corey O'Hern (*Mechanical Engineering & Materials Science; Physics*), Valerie Reinke (*Genetics*), Jeffrey Townsend (*Public Health*)

Assistant Professors Murat Acar (*Molecular, Cellular & Developmental Biology*), Julien Berro (*Molecular Biophysics & Biochemistry*), Damon Clark (*Molecular, Cellular & Developmental Biology*), Chris Cotsapas (*Neurology*), Forrest Crawford (*Public Health*), Smita Krishnaswamy (*Genetics*), Anita Wang (*Public Health*)

Fields of Study

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

and data mining, algorithm development, and high-performance computing, as well as statistical and mathematical analyses.

Special Admissions Requirements

Applicants are expected (1) to have a strong foundation in the basic sciences, such as biology, chemistry, and mathematics, and (2) to have training in computing/informatics, including significant computer programming experience. The Graduate Record Examination (GRE) General Test is required, and the GRE Subject Test in cell and molecular biology, biology, biochemistry, chemistry, computer science, or other relevant discipline is recommended. Alternatively, the Medical College Admission Test (MCAT) may be substituted for the GRE tests. Applicants for whom English is not their native language are required to submit results from the Test of English as a Foreign Language (TOEFL).

To enter the Ph.D. program, students apply to an interest-based track within the interdepartmental graduate program in Biological and Biomedical Sciences (BBS), http://bbs.yale.edu.

Integrated Graduate Program in Physical and Engineering Biology (PEB)

Students applying to one of the interest-based tracks of the Biological and Biomedical Sciences program may simultaneously apply to be part of the PEB program. See the description under Non-Degree-Granting Programs, Councils, and Research Institutes for course requirements, and http://peb.yale.edu for more information about the benefits of this program and application instructions.

Special Requirements for the Ph.D. Degree

With the help of a faculty advisory committee, each student plans a program that includes courses, seminars, laboratory rotations, and independent reading. Students are expected to gain competence in three core areas: (1) computational biology and bioinformatics, (2) biological sciences, and (3) informatics (including computer science, statistics, and applied mathematics). While the courses taken to satisfy the core areas of competency may vary considerably, all students are required to take the following courses: CB&B 562a, 740a, and 752b. A typical program will include ten courses. Completion of the core curriculum will typically take three to four terms, depending in part on the prior training of the student. With approval of the CB&B director of graduate studies (DGS), students may take one or two undergraduate courses to satisfy areas of minimum expected competency. Students will typically take two to three courses each term and three research rotations (CB&B 711a, 712b, 713b) during the first year. After the first year, students will start working in the laboratory of their Ph.D. thesis supervisor. Students must pass a qualifying examination normally given at the end of the second year or the beginning of the third year. There is no language requirement. Students will serve as teaching assistants in two term courses. In addition to all other requirements, students must successfully complete CB&B 601b, Fundamentals of Research: Responsible Conduct of Research (or another course that covers the material) prior to the end of their first year of

study. In their fourth year of study, all students must successfully complete B&BS 503b, RCR Refresher for Senior BBS Students.

M.D./Ph.D. Students

Students pursuing the joint M.D./Ph.D. degrees must satisfy the course requirements listed above for Ph.D. students. With approval of the DGS, some courses taken toward the M.D. degree can be counted toward the ten required courses. Such courses must have a graduate course number, and the student must register for them as graduate courses (in which grades are received). Laboratory rotations are available but not required. One teaching assistantship is required.

Master's Degree

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

Terminal Master's Degree Program The CB&B terminal master's program has limited availability and is intended primarily for postdoctoral fellows supported by training grants and for students with sponsored funding, e.g., from industry. The curriculum requirements are the same as in the CB&B Ph.D. program, except that there are no requirements for laboratory research rotations, for serving as a teaching assistant, and for a Ph.D. dissertation. Terminal M.S. students will be expected to complete an M.S. project, including a project report. Completion of the terminal M.S. degree will typically take four terms of full-time study. Applicants should contact the CB&B registrar before submitting an M.S. application.

Courses

CB&B 523a/ENAS 541a/MB&B 523a/PHYS 523a, Biological Physics Corey O'Hern
An introduction to the physics of several important biological phenomena including transport in the cell cytoplasm, protein folding, DNA packaging, and thermodynamics of protein binding and aggregation. The material and approach are positioned at the interface of the physical and biological sciences, and involve significant computation. This course teaches the basics of computer programming necessary for quantitative studies of biological systems. We start with the foundations of programming in MATLAB. During the course, students perform sophisticated data analyses, view and analyze protein structures, and perform Monte Carlo and molecular dynamics simulations. No prior programming experience is needed. TTH 1–2:15

CB&B 562b/AMTH 765b/ENAS 561b/INP 562b/MB&B 562b[U]/MCDB 562b[U]/PHYS 562b, Dynamical Systems in Biology Damon Clark, Jonathon Howard
This course covers advanced topics in computational biology. How do cells compute, how do they count and tell time, how do they oscillate and generate spatial patterns? Topics include time-dependent dynamics in regulatory, signal-transduction, and neuronal

networks; fluctuations, growth, and form; mechanics of cell shape and motion; spatially heterogeneous processes; diffusion. This year, the course spends roughly half its time on mechanical systems at the cellular and tissue level, and half on models of neurons and neural systems in computational neuroscience. Prerequisite: MCDB 561a or equivalent, or a 200-level biology course, or permission of the instructor. TTH 2:30–3:45

CB&B 601b/IBIO 601b, Fundamentals of Research: Responsible Conduct of Research Susan Kaech and faculty

A weekly seminar presented by faculty trainers on topics relating to proper conduct of research. Required of first-year CB&B students, first-year Immunobiology students, and training grant-funded postdocs. Pass/Fail. T 5

CB&B 645b/BIS 692b/STAT 645b, Statistical Methods in Genetics and Bioinformatics Hongyu Zhao

Introduction to problems, algorithms, and data analysis approaches in computational biology and bioinformatics; stochastic modeling and statistical methods applied to problems such as mapping disease-associated genes, analyzing gene expression microarray data, sequence alignment, and SNP analysis. Statistical methods include maximum likelihood, EM, Bayesian inference, Markov chain Monte Carlo, and some methods of classification and clustering; models include hidden Markov models, Bayesian networks, and the coalescent. The limitations of current models, and the future opportunities for model building, are critically addressed. Prerequisite: STAT 538a, 542b, or 661a. Prior knowledge of biology is not required, but some interest in the subject and a willingness to carry out calculations using R is assumed. TH 1–2:50

[**CB&B 647b/BIS 645b/GENE 645b, Statistical Methods in Human Genetics**]

CB&B 711a, 712b, 713b, Lab Rotations Hongyu Zhao

Three 2.5–3-month research rotations in faculty laboratories are required during the first year of graduate study. These rotations are arranged by each student with individual faculty members.

CB&B 740a, Clinical and Translational Informatics Richard Shiffman, Michael Krauthammer

The course provides an introduction to clinical and translational informatics. Topics include (1) overview of biomedical informatics, (2) design, function, and evaluation of clinical information systems, (3) clinical decision making and practice guidelines, (4) clinical decision support systems, (5) informatics support of clinical research, (6) privacy and confidentiality of clinical data, (7) standards, (8) issues in defining the clinical phenotype, and (9) topics in translational bioinformatics. Permission of the instructor required.

CB&B 745b/AMTH 745b/CPSC 745b, Advanced Topics in Machine Learning and Data Mining Alexander Cloninger, Smita Krishnaswamy, Guy Wolf

An overview of advances in the past decade in machine learning and automatic data-mining approaches for dealing with the broad scope of modern data-analysis challenges, including deep learning, kernel methods, dictionary learning, and bag of words/features. This year, the focus is on a broad scope of biomedical data-analysis tasks, such as

single-cell RNA sequencing, single-cell signaling and proteomic analysis, health care assessment, and medical diagnosis and treatment recommendations. The seminar is based on student presentations and discussions of recent prominent publications from leading journals and conferences in the field. Prerequisite: basic concepts in data analysis (e.g., CPSC 545 or 563) or permission of the instructor. W 2:30–5:15

CB&B 750b, Topics in Biomedical Informatics and Data Science Cynthia Brandt, Kei-Hoi Cheung

This course focuses on providing an introduction to common unifying themes that serve as the foundation for different areas of biomedical informatics, including clinical, neuro-, and genome informatics. The course is designed for students with significant computer experience and course work who plan to build databases and computational tools for use in biomedical research. Emphasis is on understanding basic principles underlying informatics approaches to interoperation among biomedical databases and software tools, standardized biomedical vocabularies and ontologies, biomedical natural language processing, modeling of biological systems, high-performance computation in biomedicine, and other related topics. TTH 1–2:15

CB&B 752b/CPSC 752b^{U}/MB&B 752b^{U}/MCDB 752b^{U}, Biomedical Data Science: Mining and Modeling Mark Gerstein

Bioinformatics encompasses the analysis of gene sequences, macromolecular structures, and functional genomics data on a large scale. It represents a major practical application for modern techniques in data mining and simulation. Specific topics to be covered include sequence alignment, large-scale processing, next-generation sequencing data, comparative genomics, phylogenetics, biological database design, geometric analysis of protein structure, molecular-dynamics simulation, biological networks, normalization of microarray data, mining of functional genomics data sets, and machine-learning approaches to data integration. Prerequisites: biochemistry and calculus, or permission of the instructor. MW 1–2:15

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

COMPUTER SCIENCE

A. K. Watson Hall, 203.432.1246
http://cpsc.yale.edu
M.S., M.Phil., Ph.D.

Chair
Joan Feigenbaum

Director of Graduate Studies
Vladimir Rokhlin (108 AKW, 203.432.1283, vladimir.rokhlin@yale.edu)

Professors Dana Angluin, James Aspnes, Dirk Bergemann,* Ronald Coifman,* Julie Dorsey, Stanley Eisenstat, Joan Feigenbaum, Michael Fischer, David Gelernter, Mark Gerstein,* Drew McDermott, Vladimir Rokhlin,† Holly Rushmeier, Brian Scassellati, Martin Schultz (*Emeritus*), Zhong Shao, Avi Silberschatz, Daniel Spielman, Leandros Tassiulas,* Y. Richard Yang, Steven Zucker†

Associate Professors Daniel Abadi, Mahesh Balakrishnan

Assistant Professors Wenjun Hu,* Amin Karbasi,* Smita Krishnaswamy,* Sahand Negahban,* Ruzica Piskac, Mariana Raykova, Frederick Shic,* Jakub Szefer*

Senior Lecturer Stephen Slade

Lecturers Jason Hirschhorn, Kyle Jensen,* Eric Koskinen, Scott Petersen, Patrick Rebeschini [F], Brad Rosen, Andrew Sherman, Xiyin Tang [Sp]

*A secondary appointment with primary affiliation in another department or school.
†A joint appointment with another department.

Fields of Study

Algorithms and computational complexity, artificial intelligence, data networking, databases, graphics, machine learning, programming languages, robotics, scientific computing, security and privacy, systems.

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 Dell dual-processor PCs (running Linux or Windows/XP). Laboratory contains specialized equipment for graphics, 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 ten courses (including CPSC 690 and CPSC 691) with at least two grades of Honors, the remainder at least High Pass, including three advanced courses in an area of specialization; (2) take six advanced courses in areas of general computer science; (3) successfully complete a research project in CPSC 690, 691, and submit a written report on it to the faculty; (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 at a TF level 10; and (7) submit a written dissertation prospectus, with a tentative title for the dissertation. To satisfy the distribution requirement (requirement 2 above), the student must take one course in programming languages or systems, one programming-intensive course, two theory courses, and two in application areas. 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. In addition to all other requirements, students must successfully complete CPSC 991, Ethical Conduct of Research, prior to the end of their first year of study. This requirement must be met prior to registering for a second year of study.

Master's Degrees

M.Phil. See Degree Requirements under Policies and Regulations.

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.

Terminal 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 510a[U]/LAW 20022, The Law and Technology of Cyber Conflict
Joan Feigenbaum, Oona Hathaway, Scott Shapiro
A cross-disciplinary seminar that addresses both technical and legal aspects of cyber conflict. Traditionally, cyber-security research and policy have proceeded on the (sometimes tacit) assumption that attackers are motivated by profit, protest, challenge, enjoyment, or the desire to evaluate security weaknesses and assist in removing them. Recent events, including the hacks of Sony and the U.S. Office of Personnel Management, illustrate the need for new thinking about the particular issues raised when cyber attacks originate from state or quasi-state actors. The instructors lead an in-depth exploration of cyber conflict from both legal and technical points of view. Total enrollment is expected to be twenty students, ten from Yale Law School and ten from Yale College or the Graduate School. This is the first half of a yearlong course; the second half is CPSC 511b. Students are required to make a yearlong (two-term) commitment. W 9:25–11:15

CPSC 511b[U]/LAW 21022, The Law and Technology of Cyber Conflict: Practicum
Joan Feigenbaum, Oona Hathaway, Scott Shapiro
A cross-disciplinary "practicum" that addresses both technical and legal aspects of cyber conflict. Traditionally, cyber-security research and policy have proceeded on the (sometimes tacit) assumption that attackers are motivated by profit, protest, challenge, enjoyment, or the desire to evaluate security weaknesses and assist in removing them. Recent events, including the hacks of Sony and the U.S. Office of Personnel Management, illustrate the need for new thinking about the particular issues raised when cyber attacks originate from state or quasi-state actors. The instructors oversee intensive student projects on both legal and technical aspects of cyber conflict. This is the second half of a yearlong course; the first half is CPSC 510a. Students are required to make a yearlong (two-term) commitment. W 9:25–11:15

CPSC 512a[U]/ECON 562a[U], Designing the Digital Economy Glen Weyl
Information technology is transforming how almost every market works: finance has been transformed by algorithmic trading and bitcoin, ridesharing is changing the nature of public transportation, Amazon is revolutionizing logistics, and Airbnb is now the most valuable accommodation provider in the world. This transformation, which has been led by start-ups and newly dominant technology companies, inherently combines technical and economic aspects, as entrepreneurs take advantage of the potential of technology to facilitate exchanges that were previously infeasible. This crash course in the key tools from economics and computer science that are being used to design digital markets exposes students to a range of concrete and topical practical problems in the area. M 2:30–5:30

CPSC 521b[U], Compilers and Interpreters Zhong Shao
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. TTH 1–2:15

CPSC 522a[U], Operating Systems Zhong Shao
The design and implementation of operating systems. Topics include synchronization, deadlocks, process management, storage management, file systems, security, protection, and networking. TTH 1–2:15

CPSC 523b[U], Principles of Operating Systems Avi Silberschatz
A survey of the underlying principles of modern operating systems. Topics include process management, memory management, storage management, protection and security, distributed systems, and virtual machines. Emphasis on fundamental concepts rather than implementation. TTH 9–10:15

CPSC 524b[U], Parallel Programming Techniques Andrew Sherman
Practical introduction to parallel programming, emphasizing techniques and algorithms suitable for scientific and engineering computations. Aspects of processor and machine architecture. Techniques such as multithreading, message passing, and data parallel computing using graphics processing units. Performance measurement, tuning, and debugging of parallel programs. Parallel file systems and I/O. MW 9–10:15

CPSC 526a[U], Building Decentralized Systems Mahesh Balakrishnan
Challenges and techniques for building decentralized computing systems, in which many networked computers need to cooperate reliably despite failures and without assuming centralized management. Topics include decentralized storage systems, mobile and remote execution, hosting untrusted code, fault tolerance, naming, capabilities, information flow control, distributed shared memory, distributed hash tables, content distribution, and practical uses of cryptography. MW 1–2:15

CPSC 527a[U], Object-Oriented Programming Michael Fischer
Object-oriented programming as a means to efficient, reliable, modular, reusable code. Use of classes, derivation, templates, name-hiding, exceptions, polymorphic functions, and other features of C++. MW 4–5:15

[**CPSC 528a[U], Language-Based Security**]

[**CPSC 530a[U], Formal Semantics**]

CPSC 531a[U], Computer Music: Algorithmic and Heuristic Composition Scott Petersen
Study of the theoretical and practical fundamentals of computer-generated music. Music and sound representations, acoustics and sound synthesis, scales and tuning systems, algorithmic and heuristic composition, and programming languages for computer music. Theoretical concepts are supplemented with pragmatic issues expressed in a high-level programming language. TTH 11:35–12:50

CPSC 532b[U], Computer Music: Sound Representation and Synthesis Scott Petersen
Study of the theoretical and practical fundamentals of computer-generated music, with a focus on low-level sound representation, acoustics and sound synthesis, scales and tuning systems, and programming languages for computer music generation. Theoretical concepts are supplemented with pragmatic issues expressed in a high-level programming language. Prerequisite: ability to read music. WF 11:35–12:50

[CPSC 533b[U], Computer Networks]

[CPSC 535b[U], Internet-Scale Applications]

[CPSC 536a[U]/ENAS 960a[U], Networked Embedded Systems and Sensor Networks]

CPSC 537a[U], Introduction to Databases Avi Silberschatz
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. TTH 9–10:15

[CPSC 538b[U], Database System Implementation and Architectures]

[CPSC 539b[U], Software Engineering]

CPSC 540b[U], Numerical Computation Vladimir Rokhlin
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. TTH 2:30–3:45

CPSC 545a[U], Introduction to Data Mining Guy Wolf
A study of algorithms and systems that allow computers to find patterns and regularities in databases, to perform prediction and forecasting, and to improve their performance generally through interaction with data. TTH 1–2:15

CPSC 551b[U], The User Interface David Gelernter
The user interface (UI) in the context of modern design, where tech has been a strong and consistent influence from the Bauhaus and U.S. industrial design of the 1920s and 1930s through the IBM-Eames design project of the 1950s to 1970s. The UI in the context of the windows-menus-mouse desktop, as developed by Alan Kay and Xerox in the 1970s and refined by Apple in the early 1980s. Students develop a detailed design and simple implementation for a UI. TTH 11:35–12:50

CPSC 553a[U]/GENE 555a, Computational Methods for the Analysis and Modeling of Biological Data Smita Krishnaswamy
This course introduces biology as a systems and data science through open computational problems in biology, the types of high-throughput data that are being produced by modern biological technologies, and computational approaches that may be used to tackle such problems. We cover applications of machine-learning methods in the analysis of high-throughput biological data, especially focusing on genomic and proteomic data, including denoising data; nonlinear dimensionality reduction for visualization and progression analysis; unsupervised clustering; and information theoretic analysis of gene regulatory and signaling networks. Students' grades are based on programming assignments, a midterm, a paper presentation, and a final project. Prerequisite: GENE 760 or permission of the instructor. TTH 9–10:15

[CPSC 554a[U], Software Analysis and Verification]

[CPSC 555a[U]/ECON 563a, Economics and Computation]

[CPSC 557b[U], Sensitive Information in a Wired World]

CPSC 558a[U], Automated Decision Systems Stephen Slade
People make dozens of decisions every day in their personal and professional lives. What would it mean for you to trust a computer to make those decisions for you? It is likely that many of those decisions are already informed, mediated, or even made by computer systems. Explicit examples include dating sites like match.com or recommendation systems such as Amazon or Netflix. Most Internet ads on sites like Google or Facebook are run by real-time-bidding (RTB) systems that conduct split-second auctions in the hopes of getting your attention. Driverless cars offer the promise of safer highways. Corporations and other enterprises invest in decision support systems to improve the quality of their products and services. This course considers the spectrum of automated decision models and tools, examining their costs and effectiveness. Examples come from a variety of fields including finance, risk management, credit-card fraud, robotics, medicine, and politics. MW 4–5:15

[CPSC 562a[U]/AMTH 562a[U], Graphs and Networks]

[CPSC 565a[U], Theory of Distributed Systems]

CPSC 567a[U], Cryptography and Computer Security Mariana Raykova
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. Focus on technology, with consideration of 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. TTH 2:30–3:45

CPSC 568b[U], Computational Complexity James Aspnes
Introduction to the theory of computational complexity. Basic complexity classes, including polynomial time, nondeterministic polynomial time, probabilistic polynomial time, polynomial space, logarithmic space, and nondeterministic logarithmic space. The roles of reductions, completeness, randomness, and interaction in the formal study of computation. MW 1–2:15

CPSC 569a[U], Randomized Algorithms James Aspnes
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. MW 11:35–12:50

CPSC 570a[U], Artificial Intelligence Drew McDermott
Introduction to artificial intelligence research, focusing on reasoning and perception. Topics include knowledge representation, predicate calculus, temporal reasoning, vision, robotics, planning, and learning. MWF 9:25–10:15

[CPSC 571a[U], Topics in Artificial Intelligence]

CPSC 572a[U], Intelligent Robotics Brian Scassellati
Introduction to the construction of intelligent, autonomous systems. Sensory-motor coordination and task-based perception. Implementation techniques for behavior selection and arbitration, including behavior-based design, evolutionary design, dynamical systems, and hybrid deliberative-reactive systems. Situated learning and adaptive behavior. MWF 10:30–11:20

CPSC 573b[U], Intelligent Robotics Laboratory Brian Scassellati
Students work in small teams to construct novel research projects using one of a variety of robot architectures. Project topics may include human-robot interaction, adaptive intelligent behavior, active perception, humanoid robotics, and socially assistive robotics. MWF 10:30–11:20

CPSC 575a[U]/ENAS 575a[U], Computational Vision and Biological Perception Steven Zucker
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. MW 2:30–3:45

[CPSC 576b[U]/AMTH 667b/ENAS 576b[U], Advanced Computational Vision]

CPSC 578b[U], Computer Graphics Holly Rushmeier
Introduction to the basic concepts of two- and three-dimensional computer graphics. Topics include affine and projective transformations, clipping and windowing, visual perception, scene modeling and animation, algorithms for visible surface determination, reflection models, illumination algorithms, and color theory. MW 9–10:15

[CPSC 579b[U], Advanced Topics in Computer Graphics]

CPSC 625b, Advanced Cloud Computing Systems Mahesh Balakrishnan
This course focuses on the fundamental systems research that powers modern cloud computing. We cover the production systems that run within data centers operated by large cloud companies such as Google, Microsoft, and Amazon, as well as the groundbreaking academic research that paved the way for these systems. Technically, we focus on the abstractions and mechanisms required to build online services that are scalable, highly available, durable, and consistent. We cover the entire stack, ranging from single-machine systems to protocols for distributing and replicating data within and across data centers. MW 1–2:15

CPSC 638a, Database Architectures Daniel Abadi
This course focuses on modern database architectures. Although the traditional database architecture (centralized, relational, disk-resident, ACID) has been very successful and continues to be in widespread use, new applications and technologies have led to a wide variety of nontraditional architectures in commercial and open-source projects as well as academia. This course examines why these new architectures have developed and explores aspects of their novel features. W 2:30–5:15

CPSC 639b, Cloud-Scale Software Engineering Eric Koskinen
This course teaches students engineering methodology, design, and implementation skills that are needed for developing software systems that may span a range of scales, from desktop/mobile applications to Cloud-level distributed systems. The course begins by covering software engineering foundations including the software lifecycle, software engineering models such as extreme programming and agile development, design patterns, modularity/reusability, version control, multi-threaded design, sockets, and file 1/o. The latter portion of the course extends these foundations by focusing on software scalability and reliability. To this end, we examine distributed Cloud platforms and cover Cloud-specific concepts such as MapReduce, key-value stores, and log-based platforms. F 1–3:45

[**CPSC 662a/AMTH 561a, Spectral Graph Theory**]

CPSC 667b, Advanced Cryptography and Security Mariana Raykova
Recent developments in cryptography. Topics include secure multiparty computation, verifiable computation, cryptographic obfuscation, functional encryption, and more. We study the motivation for, applications of, and security requirements for each of these primitives. We then focus on a few different constructions that instantiate each primitive and the formal proofs of security for them. Another point of consideration is the efficiency properties for the constructions, both asymptotically and in concrete practical terms when implementations are available. TTH 2:30–3:45

[**CPSC 671a, Advanced Artificial Intelligence**]

[**CPSC 679b, Computational Issues in 3-D Design and Fabrication**]

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 721b, Advanced Programming Language Topics**]

CPSC 745b/AMTH 745b/CB&B 745b, Advanced Topics in Machine Learning and Data Mining Alexander Cloninger, Smita Krishnaswamy, Guy Wolf
An overview of advances in the past decade in machine learning and automatic data-mining approaches for dealing with the broad scope of modern data-analysis challenges, including deep learning, kernel methods, dictionary learning, and bag of words/features. This year, the focus is on a broad scope of biomedical data-analysis tasks, such as single-cell RNA sequencing, single-cell signaling and proteomic analysis, health care assessment, and medical diagnosis and treatment recommendations. The seminar is based on student presentations and discussions of recent prominent publications from leading journals and conferences in the field. Prerequisite: basic concepts in data analysis (e.g., CPSC 545 or 563) or permission of the instructor. W 2:30–5:15

CPSC 752b[U]/CB&B 752b/MB&B 752b[U]/MCDB 752b[U], Biomedical Data Science: Mining and Modeling Mark Gerstein

Bioinformatics encompasses the analysis of gene sequences, macromolecular structures, and functional genomics data on a large scale. It represents a major practical application for modern techniques in data mining and simulation. Specific topics to be covered include sequence alignment, large-scale processing, next-generation sequencing data, comparative genomics, phylogenetics, biological database design, geometric analysis of protein structure, molecular-dynamics simulation, biological networks, normalization of microarray data, mining of functional genomics data sets, and machine-learning approaches to data integration. Prerequisites: biochemistry and calculus, or permission of the instructor. MW 1–2:15

CPSC 800a or b, Directed Readings

By arrangement with faculty.

CPSC 990a, Ethical Conduct of Research for Master's Students Holly Rushmeier

CPSC 991a/MATH 991a, Ethical Conduct of Research Vladimir Rokhlin

EAST ASIAN LANGUAGES AND LITERATURES

308 Hall of Graduate Studies, 203.432.2860
http://eall.yale.edu
M.A., M.Phil., Ph.D.

Chair
Tina Lu

Director of Graduate Studies
Aaron Gerow

Professors Kang-i Sun Chang, Aaron Gerow, Edward Kamens, Tina Lu, Jing Tsu

Assistant Professors Lucas Bender, Michael Hunter, Seth Jacobowitz

Senior Lecturer Pauline Lin

Senior Lectors Hsiu-hsien Chan, Min Chen, Seungja Choi, Koichi Hiroe, Angela Lee-Smith, Rongzhen Li, Ninghui Liang, Fan Liu, Yoshiko Maruyama, Michiaki Murata, Hiroyo Nishimura, Masahiko Seto, Jianhua Shen, Mari Stever, Wei Su, Haiwen Wang, Yu-lin Wang Saussy, Peisong Xu, Yongtao Zhang, William Zhou

Lectors Aoi Saito, Chuanmei Sun

Fields of Study

Fields for doctoral study are Chinese literature and Japanese literature. (See also the Combined Ph.D. Program in Film and Media Studies.) Although the primary emphasis is on these East Asian subjects, the department welcomes applicants who are seeking to integrate their interests in Chinese or Japanese literature with interdisciplinary studies in such fields as history, history of art, linguistics, religious studies, comparative literature, film and media studies, theater studies, literary theory and criticism, and the social sciences.

Special Admissions Requirements

The department requires entering students in Chinese or Japanese (and the Combined Program in Film and Media Studies) 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 terminal 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. Usually students complete twelve term courses in the first and second years, and then take two tutorials or two seminars in the third year. Students concentrating in Chinese or Japanese literature are encouraged to take at least one term course in Western literature or literary theory. By the end of the second year, all students must prove their

proficiency in a language other than their primary language of study that is relevant to their course of study and is approved by the director of graduate studies (DGS). By the end of the third year, students specializing in premodern Japanese literature must pass a reading test in literary Chinese. At the end of the second full academic year, the student must take a written examination in the language of his or her specialization, including both its modern and premodern forms.

At the end of each academic year, until a student is admitted to candidacy, a faculty committee will review the student's progress. For the second-year review, the student must submit a revised seminar research paper, on a topic selected in consultation with the adviser, no later than April 1 of the fourth term. No later than the end of the sixth term the student will take the qualifying oral examination. The exam will cover three fields distinguished by period and/or genre in one or more East Asian national literatures or in other fields closely related to the student's developing specialization. These fields and accompanying reading lists will be selected in consultation with the examiners and the director of graduate studies in order to allow the student to demonstrate knowledge and command of a range of topics. After having successfully passed the qualifying oral examination, students will be required to submit a dissertation prospectus to the department for approval by October 1 of the seventh term in order to complete the process of admission to candidacy for the Ph.D.

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

Combined Ph.D. Program

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

Master's Degrees

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

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

Additional program materials are available at the department Web site, http://eall.yale.edu.

Courses

Courses in Chinese, Japanese, and Korean languages at the elementary, intermediate, and advanced levels are listed in *Yale College Programs of Study*.

CHNS 570a[U], Introduction to Literary Chinese I Michael Hunter
Reading and interpretation of texts in various styles of literary Chinese (*wenyan*), with attention to basic problems of syntax and literary style. Prerequisite: CHNS 151b or 153b or equivalent. TTH 9–10:15

CHNS 571b[U], Introduction to Literary Chinese II Pauline Lin
Continuation of CHNS 570a. Reading and interpretation of texts in various styles of literary Chinese (*wenyan*), with attention to basic problems of syntax and literary style. Prerequisite: CHNS 570a or equivalent. MW 11:35–12:50

EALL 503b[U], *The Tale of Genji* Edward Kamens
A reading of the central work of prose fiction in the Japanese classical tradition in its entirety (in English translation) along with some examples of predecessors, parodies, and adaptations (the latter include Noh plays and twentieth-century short stories). Topics of discussion include narrative form, poetics, gendered authorship and readership, and the processes and premises that have given *The Tale of Genji* its place in world literature. Attention is also given to the text's special relationship to visual culture. TTH 9–10:15

EALL 510b[U], Man and Nature in Chinese Literature Kang-i Sun Chang
An exploration of man and nature in traditional Chinese literature, with special attention to aesthetic and cultural meanings. Topics include the concept of nature and literature; Neo-Daoist self-cultivation; poetry and Zen (Chan) Buddhism; travel in literature; loss, lament, and self-reflection in song lyrics; nature and the supernatural in classical tales; love and allusions to nature; religious pilgrimage and allegory. All readings in translation; no knowledge of Chinese required. Some Chinese texts provided for students who read Chinese. TTH 1–2:15

EALL 511a[U], Women and Literature in Traditional China Kang-i Sun Chang
This course focuses on major women writers in traditional China, as well as representations of women by male authors. Topics include the power of women's writing; women and material culture; women in exile; courtesans; Taoist and Buddhist nuns; widow poets; the cross-dressing women; the female body and its metaphors; foot binding and its implications; women's notion of love and death; the aesthetic of illness; women and revolution; women's poetry clubs; the function of memory in women's literature; problems of gender and genre. All readings in translation; no knowledge of Chinese required. Some Chinese texts provided for students who read Chinese. TTH 1–2:15

EALL 555b[U], Japanese Modernism Seth Jacobowitz
Japanese literature and art from the 1920s through the 1940s. The avant-garde and mass culture; popular genre fiction; the advent of new media technologies and techniques; effects of Japanese imperialism, militarism, and fascism on cultural production; experimental writers and artists and their resistance to, or complicity with, the state. TTH 11:35–12:50

EALL 581b[U]/FILM 873b[U], Japanese Cinema and Its Others Aaron Gerow
A critical inquiry into the myth of a homogeneous Japan through analyzing how Japanese film and media historically represent "others" of different races, ethnicities, nationalities, genders, and sexualities, including blacks, ethnic Koreans, Okinawans, Ainu,

undocumented immigrants, LGBT minorities, the disabled, youth, and "monstrous" others like ghosts. TTH 11:35–12:50, screenings W 6:30

EALL 586b[U]/CPLT 952b[U], Modern Novel in Japan and Brazil Seth Jacobowitz
Brazilian and Japanese novels from the late nineteenth century to the present. Representative texts from major authors are read in pairs to explore their commonalities and divergences. Topics include nineteenth-century realism and naturalism, the rise of mass culture and the avant-garde, and existentialism and postmodernism. W 1:30–3:20

EALL 602b[U], Readings in Classical Chinese Prose Kang-i Sun Chang
Close reading of classical prose, critical texts, etc. Topics include literature, politics, textual transmission, reception, and premodern Chinese culture. Because readings vary from year to year, this course may be repeated for credit. Readings in Chinese; discussion in English. W 1:30–3:20

EALL 603a[U], Readings in Classical Chinese Poetry Kang-i Sun Chang
A seminar on classical Chinese poetry and poetics. Topics include poetry and cultural history, intertextuality, poetics of lyricism, etc. Because readings vary from year to year, this course may be repeated for credit. Readings in Chinese, discussion in English. W 1:30–3:20

EALL 608b[U], Sages of the Ancient World Michael Hunter
Comparative survey of the embodiment and performance of wisdom by ancient sages. Distinctive features and common themes in discourses about wisdom from China, India, the Near East, Egypt, Greece, and Rome. Topics include teaching, scheming, and dying. TTH 11:35–12:50

EALL 651a[U],b[U], Advanced Readings: Modern Chinese Literature Jing Tsu
A rigorous introduction to literary criticism and analysis using texts in the original language. Focus on the contemporary period, drawing from fiction written in Chinese in different parts of the world, from mainland China to Taiwan and from Malaysia to Hong Kong. Texts in both simplified and traditional characters. W 2:30–4:30

EALL 657a[U], Meiji Literature and Visual Culture Seth Jacobowitz
Introduction to the literature and visual culture of Meiji Japan (1868–1912), including novels, poetry, calligraphy, woodblock prints, painting, photography, and cinema. The relationship between theories and practices of fine art and literature; changes in word and image relations; transformations from woodblock to movable-type print culture; the invention of photography and early forms of cinematic practice. TTH 11:35–12:50

EALL 720b, Studies in Premodern Japanese Literature Edward Kamens
A research seminar. Students pursue individual topics in pre-seventeenth-century literature and share readings and analyses for discussion on a rotating basis. Prerequisite: proficiency in reading literary Japanese. W 4–6

EALL 759a, Studies in the Man'yōshū Edward Kamens
Close study of the anthology and consultation in a variety of commentaries and critiques. Students carry out research projects on topics of their choice. Prerequisite: at least one year or the equivalent of study of literary Japanese. W 4–6

EALL 761a, Topics in Early Chinese Thought Michael Hunter
An examination of certain key problems in the study of early Chinese thought. Topics vary from year to year but in general include intellectual typologies and affiliations, relating received texts and excavated manuscripts, the role of Han editors in shaping pre-Han textual traditions, ruling ideology, and comparisons with other parts of the ancient world. Discussions and papers are in English. Because readings are different each year, this course may be repeated for credit. W 2:30–4:20

EALL 802a, Brazil in the Japanese Imperial Imagination Seth Jacobowitz
This seminar examines Japanese immigrant literature in Brazil in the broader context of Japanese imperialism and expansionism. Primary sources are read in Japanese with secondary scholarship in Japanese and English. T 2:30–4:20

EALL 846a/CPLT 546a, Philology and Sinology Jing Tsu
In this course we examine the history and theoretical foundations of non-Western philology in relation to Western philology and linguistics. We study how they interacted and the development of comparative methods based on notions of sameness and difference. T 1:30–3:20

EALL 871b/EAST 593b/HIST 893b, History of China's Republican Period
Denise Ho
This reading seminar examines recent English-language scholarship on China's Republican period (1912–1949) covering themes from state and economy to society and culture. Weekly topics include state institutions and law, nationalism, politics and political movements, the development of cities, media and publication, public health, education, labor, and rural reconstruction. W 3:30–5:20

EALL 872a/FILM 880a, Theories of Popular Culture in Japan: Television
Aaron Gerow
Exploration of postwar theories of popular culture and subculture in Japan, particularly focusing on the intellectual debates over television and new media. M 1:30–3:20, screenings HTBA

EALL 900, Directed Readings
Offered by permission of instructor and DGS to meet special needs not met by regular courses.

EALL 990, Directed Research
Offered as needed with permission of instructor and DGS for student preparation of dissertation prospectus.

JAPN 570a[U], Introduction to Literary Japanese Edward Kamens
Introduction to the grammar and style of the premodern literary language (*bungotai*) through a variety of texts. Prerequisite: JAPN 151 or equivalent. MWF 9:25–10:15

JAPN 571b[U], Readings in Literary Japanese Angelika Koch
Close analytical reading of a selection of texts from the Nara through Tokugawa period: prose, poetry, and various genres. Introduction of *kanbun*. Prerequisite: JAPN 570a or equivalent.

EAST ASIAN STUDIES

The MacMillan Center
320 Luce Hall, 203.432.3426
http://ceas.yale.edu
M.A.

Chair
Jing Tsu (jing.tsu@yale.edu)

Director of Graduate Studies
Peter Perdue [F] (RKZ 242, 617.905.3702, peter.c.perdue@yale.edu)
Valerie Hansen [Sp] (RKZ 342, 203.432.0480, valerie.hansen.yale.edu)

Professors Daniel Botsman (*History*), Kang-i Sun Chang (*East Asian Languages & Literatures*), Deborah Davis (*Sociology*), Fabian Drixler (*History*), Aaron Gerow (*East Asian Languages & Literatures; Film & Media Studies*), Valerie Hansen (*History; on leave* [F]), Edward Kamens (*East Asian Languages & Literatures*), William Kelly (*Anthropology; on leave* [Sp]), Tina Lu (*East Asian Languages & Literatures*), Peter Perdue (*History; on leave* [Sp]), Frances Rosenbluth (*Political Science*), Helen Siu (*Anthropology*), William Summers (*Therapeutic Radiology; History of Science & Medicine*), Jing Tsu (*East Asian Languages & Literatures; Comparative Literature*), Anne Underhill (*Anthropology*), Mimi Hall Yiengpruksawan (*History of Art*)

Associate Professors William Honeychurch (*Anthropology; on leave* [F]), Andrew Quintman (*Religious Studies*), Chloë Starr (*Divinity*)

Assistant Professors Lucas Bender (*East Asian Languages & Literatures*), Eric Greene (*Religious Studies; on leave* [Sp]), Denise Ho (*History*), Michael Hunter (*East Asian Languages & Literatures*), Seth Jacobowitz (*East Asian Languages & Literatures*), Youn-mi Kim (*History of Art*), Eric Weese (*Economics*)

Senior Lecturers Annping Chin (*History*), Pauline Lin (*East Asian Languages & Literatures*)

Lecturers Marc Opper, Cindi Textor, Klaus Yamamoto-Hammering, Soo Ryon Yoon

Senior Lector II Seungja Choi

Senior Lectors Hsiu-hsien Chan, Min Chen, Koichi Hiroe, Angela Lee-Smith, Rongzhen Li, Ninghui Liang, Fan Liu, Yoshiko Maruyama, Michiaki Murata, Hiroyo Nishimura, Masahiko Seto, Jianhua Shen, Mari Stever, Wei Su, Haiwen Wang, Yu-lin Wang Saussy, Peisong Xu, Yongtao Zhang, William Zhou

Lectors Aoi Saito, Chuanmei Sun

Fields of Study

The Master of Arts (M.A.) program in East Asian Studies is a multidisciplinary program offering a concentrated course of study designed to provide a broad understanding of the people, history, culture, contemporary society, politics, and economy of China, Japan, or

a transnational region within East Asia. This program is designed for students preparing to go on to the doctorate in one of the disciplines of East Asian Studies (e.g., anthropology; economics; history; history of art; language and literature, including comparative literature, film studies, and theater studies; political science; sociology; etc.), 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 East Asian Studies graduate program is designed to be completed in either a one-year or a two-year track. The two-year track requires the preparation of a master's thesis and is therefore ideal for students who are keen to pursue focused, independent research under the guidance of a faculty member. It also provides students with an opportunity to pursue additional disciplinary and language training. Students who enter the two-year track with a strong command of one East Asian language will be encouraged to consider beginning a second (or third) language.

In general, students focus their course work on the study of China, Japan, or transnational East Asia. Some students may prefer to focus their course work on one or two disciplines, in addition to language study and courses focused on East Asia. Others may create a highly interdisciplinary program, taking courses in traditional disciplines such as history, literature, political science, art history, or anthropology, as well as in Yale's professional schools.

Applicants to the East Asian Studies graduate program must indicate on their application whether they are applying to the one-year or the two-year track.

Requirements for the M.A. Degree: One-Year Track

The program of study for completion of the degree on the one-year track consists of eight term courses that must include two terms of language study at or above Yale's third-year level (unless the language requirement has already been met through previous study or native fluency), plus six other courses selected from the University's offerings of advanced language study and seminars related to East Asia at the graduate level. For those who meet the language requirement at matriculation, two of the required eight courses may be advanced training in a particular discipline (e.g., economics, history, political theory, statistics, etc.) with no explicit focus on East Asia, but related to the student's professional goals. The course of study must be approved by the director of graduate studies (DGS).

SPECIAL REQUIREMENTS

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

Requirements for the M.A. Degree: Two-Year Track

The program of study for completion of the degree on the two-year track consists of sixteen term courses that must include four terms of language study, two terms of which must be at Yale's fourth-year level (unless the language requirement has already been met

through previous study or native fluency), plus twelve other courses selected from the University's offerings of advanced language study and seminars related to East Asia at the graduate level. Students who have achieved advanced proficiency in one East Asian language are strongly encouraged to pursue study of a second East Asian language, but for those who have met the language requirement in one language at matriculation, two of the required sixteen courses may be advanced training in a particular discipline (e.g., economics, history, political theory, statistics, etc.) with no explicit focus on East Asia, but related to the student's professional goals. The course of study must be approved by the director of graduate studies (DGS).

SPECIAL REQUIREMENTS

Students must earn four Honors grades ("H") over the course of their four terms at Yale. Honors grades earned in any language course cannot be counted toward satisfying this requirement, except with the permission of the DGS. A master's thesis is also required.

MASTER'S THESIS

A master's thesis is required of students enrolled in the two-year degree program. The master's thesis is based on research in a topic approved by the DGS and advised by a faculty member with specialized competence in the chosen topic. M.A. students must register for EAST 900, which may count toward the sixteen required courses. EAST 900 may not be taken for audit. Students may register for an additional independent study to prepare topics and begin research. The master's thesis must be prepared according to CEAS guidelines and is due in two copies in the student's second year on an early-April date as specified by CEAS.

Joint-Degree Programs

The Council on East Asian Studies (CEAS) collaborates with three of Yale's professional schools—Forestry & Environmental Studies, Law, and Public Health—and has developed joint-degree programs that offer a strong connection between two demanding courses of study while also fulfilling the requirements of each separate school. Only students enrolled in the two-year track of the East Asian Studies M.A. degree program are eligible for a joint degree.

Each joint program leads to the simultaneous award of two graduate professional degrees: the M.A. in East Asian Studies from the Graduate School of Arts and Sciences, and an M.F., M.E.M., M.E.Sc., M.F.S., J.D., or M.P.H. from the relevant professional school. Students can earn the two degrees simultaneously in less time than if they were pursued sequentially.

With the exception of the joint M.A./J.D. program, which requires four years, completion of all requirements takes three years. Typically candidates spend the first year in one program and the second year in the partner program. During the third and final year of study, students register in one program each term. Joint-degree students are guided in this process by a committee composed of the DGS and a faculty member of the relevant professional school.

Candidates must submit formal applications to both the Graduate School and the relevant professional school and be admitted separately to each school, i.e., each school

makes its decision independently. It is highly recommended that students apply to and enter a joint-degree program from the outset, although it is possible to apply to the second program once matriculated at Yale.

Program materials are available upon request to the Council on East Asian Studies, Yale University, PO Box 208206, New Haven CT 06520-8206; e-mail, eastasian.studies@yale.edu; Web site, http://ceas.yale.edu. Applications are available online at http://gsas.yale.edu/admission-graduate-school; e-mail, graduate.admissions@yale.edu.

Courses

Please consult the course information available online at http://ceas.yale.edu/academics/courses and http://students.yale.edu/oci for a complete list of East Asian-related courses offered at Yale University.

EAST 593b/EALL 871b/HIST 893b, History of China's Republican Period
Denise Ho
This reading seminar examines recent English-language scholarship on China's Republican period (1912–1949) covering themes from state and economy to society and culture. Weekly topics include state institutions and law, nationalism, politics and political movements, the development of cities, media and publication, public health, education, labor, and rural reconstruction. W 3:30–5:20

EAST 900b, Master's Thesis
Directed reading and research on a topic approved by the DGS 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.

EAST 910a, Independent Study
By arrangement with faculty and with approval of the DGS.

ECOLOGY AND EVOLUTIONARY BIOLOGY

Osborn Memorial Laboratories, 203.432.3837
http://eeb.yale.edu
M.S., Ph.D.

Chair
Paul Turner

Director of Graduate Studies
David Vasseur

Professors Richard Bribiescas (*Anthropology*), Nicholas Christakis (*Sociology*), Michael Donoghue, Alison Galvani (*Public Health*), Vivian Irish (*Molecular, Cellular & Developmental Biology*), David Post, Jeffrey Powell, Richard Prum, Eric Sargis (*Anthropology*), Oswald Schmitz (*Forestry & Environmental Studies*), David Skelly (*Forestry & Environmental Studies*), Stephen Stearns, Paul Turner, J. Rimas Vaisnys (*Electrical Engineering*), Günter Wagner

Associate Professors Walter Jetz, Thomas Near, James Noonan (*Genetics*), Jeffrey Townsend (*Public Health*), David Vasseur

Assistant Professors Liza Comita (*Forestry & Environmental Studies*), Forrest Crawford (*Public Health*), Alvaro Sanchez, Carla Staver (*on leave*)

Senior Lecturer Marta Martínez Wells

Lecturers Adalgisa Caccone, Linda Puth

Fields of Study

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

Special Admissions Requirements

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

Special Requirements for the Ph.D. Degree

Each entering student, in consultation with the director of graduate studies (DGS), 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. All first-year students carry out two research rotations. Students have the option of a rotation over their first summer. Students must participate

in (1) E&EB 500, Advanced Topics in Ecology and Evolutionary Biology; (2) E&EB 545b, a course on the responsible conduct of research; (3) weekly E&EB seminars; and (4) symposia of faculty and graduate student research. In addition, during their first two years of study, graduate students must enroll in a minimum of three additional graduate-level courses (numbered 500 and above); a grade of H must be earned in two of these. Teaching experience is regarded as an integral part of the graduate training program. All students are required to teach three courses, normally at a level 20, typically during their first two years of study.

By the middle of the fourth term of study, each student organizes a formal pre-prospectus consultative meeting with his/her advisory committee to discuss the planned dissertation research. Before the beginning of the fifth term, students present and defend their planned dissertation research at a prospectus meeting, at which the department determines the viability and appropriateness of the student's Ph.D. proposal. A successful prospectus meeting and completion of course requirements results in admission to candidacy for the Ph.D. The remaining requirements include completion, presentation, and successful defense of the dissertation, and submission of copies of the dissertation to the Graduate School and to the Center for Science and Social Science Information.

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

Honors Requirement

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

Master's Degree

M.S. (en route to the Ph.D.) Students must pass ten graduate-level courses. At least four courses must be taken for a grade, and students must earn Honors in two courses and maintain an overall average of High Pass. Required courses are:
E&EB 500a, Advanced Topics in Ecology and Evolutionary Biology
E&EB 501b, Advanced Topics in Ecology and Evolutionary Biology
E&EB 545, Responsible Conduct of Research
E&EB 901, Research Rotation I; and E&EB 902, Research Rotation II

A minimum of five additional graduate-level courses (four taken for a grade) are required.

Additional information on the department, faculty, courses, and facilities is available from Laura Rotter, Office of the Director of Graduate Studies, Department of Ecology and Evolutionary Biology, Yale University, PO Box 208106, New Haven CT 06520-8106; e-mail, laura.rotter@yale.edu; tel., 203.432.3837; fax, 203.432.2374; Web site, http://eeb.yale.edu.

Courses

E&EB 500a and 501b, Advanced Topics in Ecology and Evolutionary Biology
David Vasseur
Topics to be announced. Graded Satisfactory/Unsatisfactory. M 2:30–4:30

E&EB 510a[U]/STAT 501a[U], Introduction to Statistics: Life Sciences Walter Jetz
Statistical and probabilistic analysis of biological problems, presented with a unified foundation in basic statistical theory. Problems are drawn from genetics, ecology, epidemiology, and bioinformatics. TTH 1–2:15

E&EB 515a[U], Conservation Biology Jeffrey Powell, Linda Puth
An introduction to ecological and evolutionary principles underpinning efforts to conserve Earth's biodiversity. Efforts to halt the rapid increase in disappearance of both plants and animals. Discussion of sociological and economic issues. MW 10:30–11:20, 1 HTBA

E&EB 520a[U], General Ecology David Post, David Vasseur
A broad consideration of the theory and practice of ecology, including the ecology of individuals, population dynamics and regulation, community structure, ecosystem function, and ecological interactions on broad spatial and temporal scales. Topics such as climate change, fisheries management, and infectious disease are placed in an ecological context. MWF 10:30–11:20

E&EB 523Lb[U], Laboratory for Evolution and Functional Traits
Marta Martínez Wells
Experimental approaches to organismal and population biology, including study of the diversity of life. TWTH 1:30–4:30

E&EB 525b[U], Evolutionary Biology Alvaro Sanchez
An overview of evolutionary biology as the discipline uniting all of the life sciences. Evolution explains the origin of life and Earth's biodiversity, and how organisms acquire adaptations that improve survival and reproduction. This course uses reading and discussion of scientific papers to emphasize that evolutionary biology is a dynamic science, involving active research to better understand the mysteries of life. We discuss principles of population genetics, paleontology, and systematics; application of evolutionary thinking in disciplines such as developmental biology, ecology, microbiology, molecular biology, and human medicine. TTH 10:30–11:20, 1 HTBA

[**E&EB 526Lb[U], Laboratory for Evolutionary Biology**]

E&EB 528b[U], Ecology and Evolution of Infectious Disease Paul Turner
Overview of the ecology and evolution of pathogens (bacteria, viruses, protozoa) and their impact on host populations. Topics include theoretical concepts, ecological and evolutionary dynamics, molecular biology, and epidemiology of ancient and emerging diseases. TTH 10:30–11:20, 1 HTBA

E&EB 530a[U], Field Ecology Linda Puth
A field-based introduction to ecological research. Experimental and descriptive approaches, comparative analysis, and modeling are explored through field and small-group projects. TTH 1–5

E&EB 535a[U], Evolution and Medicine Stephen Stearns
Introduction to the ways in which evolutionary science informs medical research and clinical practice. Diseases of civilization and their relation to humans' evolutionary past; the evolution of human defense mechanisms; antibiotic resistance and virulence in pathogens; cancer as an evolutionary process. Students view course lectures online; class time focuses on discussion of lecture topics and research papers. T 7–8:50

E&EB 545b, Responsible Conduct of Research David Post
This five-week discussion seminar considers issues related to the responsible conduct of research. Topics addressed include research misconduct, plagiarism, data acquisition and management, mentoring and collaboration, authorship and peer review, the use of animals and humans in scientific research, sexual harassment, diversity, and balancing professional and personal life. Graded Satisfactory/Unsatisfactory. M 2:30–4:30

E&EB 546a[U], Plant Diversity and Evolution Michael Donoghue
Introduction to the major plant groups and their evolutionary relationships, with an emphasis on the diversification and global importance of flowering plants. MW 1–2:15

E&EB 547a[U], Laboratory for Plant Diversity and Evolution Michael Donoghue
Hands-on experience with the plant groups examined in the accompanying lectures. Local field trips. T 1–4

E&EB 550a[U], Biology of Terrestrial Arthropods Marta Martínez Wells
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). TTH 11:35–12:50

E&EB 551La[U], Laboratory for Biology of Terrestrial Arthropods
Marta Martínez Wells
Comparative anatomy, dissections, identification, and classifications of terrestrial arthropods; specimen collection; field trips. W 1:30–4:30

[**E&EB 564a[U], Ichthyology**]

[**E&EB 565La[U], Laboratory for Ichthyology**]

E&EB 575b[U], Biological Oceanography Mary Beth Decker
Exploration of a range of coastal and pelagic ecosystems. Relationships between biological systems and the physical processes that control the movements of water and productivity of marine systems. Anthropogenic impacts on oceans, such as the effects of fishing and climate change. Includes three Friday field trips. TTH 11:35–12:50

E&EB 610a, Evolutionary Functional Genomics, Cell Types, and Homology
Günter Wagner
Functional genomics has opened the opportunity to assess the activity state of all genes in the genomes in a largely scalable way. Many cell types, tissues, and characters can readily be assessed across many species, leading to a new field of evolutionary or comparative

functional genomics. At the same time this new field of data analysis can be used to address many deep issues in organismic evolution, like the evolution of cell types, the homology among cell types, etc. In this seminar we review the current state of published literature as it pertains to the evolutionary analysis of transcriptomes and epigenetic marks and their bearing on issues of cell and tissue evolution and homology.

[**E&EB 620b[U], Advanced Ecology**]

[**E&EB 636b/SOCY 636b, Biosocial Science**]

E&EB 650b, Biology of Insect Disease Vectors Brian Weiss
Insects transmit pathogens that cause many emerging and reemerging human and agriculture-related diseases. Many of these diseases, which are referred to as neglected tropical diseases (NTDs), have a dramatically negative impact on human health in the developing world. Furthermore, they cause indirect devastation by significantly reducing agricultural productivity and nutrient availability, exacerbating poverty and deepening disparities. This course introduces students to the biological interactions that occur between major groups of important disease vectors and the pathogens they transmit. Lectures cover current research trends that relate to the ecology and physiology of insect vectors. Course content focuses on how these aspects of vector biology relate to the development and implementation of innovative and effective disease control strategies. Prerequisites: full year of college/university-level biology, or permission of the instructor. W 3–4:20, TH 3–3:50

[**E&EB 660b[U], Conservation Genetics**]

E&EB 672b[U], Ornithology Richard Prum
An overview of avian biology and evolution, including the structure, function, behavior, and diversity of birds. The evolutionary origin of birds, avian phylogeny, anatomy, physiology, neurobiology, breeding systems, and biogeography. MWF 9:25–10:15

E&EB 673Lb[U], Laboratory for Ornithology Richard Prum
Laboratory and field studies of avian morphology, diversity, phylogeny, classification, identification, and behavior. T 1:30–4:30

E&EB 680b[U], Life History Evolution Stephen Stearns
Life history evolution studies how the phenotypic traits directly involved in reproductive success are shaped by evolution to solve ecological problems. The intimate interplay between evolution and ecology. TTH 11:35–12:50

[**E&EB 713b, Spatial and Environmental Data Analysis**]

[**E&EB 720b, Ecology of Global Change**]

[**E&EB 740b, Long-term Temporal Dynamics of Ecological Systems**]

E&EB 810a, Evolving Dynamical Systems J. Rimas Vaisnys
An introduction to the ways evolving biological systems can be described, modeled, and analyzed by using a dynamical systems approach. Concrete models are explored with respect to field or laboratory observations. Extensive use of the software package Mathematica, but prior experience with the program is not required. TTH 9:25–10:15

E&EB 842b[U]/ANTH 835b[U], Primate Diversity and Evolution Eric Sargis
The diversity and evolutionary history of living and extinct primates. Focus on major controversies in primate systematics and evolution, including the origins and relationships of several groups. Consideration of both morphological and molecular studies. Morphological diversity and adaptations explored through museum specimens and fossil casts. W 1:30–3:20

E&EB 900a–b, First-Year Introduction to Research and Rotations David Vasseur

E&EB 901, Research Rotation I David Vasseur

E&EB 902, Research Rotation II David Vasseur

[**E&EB 930a, Seminar in Systematics**]

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

E&EB 960b[U]/EMD 695b, Studies in Evolutionary Medicine I Stephen Stearns
The first term of a two-term course that begins in January. Students learn the major principles of evolutionary biology and apply them to issues in medical research and practice by presenting and discussing original papers from the current research literature. Such issues include lactose and alcohol tolerance; the hygiene hypothesis and autoimmune disease; human genetic variation in drug response and pathogen resistance; spontaneous abortions, immune genes, and mate choice; parental conflicts over reproductive investment mediated by genetic imprinting; life history trade-offs and the evolution of aging; the evolution of virulence and drug resistance in pathogens; the evolutionary genetics of humans and their pathogens; the ecology and evolution of disease; the evolutionary origin of diseases; and the emergence of new diseases. Students develop a research proposal based on one of their own questions in the spring term, spend the summer on a research project related to their research proposal, and write a paper based on the results of their research in the fall term. Credit and grades are awarded for each term. Only students who have engaged in summer research projects may enroll in the fall term. Admission is by competitive application only. Forms are available on the E&EB department Web site. TTH 4–5:15

E&EB 961a[U]/EMD 695a, Studies in Evolutionary Medicine II Paul Turner
Continuation of E&EB 960b. Students learn the major principles of evolutionary biology and apply them to issues in medical research and practice by presenting and discussing original papers from the current research literature. Such issues include lactose and alcohol tolerance; the hygiene hypothesis and autoimmune disease; human genetic variation in drug response and pathogen resistance; spontaneous abortions, immune genes, and mate choice; parental conflicts over reproductive investment mediated by genetic imprinting; life history trade-offs and the evolution of aging; the evolution of virulence and drug resistance in pathogens; the evolutionary genetics of humans and their pathogens; the ecology and evolution of disease; the evolutionary origin of diseases; and the emergence of new diseases. Students develop a research proposal based on one of their own questions in the spring term, spend the summer on a research project related to their

research proposal, and write a paper based on the results of their research in the fall term. Credit and grades are awarded for each term. Only students who have engaged in summer research projects may enroll in the fall term. Prerequisite: E&EB 960b or permission of the instructor. TTH 4–5:15

ECONOMICS

28 Hillhouse Avenue, 203.432.3575
http://economics.yale.edu
M.A., M.Phil., Ph.D.

Chair
Dirk Bergemann (28 Hillhouse, 203.432.3571)

Director of Graduate Studies
Truman Bewley (30 Hillhouse, Rm. 30, 203.432.3719, truman.bewley@yale.edu)

Professors Joseph Altonji, Donald Andrews, Dirk Bergemann, Steven Berry, Truman Bewley, Xiaohong Chen, Zhiwu Chen (*Management*), Ray Fair, Howard Forman (*Public Health*), John Geanakoplos, Pinelope Goldberg, Timothy Guinnane, Philip Haile, Johannes Hörner, Jonathan Ingersoll (*Management*), Gerald Jaynes, Dean Karlan, Yuichi Kitamura, Alvin Klevorick, Samuel Kortum, Naomi Lamoreaux (*on leave* [F]), Giovanni Maggi, Costas Meghir, Robert Mendelsohn (*Forestry & Environmental Studies*), Giuseppe Moscarini, William Nordhaus, Peter Phillips, Benjamin Polak, Mark Rosenzweig, Larry Samuelson, Robert Shiller, Anthony Smith, Aleh Tsyvinski, Christopher Udry, Edward Vytlacil, Ebonya Washington

Associate Professors Konstantinos Arkolakis, Eduardo Faingold, Amanda Kowalski, Nancy Qian

Assistant Professors Timothy Armstrong, José-Antonio Espín-Sánchez, Zhen Huo, Mitsuru Igami, Daniel Keniston, Ilse Lindenlaub, Michael Peters, Nicholas Ryan, Joseph Shapiro, Eric Weese

Fields of Study

Fields include economic theory, including microeconomics, macroeconomics, mathematical economics; econometrics; economic history; labor economics; industrial organization; financial economics; behavioral finance; public economics; public finance; international trade; international finance; economic development; behavioral economics; law and economics.

Special Admissions Requirements

Please see http://economics.yale.edu/graduate/application-info.

Special Requirements for the Ph.D. Degree

The following requirements must be satisfied in addition to those prescribed by the Graduate School.

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 twice.

Prior to registration for the third year. (a) Students must have taken at least fourteen term courses in Economics and have received a grade of at least Pass in each of them. With the permission of the director of graduate studies, courses in related fields and independent reading courses can be used to fulfill this requirement. Workshops may not be used to satisfy it. All workshops are graded on a Satisfactory/Unsatisfactory basis. (b) 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. Grades within the Economics department include pluses and minuses. A failure counts as a zero, a P– as a 1, a P as a 2, a P+ as a 3, and so on up to a 9 for H+. The arithmetic average of these numbers must be at least 4.5.

Admission to candidacy. Students must 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 the Department of Economics after having completed department requirements listed above, the Graduate School's prospectus requirement, and the following additional requirements: (a) Students must have completed two one-term prospectus workshops. In order for workshops to count toward the prospectus requirement, students must make a presentation in each workshop and present original work in one of them. If students can find no workshop whatsoever in their areas of interest, they may substitute independent study guided by a faculty member, provided the independent study leads to a dissertation prospectus that is accepted. (b) Students must receive a grade of High Pass– or better in ECON 551b (Econometrics II) or 552b (Econometrics III). More advanced courses may be substituted for these with special permission of the director of graduate studies. (c) Students must receive a grade of Satisfactory on an applied econometrics paper, which is evaluated by the faculty adviser of the paper and another faculty member. (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 in two fields. At least one field must have substantial empirical and institutional content. The choice of fields must be approved by the director of graduate studies. In the event of failure, students may take the oral examination no more than twice.

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 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 under Policies and Regulations.

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. Students must complete at least two of the three two-course sequences in microeconomics, macroeconomics, or econometrics for first-year graduate students.

The M.A. in International and Development Economics is described under International and Development Economics.

Program materials are available on our Web site: http://economics.yale.edu.

Courses

ECON 500a, General Economic Theory: Microeconomics Truman Bewley, Mira Frick
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 Eduardo Faingold, Ryota Iijima
General equilibrium and welfare economics. Allocation involving time. Public sector economics. Uncertainty and the economics of information. Introduction to social choice.

[**ECON 502a, Mathematics for Economists**]

ECON 510a, General Economic Theory: Macroeconomics Anthony Smith, Zhen Huo
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 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 Mira Frick, Dov Somet
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 Juuso Välimäki, Ryota Iijima
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, Microeconomic Theory Lunch
A forum for advanced students to critically examine recent papers in the literature and present their own work.

[**ECON 524a, Behavioral Applied Theory**]

ECON 525a, Advanced Macroeconomics I Zhen Huo, Nicolas Werquin
Heterogeneous agent economics, investment, scrapping and firing, nonquadratic adjustment costs, financial constraints, financial intermediation, psychology of decision making under risk, optimal risk management, financial markets, consumption behavior, monetary policy, term structure of interest rates.

ECON 526b, Advanced Macroeconomics II Ilse Lindenlaub
Macroeconomic equilibrium in the presence of uninsurable labor income risk. Implications for savings, asset prices, unemployment.

[**ECON 527a/LAW 20083/MGT 565a, Behavioral and Institutional Economics**]

ECON 530a, General Equilibrium Foundations of Finance and Macroeconomics
John Geanakoplos
The course gives a careful mathematical description of the general equilibrium underpinnings of the main models of finance and the new macroeconomics of collateral and default. Part I is a review of Walrasian general equilibrium, including the mathematical techniques of fixed points and genericity, both taught from an elementary point of view. Part II covers general equilibrium with incomplete markets (GEI). Part III focuses on the special case of the capital asset pricing model (CAPM), including extensions to multicommodity CAPM and multifactor CAPM. Part IV focuses on the Modigliani-Miller theorem and generic constrained inefficiency. Part V describes collateral equilibrium and the leverage cycle. Part VI covers default and punishment and adverse selection and moral hazard in general equilibrium. Part VII describes monetary equilibrium. W 4–7

[**ECON 531b, Mathematical Economics II**]

[**ECON 535a and b, Prospectus Workshop in Mathematical Economics**]

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

ECON 540a and 541b, Student Workshop in Macroeconomics
A course that gives third- and fourth-year students doing research in macroeconomics an opportunity 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
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 545a, Microeconomics Michael Boozer
A survey of the main features of current economic analysis and of the application of the theory to a number of important economic questions, covering microeconomics and demand theory, the theory of the firm, and market structures. For IDE students.

ECON 546b, Growth and Macroeconomics David Love
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.

ECON 550a, Econometrics I Donald Andrews
Probability: concepts and axiomatic development. Data: tools of descriptive statistics and data reduction. Random variables and probability distributions; univariate distributions (continuous and discrete); multivariate distributions; functions of random variables and transformations; the notion of statistical inference; sampling concepts and distributions; asymptotic theory; point and interval estimation; hypothesis testing.

ECON 551b, Econometrics II Timothy Armstrong
Provides a basic knowledge of econometric theory, and an ability to carry out empirical work in economics. Topics include linear regression and extensions, including regression diagnostics, generalized least squares, statistical inference, dynamic models, instrumental variables and maximum likelihood procedures, simultaneous equations, nonlinear and qualitative-choice models. Examples from cross-section, time series, and panel data applications.

ECON 552b, Econometrics III Xiaohong Chen, Yuichi Kitamura
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 Xiaohong Chen, Timothy Armstrong
The first half of this course is about nonlinear parametric models. Specification, estimation, and testing within the Likelihood and Generalized Method of Moments frameworks. First-order asymptotics for both smooth and non-smooth objective functions. Efficiency and robustness. A short account of high-order asymptotics for smooth

problems. The second part is on nonparametric and semiparametric methods. Nonparametric estimation by kernels, series, splines, and other methods. Bias reduction and bandwidth selection. The course of dimensionality and additive models. Specification and estimation of semiparametric models. U-statistics and asymptotic properties. Efficiency and adaptation.

[**ECON 555a, Applied Econometrics II: Microeconometrics**]

ECON 556a, Topics in Empirical Economics and Public Policy Amanda Kowalski, Philip Haile, Edward Vytlacil
Methods and approaches to empirical economic analysis are reviewed, illustrated, and discussed with reference to specific empirical studies. The emphasis is on learning to use methods and on understanding how specific empirical questions determine the empirical approach to be used. We review a broad range of approaches including program evaluation methods and structural modeling, including estimation approaches, computational issues, and problems with inference. Open only to doctoral students in the Department of Economics. Exceptionally, doctoral students from other departments may take the course for credit if a faculty member, normally from their department, can supervise and grade their term paper.

[**ECON 557a, Econometrics VI**]

ECON 558a, Econometrics Michael Boozer
Application of statistical analysis to economic data. Basic probability theory, linear regression, specification and estimation of economic models, time series analysis, and forecasting. The computer is used. For IDE students.

ECON 559b, Development Econometrics (IDE) Michael Boozer

ECON 561b[U], Computational Methods in Economics Anthony Smith
How to use computational methods to solve and analyze dynamic economic models. The first part of the course covers standard tools of numerical analysis that are useful in economics (minimization of functions, root-finding, interpolation, approximation of functions, integration, simulation). The second shows how to use these tools to study dynamic economic problems in macroeconomics, finance, labor economics, public finance, and industrial organization, paying special attention to methods for solving stochastic dynamic programming problems and for computing equilibria in economic models with heterogeneous actors.

ECON 562a[U]/CPSC 512a[U], Designing the Digital Economy Glen Weyl
Information technology is transforming how almost every market works: finance has been transformed by algorithmic trading and bitcoin, ridesharing is changing the nature of public transportation, Amazon is revolutionizing logistics, and Airbnb is now the most valuable accommodation provider in the world. This transformation, which has been led by start-ups and newly dominant technology companies, inherently combines technical and economic aspects, as entrepreneurs take advantage of the potential of technology to facilitate exchanges that were previously infeasible. This crash course in the key tools from economics and computer science that are being used to design digital

markets exposes students to a range of concrete and topical practical problems in the area. M 2:30–5:30

[**ECON 563a/CPSC 555a[U], Economics and Computation**]

ECON 567a and 568b, Econometrics Workshop
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
A course for third- and fourth-year students doing research in econometrics to prepare their prospectus and present dissertation work.

ECON 580a, 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; permission of the instructor.

ECON 581b, American Economic History José-Antonio Espín-Sánchez, Naomi Lamoreaux
This course examines both the long-term factors (such as industrialization and the development of markets) and the epochal events (such as the Revolution, Civil War, and Great Depression) that have shaped the development of the American economy. The objectives of this course are to familiarize students with the major topics and debates in American economic history. Prerequisites: concurrent enrollment in or successful completion of ECON 501b and ECON 510a.

[**ECON 582a, General Economic History: Latin America**]

[**ECON 583a, Topics in Economic History**]

[**ECON 585b, Readings in Economic History**]

ECON 588a and 589b, Economic History Workshop Timothy Guinnane
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 591a[U], Economics of Poverty Alleviation Dean Karlan
Measures that succeed and fail—and why—in the fight against poverty in developing countries. Fundamentals of behavioral economics and their application to policy and program design. When and how to use experimental methods to evaluate ideas and programs. Interventions and policies that apply to households, small firms, and communities, with particular attention to microfinance, health, and education.

ECON 600a, Industrial Organization I Philip Haile, Mitsuru Igami
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. 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 Industrial Organization
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, Industrial Organization Seminar
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 Costas Meghir
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 Joseph Altonji, Ilse Lindenlaub
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
A forum primarily for graduate students to present their research plans and findings. Discussions encompass empirical microeconomic research relating to both high- and low-income countries.

ECON 640a/b, Prospectus Workshop in Labor Economics and Public Finance
Workshop for students doing research in labor economics and public finance.

ECON 670a/MGMT 740a, Financial Economics I Jonathan Ingersoll
Current issues in theoretical financial economics are addressed through the study of current papers. Focuses on the development of the problem-solving skills essential for research in this area.

ECON 671b/MGMT 741b, Financial Economics II Alan Moreira
Continuation of ECON 670a/MGMT 740a.

ECON 672b/MGMT 745b, Behavioral Finance Nicholas Barberis
Much of modern financial economics works with models in which agents are rational, in that they maximize expected utility and use Bayes's law to update their beliefs. Behavioral finance is a large and active field that studies models in which some agents are less than fully rational. Such models have two building blocks: limits to arbitrage, which make it difficult for rational traders to undo the dislocations caused by less rational traders; and psychology, which catalogues the kinds of deviations from full rationality we might expect to see. We discuss these two topics and then consider a number of applications: asset pricing (the aggregate stock market and the cross-section of average returns); individual trading behavior; and corporate finance (security issuance, corporate investment, and mergers).

ECON 674b/MGMT 746b, Financial Crises Gary Gorton, Andrew Metrick
An elective doctoral course covering theoretical and empirical research on financial crises. The first half of the course focuses on general models of financial crises and historical episodes from the nineteenth and twentieth centuries. The second half of the course focuses on the recent financial crisis. Prerequisites: MGMT 740a and 741b (doctoral students in Economics may substitute the core microeconomics sequence), and permission of the instructor.

ECON 680a, Public Finance I Amanda Kowalski
Major topics in public finance including externalities, public goods, benefit/cost analysis, fiscal federalism, social insurance, retirement savings, poverty and inequality, taxation, and others. Applications are provided to crime, education, environment and energy, health and health insurance, housing, and other markets and domains. The course covers a variety of applied methods including sufficient statistics, randomized control trials, hedonic models, regression discontinuity, discrete choice, spatial equilibrium, dynamic growth models, differences-in-differences, integrated assessment models, applied general equilibrium, event studies, firm production functions, learning models, general method of moments, and propensity-score reweighting estimators.

ECON 681b, Public Finance II Abigail Adams, Jesse Gregory
This course covers social insurance, health care, charitable giving, externalities, crime, and an introduction to political economy. Students are expected to participate actively in class discussion and to write and present a short empirical research paper.

[**ECON 702b, International Economics**]

[**ECON 709a, International Economics and Open Economy Macroeconomics**]

ECON 720a, International Trade I Pinelope Goldberg, Giovanni Maggi
This course covers the theory of international trade, policy, and institutions. Discussion of Classical, Neo-classical, and more recent imperfect-Competition-Scale-Economies-based static models of trade. The course presents dynamic extensions of some of the models that explore the relations among trade, innovation, and growth. The analytics of trade policy issues, such as gains from trade, tariffs and quotas, customs unions and free trade areas, and the political economy of trade policy making, are discussed.

ECON 721b, International Trade II Samuel Kortum
The course covers empirical topics in international trade with particular emphasis on current research areas. Topics include tests of international trade theories; studies of the relationship between international trade, labor markets, and income distribution; recent trade liberalization episodes in developing countries; empirical assessment of various trade policies, such as VERs and Anti-Dumping; productivity (and its relation to international trade liberalization); and exchange rates, market integration, and international trade. Methodologically, the course draws heavily on empirical models used in the fields of industrial organization and to a lesser degree labor economics; taking these courses is thus recommended though not required.

[**ECON 724b, International Finance**]

ECON 730a, Economic Development I Christopher Udry, Mark Rosenzweig
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 II Nicholas Ryan, Nancy Qian
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, Advanced Economic Development Daniel Keniston
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.

[**ECON 735b^{U}, Economics of Agriculture**]

[**ECON 736a^{U}, Economics of Technology**]

ECON 737b^{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 749a and 750b, Trade and Development Workshop
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 756a/b, Prospectus Workshop in Development
Workshop for students doing research in development to present and discuss work.

[**ECON 776b^{U}, Economics of Population**]

ECON 788a/PLSC 575a, Political Competition John Roemer
Political competition in democracies is party competition. We develop, from the formal viewpoint, theories of party competition in democracies. The familiar "median voter

theorem" of A. Downs is the simplest example of such a theory, but it is inadequate in several ways. We develop a theory in which parties (1) compete over several issues, not just one issue, as in Downs; (2) are uncertain about how citizens will respond to platforms; and (3) represent interest groups in the population. Applications, particularly to the theory of income distribution and taxation, are studied.

ECON 790b, Political Economy I Ebonya Washington
An overview of the field of empirical political economy. While students are expected to familiarize themselves with the most prevalent models in the field, the emphasis in this course is on the applied work. Students attain a working knowledge of the literature, learn to critically evaluate the literature, and most importantly develop the skills to come up with interesting, workable, and theoretically grounded research questions that will push that literature forward.

ECON 794b, Political Economy II Giovanni Maggi
Theoretical and empirical research in international trade policy. The course focuses on welfare analysis of trade policies under perfect completion and under oligopoly; the political economy of trade policy; and the economics and political economy of international trade agreements. Prerequisites: ECON 500a and 501b.

[**ECON 795a, Topics in Political Economy**]

ECON 899a or b, Individual Reading and Research
By arrangement with faculty.

ELECTRICAL ENGINEERING

Dunham Laboratory, 203.432.4252
M.S., M.Phil., Ph.D.

Chair
Leandros Tassiulas

Director of Graduate Studies
Hongxing Tang (hong.tang@yale.edu)

Professors Richard Barker (*Emeritus*), James Duncan, Jung Han, Roman Kuc, Tso-Ping Ma, A. Stephen Morse, Kumpati Narendra, Mark Reed, Peter Schultheiss (*Emeritus*), Lawrence Staib, Hemant Tagare, Hongxing Tang, Leandros Tassiulas, J. Rimas Vaisnys, Y. Richard Yang

Associate Professors Richard Lethin (*Adjunct*), Sekhar Tatikonda

Assistant Professors Wenjun Hu, Amin Karbasi, Jakub Szefer, Fengnian Xia

Fields of Study

Fields include biomedical sensory systems, communications and signal processing, neural networks, control systems, wireless networks, sensor networks, microelectromechanical and nanomechanical systems (MEMS and NEMS), nanoelectronic science and technology, optoelectronic materials and devices, semiconductor materials and devices, computer engineering, computer architecture, hardware security, and VLSI design and testing.

For admissions and degree requirements, and for course listings, see Engineering & Applied Science.

ENGINEERING & APPLIED SCIENCE

Dunham Laboratory, 203.432.4252
http://seas.yale.edu
M.S., M.Phil., Ph.D.

Dean
T. Kyle Vanderlick

Deputy Dean
Vincent Wilczynski

Programs of study are offered in the areas of applied mechanics, computer science, mechanical engineering and materials science, chemical and environmental engineering, electrical engineering, and biomedical engineering. All programs are under the School of Engineering & Applied Science.

Biomedical Engineering

Chair
Jay Humphrey

Director of Graduate Studies
Richard Carson (richard.carson@yale.edu)

Professors Richard Carson, Nicholas Christakis, James Duncan, Karen Hirschi, Jay Humphrey, Fahmeed Hyder, Themis Kyriakides (*Pathology*), Andre Levchenko, Laura Niklason, Douglas Rothman, W. Mark Saltzman, Martin Schwartz, Fred Sigworth, Brian Smith, Lawrence Staib, Hemant Tagare, Paul Van Tassel, Steven Zucker (*Computer Science*)

Associate Professors Joerg Bewersdorf (*Cell Biology*), Robin de Graaf, Tarek Fahmy, Rong Fan, Anjelica Gonzalez, Evan Morris, Xenophon Papademetris, Corey Wilson

Assistant Professors Stuart Campbell, Michael Choma, Chi Liu, Kathryn Miller-Jensen, Michael Murrell, Steven Tommasini, Jiangbing Zhou

FIELDS OF STUDY

Fields include biological devices, biological signals and sensors, biomaterials, biomechanics, biophotonics, computer vision, digital image analysis and processing, drug delivery, modeling in mechanobiology, MRI, MRS, PET and modeling, the physics of image formation (MRI, optics, ultrasound, nuclear medicine, and X-ray), physiology and human factors engineering, systems biology, systems medicine, and tissue engineering and regenerative medicine.

Chemical & Environmental Engineering

Chair
Jaehong Kim

Director of Graduate Studies
Eric Altman

Professors Eric Altman, Michelle Bell, Gaboury Benoit, Ruth Blake, Menachem Elimelech, Thomas Graedel, Gary Haller (*Emeritus*), Edward Kaplan, Michael Loewenberg, Robert McGraw (*Adjunct*), Andrew Miranker, Lisa Pfefferle, Joseph Pignatello (*Adjunct*), Daniel Rosner (*Emeritus*), James Saiers, W. Mark Saltzman, Udo Schwarz, T. Kyle Vanderlick, Paul Van Tassel, Kurt Zilm

Associate Professors Tarek Fahmy, Jaehong Kim, Chinedum Osuji, Jordan Peccia, André Taylor, Corey Wilson, Julie Zimmerman

Assistant Professors Drew Gentner, Shu Hu, Desirée Plata, Mingjiang Zhong

FIELDS OF STUDY

Fields include nanomaterials, soft matter, interfacial phenomena, biomolecular engineering, energy, water, and sustainability.

Computer Science

Chair
Joan Feigenbaum

Director of Graduate Studies
Vladimir Rokhlin (108 AKW, 203.432.1283, vladimir.rokhlin@yale.edu)

Professors Dana Angluin, James Aspnes, Dirk Bergemann,* Ronald Coifman,* Julie Dorsey, Stanley Eisenstat, Joan Feigenbaum, Michael Fischer, David Gelernter, Mark Gerstein,* Drew McDermott, Vladimir Rokhlin,† Holly Rushmeier, Brian Scassellati, Martin Schultz (*Emeritus*), Zhong Shao, Avi Silberschatz, Daniel Spielman, Leandros Tassiulas,* Y. Richard Yang, Steven Zucker†

Associate Professors Daniel Abadi, Mahesh Balakrishnan

Assistant Professors Wenjun Hu,* Amin Karbasi,* Smita Krishnaswamy,* Sahand Negahban,* Ruzica Piskac, Mariana Raykova, Frederick Shic,* Jakub Szefer*

Senior Lecturer Stephen Slade

Lecturers Jason Hirschhorn, Kyle Jensen,* Eric Koskinen, Scott Petersen, Patrick Rebeschini [F], Brad Rosen, Andrew Sherman, Xiyin Tang [Sp]

*A secondary appointment with primary affiliation in another department or school.
†A joint appointment with another department.

FIELDS OF STUDY

Algorithms and computational complexity, artificial intelligence, data networking, databases, graphics, machine learning, programming languages, robotics, scientific computing, security and privacy, systems.

Electrical Engineering

Chair
Leandros Tassiulas

Director of Graduate Studies
Hongxing Tang (hong.tang@yale.edu)

Professors Richard Barker (*Emeritus*), James Duncan, Jung Han, Roman Kuc, Tso-Ping Ma, A. Stephen Morse, Kumpati Narendra, Mark Reed, Peter Schultheiss (*Emeritus*), Lawrence Staib, Hemant Tagare, Hongxing Tang, Leandros Tassiulas, J. Rimas Vaisnys, Y. Richard Yang

Associate Professors Richard Lethin (*Adjunct*), Sekhar Tatikonda

Assistant Professors Wenjun Hu, Amin Karbasi, Jakub Szefer, Fengnian Xia

FIELDS OF STUDY

Fields include biomedical sensory systems, communications and signal processing, neural networks, control systems, wireless networks, sensor networks, microelectromechanical and nanomechanical systems (MEMS and NEMS), nanoelectronic science and technology, optoelectronic materials and devices, semiconductor materials and devices, computer engineering, computer architecture, hardware security, and VLSI design and testing.

Mechanical Engineering & Materials Science

Chair
Udo Schwarz

Director of Graduate Studies
Jan Schroers (jan.schroers@yale.edu)

Professors Charles Ahn, Ira Bernstein (*Emeritus*), Juan Fernández de la Mora, Alessandro Gomez, Sohrab Ismail-Beigi, Shun-Ichiro Karato, Marshall Long, Brian Scassellati, Jan Schroers, Udo Schwarz, Mitchell Smooke

Associate Professors Aaron Dollar, Corey O'Hern

Assistant Professors Eric Brown, Judy Cha, Madhusudhan Venkadesan

Lecturers Beth Anne Bennett, Kailasnath Purushothaman, Joseph Zinter

FIELDS OF STUDY

Fluids and thermal sciences Dynamics and stability of drops and bubbles; dynamics of thin liquid films; macroscopic and particle-scale dynamics of emulsions, foams, and colloidal suspensions; electrospray theory and characterization; electrical propulsion applications; combustion and flames; computational methods for fluid dynamics and reacting flows; turbulence; particle tracking in fluid mechanics; laser diagnostics of reacting and nonreacting flows; and magnetohydrodynamics.

Soft matter/complex fluids Jamming and slow dynamics in gels, glasses, and granular materials; mechanical properties of soft and biological materials; and structure and dynamics of macromolecules. Several faculty in Mechanical Engineering are also affiliated with the Integrated Graduate Program in Physical and Engineering Biology (http://peb.yale.edu).

Materials science Studies of thin films; nanoscale effects on electronic properties of two-dimensional layered materials; amorphous metals and nanomaterials including nanocomposites, characterization of crystallization and other phase transformations; nanoimprinting; atomic-scale investigations of surface interactions and properties; classical and quantum nanomechanics; nanotribology; nanostructured energy applications; combinatorial materials science; and in situ transmission electron and scanning probe microscopy.

Robotics/mechatronics Machine and mechanism design; dynamics and control; robotic grasping and manipulation; human-machine interface; rehabilitation robotics; haptics; electromechanical energy conversion; biomechanics of human movement; and human-powered vehicles.

Integrated Graduate Program in Physical and Engineering Biology (PEB)

Students applying to the Ph.D. program in Biomedical Engineering, Chemical & Environmental Engineering, and Mechanical Engineering & Materials Science may also apply to be part of the PEB program. See the description under Non-Degree-Granting Programs, Councils, and Research Institutes for course requirements, and http://peb.yale.edu for more information about the benefits of this program and application instructions.

Special Requirements for the Ph.D. Degree

The online publication *Qualification Procedure for the Ph.D. Degree in Engineering & Applied Science* describes in detail all requirements in Biomedical Engineering, Chemical & Environmental Engineering, Electrical Engineering, and Mechanical Engineering & Materials Science. The student is strongly encouraged to read it carefully; key requirements are briefly summarized below. See Computer Science's departmental entry in this bulletin for special requirements for the Ph.D. in Computer Science.

The student plans his/her course of study in consultation with faculty advisers (the student's advisory committee). A minimum of ten term courses is required, to be completed in the first two years. Well-prepared students may petition for course waivers based on courses taken in a previous graduate degree program. Similarly, students may place out of certain ENAS courses via an examination prepared by the course instructor. Placing out of the course will not reduce the total number of required courses. Core courses, as identified by each department/program, should be taken in the first year unless otherwise noted by the department. With the permission of the departmental director of graduate studies (DGS), students may substitute more advanced courses that cover the same topics. No more than two courses can be Special Investigations, and at least two must be outside the area of the dissertation. All students must complete a one-term course, Responsible Conduct of Research, in the first year of study.

Each term, the faculty review the overall performance of the student and report their findings to the DGS who, in consultation with the associate dean, determines whether the student may continue toward the Ph.D. degree. By the end of the second term, it is expected that a faculty member has agreed to accept the student as a research assistant. By December 5 of the third year, an area examination must be passed and a written prospectus submitted before dissertation research is begun. These events result in the student's admission to candidacy. Subsequently, the student will report orally each year to the full advisory committee on progress. When the research is nearing completion, but before the thesis writing has commenced, the full advisory committee will advise the student on the thesis plan. A final oral presentation of the dissertation research is required to be given during term time. There is no foreign language requirement.

Teaching experience is regarded as an integral part of the graduate training program at Yale University, and all Engineering graduate students are required to serve as a Teaching Fellow for one term, typically during year two. Teaching duties normally involve assisting in laboratories or discussion sections and grading papers and are not expected to require more than ten hours per week. Students are not permitted to teach during the first year of study.

If a student was admitted to the program having earned a score of less than 26 on the Speaking Section of the Internet-based TOEFL, the student will be required to take an English as a Second Language (ESL) course each semester at Yale until the Graduate School's Oral English Proficiency standard has been met. This must be achieved by the end of the third year in order for the student to remain in good standing.

Core Course Requirements for the Ph.D. Degree

Biomedical Engineering Physiological Systems (ENAS 550), Physical and Chemical Basis of Bioimaging and Biosensing (ENAS 510). One of these courses may be taken in the second year. In addition, there is a math requirement that must be met by taking Biomedical Data Analysis (ENAS 549), Mathematical Methods I (ENAS 500), or Advanced Engineering Mathematics (ENAS 505) in the first year.

Chemical & Environmental Engineering (Chemical track) Mathematical Methods I (ENAS 500), Classical and Statistical Thermodynamics (ENAS 521), Energy, Mass, and Momentum Processes (ENAS 603), Chemical Reaction Engineering (ENAS 602).

Chemical & Environmental Engineering (Environmental track) Water Chemistry (ENAS 638), Biological Processes in Environmental Engineering (ENAS 641), Environmental Physicochemical Processes (ENAS 642). In addition, there is a math requirement that must be met by taking one of the following courses in the first year: Mathematical Methods I (ENAS 500), Applied Spatial Statistics (F&ES 781), Multivariate Statistical Analysis in the Environmental Sciences (F&ES 758), Introductory Data Analysis (STAT 530), or Multivariate Statistical Methods for the Social Sciences (STAT 660).

Computer Science See Computer Science's departmental entry in this bulletin.

Electrical Engineering (Computer Engineering track) Computer Architectures for Cognitive Processing and Machine Learning (ENAS 907), Computer Organization and Architecture (ENAS 967).

Electrical Engineering (Microelectronics track) Two of the following four courses: Photonics and Optical Electronics (ENAS 511), Heterojunction Devices (ENAS 718), Solid State Physics I (ENAS 850), Semiconductor Silicon Devices and Technology (ENAS 986).

Electrical Engineering (System and Signals track) Linear Systems (ENAS 902), Stochastic Processes (ENAS 502).

Mechanical Engineering & Materials Science Students must demonstrate competence in one of four areas: Fluid and Thermal Sciences, Soft Matter/Complex Fluids, Materials Science, or Robotics/Mechatronics. As a minimum requirement, students must take at least one of the following courses in the first year of study: Intelligent Robotics (CPSC 573), Classical and Statistical Thermodynamics (ENAS 521), Biological Physics (ENAS 541), Polymer Physics (ENAS 606), Synthesis of Nanomaterials (ENAS 615), Statistical Physics II (PHYS 628), Theoretical Fluid Dynamics (ENAS 704), Fundamentals of Combustion (ENAS 708), Solidification and Phase Transformations (ENAS 752), Introduction to Robot Analysis (ENAS 777), Forces on the Nanoscale (ENAS 787), Soft Condensed Matter Physics (ENAS 848), Solid State Physics I (ENAS 850), Solid State Physics II (ENAS 851), Linear Systems (ENAS 902)—if not used to satisfy the math requirement—and Systems and Control (ENAS 936). In addition, there is a math requirement that must be met by taking Mathematical Methods I (ENAS 500), Mathematical Methods of Physics (PHYS 506), or Linear Systems (ENAS 902), depending on the research area.

Honors Requirement

Students must meet the 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 Degree Requirements under Policies and Regulations.

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.

Terminal 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., although there are no core course requirements for students in this program. 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.

Program materials are available upon request to the Office of Graduate Studies, School of Engineering & Applied Science, Yale University, PO Box 208267, New Haven CT 06520-8267; e-mail, engineering@yale.edu; Web site, http://seas.yale.edu.

Courses

The list of courses may be slightly modified by the time term begins. Please check the Web site http://students.yale.edu/oci for the most updated course listing.

ENAS 500a/APHY 500a, Mathematical Methods I J. Rimas Vaisnys
A beginning, graduate-level introduction to ordinary and partial differential equations, vector analysis, linear algebra, and complex functions. Laplace transform, series expansion, Fourier transform, and matrix methods are given particular attention. Applications to problems frequently encountered in engineering practice are stressed throughout. TTH 9–10:15

[**ENAS 501b, Mathematical Methods II**]

ENAS 502b[U], Stochastic Processes Amin Karbasi
A study of stochastic processes and estimation, including fundamentals of detection and estimation. Vector space representation of random variables, Bayesian and Neyman-Pearson hypothesis testing, Bayesian and nonrandom parameter estimation, minimum-variance unbiased estimators, and the Cramer-Rao bound. Stochastic processes. Linear prediction and Kalman filtering. Poisson counting process and renewal processes, Markov chains, branching processes, birth-death processes, and semi-Markov processes. Applications from communications, networking, and stochastic control. MW 1–2:15

ENAS 503a/AMTH 605a/STAT 667a, Probabilistic Networks, Algorithms, and Applications Sekhar Tatikonda
This course examines probabilistic and computational methods for the statistical modeling of complex data. The emphasis is on the unifying framework provided by graphical models, a formalism that merges aspects of graph theory and probability theory. Graphical models: Markov random fields, Bayesian networks, and factor graphs. Algorithms: filtering, smoothing, belief-propagation, sum-product, and junction tree. Variational techniques: mean-field and convex relaxations. Markov processes on graphs: MCMC, factored HMMs, and Glauber dynamics. Some statistical physics techniques: cavity and replica methods. Applications to error-correcting codes, computer vision, bio-informatics, and combinatorial optimization.

[**ENAS 505a, Advanced Engineering Mathematics**]

[**ENAS 506b, Ethics and Professional Development for Biomedical Engineers and Scientists**]

ENAS 508b, Responsible Conduct of Research
Required of first-year students. Presentation and discussion of topics and best practices relevant to responsible conduct of research including academic fraud and misconduct, conflict of interest and conflict of commitment, data acquisition and human subjects, use and care of animals, publication practices and responsible authorship, mentor/trainee responsibilities and peer review, and collaborative science.

ENAS 509a[U], Electronic Materials: Fundamentals and Applications Jung Han
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. TTH 9–10:15

ENAS 510a[U], Physical and Chemical Basis of Bioimaging and Biosensing
Douglas Rothman, Fahmeed Hyder, Fred Sigworth, Richard Carson
Basic principles and technologies for imaging and sensing the chemical, electrical, and structural properties of living tissues and biological macromolecules. Topics include magnetic resonance spectroscopy, MRI, positron emission tomography, and molecular imaging with MRI and fluorescent probes. TTH 1–2:15

ENAS 511a[U], Physics and Devices of Optical Communication Hongxing Tang
A survey of the enabling components and devices that constitute modern optical communication systems. Focus on the physics and principles of each functional unit, its current technological status, design issues relevant to overall performance, and future directions. Permission of the instructor required. MW 2:30–3:45

ENAS 513a[U], Introduction to Analysis
Foundations of real analysis, including metric spaces and point set topology, infinite series, and function spaces. TTH 1–2:15

ENAS 514b[U], Real Analysis Philip Gressman
The Lebesgue integral, Fourier series, applications to differential equations. TTH 1–2:15

ENAS 517b/MB&B 517b3/MCDB 517b3/PHYS 517b3, Methods and Logic in Interdisciplinary Research Lynne Regan, Julien Berro, Enrique De La Cruz, Eric Dufresne, Thierry Emonet, Paul Forscher, Jonathon Howard, Megan King, Simon Mochrie, Corey O'Hern, Thomas Pollard, Yongli Zhang, and staff
This half-term PEB class is intended to introduce students to integrated approaches to research. Each week, the first of two sessions is student-led, while the second session is led by faculty with complementary expertise and discusses papers that use different approaches to the same topic (for example, physical and biological or experiment and theory). Counts as 0.5 credit toward graduate course requirements. MW 5–7

ENAS 518a/MB&B 635a[U], Quantitative Approaches in Biophysics and Biochemistry
Yong Xiong, Julien Berro, Nikhil Malvankar
The course offers an introduction to quantitative methods relevant to analysis and interpretation of biophysical and biochemical data. Topics covered include statistical testing, data presentation, and error analysis; introduction to dynamical systems; analysis of large datasets; and Fourier analysis in signal/image processing and macromolecular structural studies. The course also includes an introduction to basic programming skills and data analysis using MATLAB. Real data from research groups in MB&B are used for practice. Prerequisites: MATH 120 and MB&B 600a or equivalents, or permission of the instructors. TTH 9–10:15

ENAS 521b, Classical and Statistical Thermodynamics Chinedum Osuji
A unified approach to bulk-phase equilibrium thermodynamics, bulk-phase irreversible thermodynamics, and interfacial thermodynamics in the framework of classical thermodynamics, and an introduction to statistical thermodynamics. Both the activity coefficient and the equations of state are used in the description of bulk phases. Emphasis

on classical thermodynamics of multicomponents, including concepts of stability and criticality, curvature effect, and gravity effect. The choice of Gibbs free energy function covers applications to a broad range of problems in chemical, environmental, biomedical, and petroleum engineering. The introduction includes theory of Gibbs canonical ensembles and the partition functions, fluctuations; Boltzmann statistics; Fermi-Dirac and Bose-Einstein statistics. Application to ideal monatomic and diatomic gases is covered.

[**ENAS 525a^{U}, Optimization I**]

ENAS 530b^{U}, Optimization Techniques Sekhar Tatikonda
Fundamental theory and algorithms of optimization, emphasizing convex optimization. The geometry of convex sets, basic convex analysis, the principle of optimality, duality. Numerical algorithms: steepest descent, Newton's method, interior point methods, dynamic programming, unimodal search. Applications from engineering and the sciences. MW 2:30–3:45

ENAS 534a^{U}, Biomaterials Anjelica Gonzalez
Introduction to materials, classes of materials from atomic structure to physical properties. Major classes of materials: metals, ceramics and glasses, and polymers, addressing their specific characteristics, properties, and biological applications. Throughout the presentation of the synthesis, characterization, and properties of the classes of materials, a connection is made to the selection of materials for use in specific biological applications by matching the material's properties to those necessary for success in the application. Case studies address the successes and failures of particular materials from each of the classes in biological applications. MW 11:35–12:50

ENAS 535b^{U}/PATH 630b, Biomaterial-Tissue Interactions Themis Kyriakides
The course addresses the interactions between tissues and biomaterials, with an emphasis on the importance of molecular- and cellular-level events in dictating the performance and longevity of clinically relevant devices. In addition, specific areas such as biomaterials for tissue engineering and the importance of stem/progenitor cells, and biomaterial-mediated gene and drug delivery are addressed. TTH 9–10:15

ENAS 541a/CB&B 523a/MB&B 523a/PHYS 523a, Biological Physics Corey O'Hern
An introduction to the physics of several important biological phenomena including transport in the cell cytoplasm, protein folding, DNA packaging, and thermodynamics of protein binding and aggregation. The material and approach are positioned at the interface of the physical and biological sciences, and involve significant computation. This course teaches the basics of computer programming necessary for quantitative studies of biological systems. We start with the foundations of programming in MATLAB. During the course, students perform sophisticated data analyses, view and analyze protein structures, and perform Monte Carlo and molecular dynamics simulations. No prior programming experience is needed. TTH 1–2:15

ENAS 549b, Biomedical Data Analysis Richard Carson
The course focuses on the analysis of biological and medical data associated with applications of biomedical engineering. It provides basics of probability and statistics, and analytical approaches for determination of quantitative biological parameters from noisy,

experimental data. Programming in MATLAB to achieve these goals is a major portion of the course. Applications include Michaelis-Menten enzyme kinetics, Hodgkin-Huxley, neuroreceptor assays, receptor occupancy, MR spectroscopy, PET neuroimaging, brain image segmentation and reconstruction, and molecular diffusion.

ENAS 550a[U]/C&MP 550a[U]/MCDB 550a[U]/PHAR 550a, Physiological Systems
Emile Boulpaep, Stuart Campbell
The course develops a foundation in human physiology by examining the homeostasis of vital parameters within the body, and the biophysical properties of cells, tissues, and organs. Basic concepts in cell and membrane physiology are synthesized through exploring the function of skeletal, smooth, and cardiac muscle. The physical basis of blood flow, mechanisms of vascular exchange, cardiac performance, and regulation of overall circulatory function are discussed. Respiratory physiology explores the mechanics of ventilation, gas diffusion, and acid-base balance. Renal physiology examines the formation and composition of urine and the regulation of electrolyte, fluid, and acid-base balance. Organs of the digestive system are discussed from the perspective of substrate metabolism and energy balance. Hormonal regulation is applied to metabolic control and to calcium, water, and electrolyte balance. The biology of nerve cells is addressed with emphasis on synaptic transmission and simple neuronal circuits within the central nervous system. The special senses are considered in the framework of sensory transduction. Weekly discussion sections provide a forum for in-depth exploration of topics. Graduate students evaluate research findings through literature review and weekly meetings with the instructor. MWF 9:25–10:15

ENAS 551a[U], Biotransport and Kinetics Kathryn Miller-Jensen
Creation and critical analysis of models of biological transport and reaction processes. Topics include mass and heat transport, biochemical interactions and reactions, and thermodynamics. Examples from diverse applications, including drug delivery, biomedical imaging, and tissue engineering. TTH 11:35–12:50

ENAS 553a, Immuno-Engineering Tarek Fahmy
An advanced class that introduces immunology principles and methods to engineering students. The course focuses on biophysical principles and biomaterial applications in understanding and engineering immunity. The course is divided into three parts. The first part introduces the immune system: organs, cells, and molecules. The second part introduces biophysical characterization and quantitative modeling in understanding immune system interactions. The third part focuses on intervention, modulation, and techniques for studying the immune system with emphasis on applications of biomaterials for intervention and diagnostics. MW 2:30–3:45

[ENAS 554b[U], Continuum Biomechanics]

ENAS 555b[U], Vascular Mechanics Jay Humphrey
This course is designed to enable students to apply methods of continuum biomechanics to study diverse vascular conditions and treatments, including aging, atherosclerosis, aneurysms, effects of hypertension, design of tissue-engineered constructs, and vein grafts from an engineering perspective. Emphasis is placed on ensuring that the mechanics is driven by advances in the vascular mechanobiology. TTH 2:30–3:45

[ENAS 557b[U], Musculoskeletal Biomechanics]

ENAS 558a[U], Introduction to Biomechanics Jay Humphrey
An introduction to the biomechanics used in biosolid mechanics, biofluid mechanics, biothermomechanics, and biochemomechanics. Diverse aspects of biomedical engineering, from basic mechanobiology to characterization of materials behaviors and the design of medical devices and surgical interventions. MW 11:35–12:50

ENAS 561b/AMTH 765b/CB&B 562b/INP 562b/MB&B 562b[U]/MCDB 562b[U]/ PHYS 562b, Dynamical Systems in Biology Damon Clark, Jonathon Howard
This course covers advanced topics in computational biology. How do cells compute, how do they count and tell time, how do they oscillate and generate spatial patterns? Topics include time-dependent dynamics in regulatory, signal-transduction, and neuronal networks; fluctuations, growth, and form; mechanics of cell shape and motion; spatially heterogeneous processes; diffusion. This year, the course spends roughly half its time on mechanical systems at the cellular and tissue level, and half on models of neurons and neural systems in computational neuroscience. Prerequisite: MCDB 561a or equivalent, or a 200-level biology course, or permission of the instructor. TTH 2:30–3:45

[ENAS 563b[U], Fault Tolerant Computer Systems]

ENAS 564b[U], Tissue Engineering Laura Niklason
Introduction to the major aspects of tissue engineering, including materials selection and information on synthetic and natural scaffolds; cell biology considerations including cues for replication, differentiation, adhesion, and senescence; bioreactor design at laboratory and commercial scale and bioreactor design considerations; and tissue- and organ-level physiology with a focus on design criteria for engineered tissue replacements. Course involves team laboratory project to engineer a connective tissue. Class sessions include lectures and hands-on laboratory work. MW 9:25–10:15, W 2:30–4:30

ENAS 566a[U], Engineering of Drug Delivery W. Mark Saltzman
Drug delivery is a field of biomedical engineering that aims to develop approaches and technologies for getting pharmaceutical agents into particular cells and tissues in the body for a biological effect, while minimizing unwanted toxic or side effects. The course describes two interrelated fields of study: (1) mathematical descriptions of the biological barriers to drug delivery (diffusion, permeation through membranes, lifetime of circulation); and (2) engineering design to improve drug delivery. Prerequisite: ENAS 551a. MW 9–10:15

ENAS 567b[U], Systems Biology of Cell Signaling Andre Levchenko
This course designed for graduate and advanced undergraduate students is focused on systems biology approaches to the fundamental processes underlying the sensory capability of individual cells and cell-cell communication in health and disease. The course is designed to provide deep treatment of both the biological underpinnings and mathematical modeling of the complex events involved in signal transduction. As such, it can be attractive to students of biology, bioengineering, biophysics, computational biology, and applied math. The class is part of the planned larger track in systems biology, being one of its final, more specialized courses. In spite of this, each lecture has friendly introduction

to the specific topic of interest, aiming to provide sufficient refreshment of the necessary knowledge. The topics have been selected to represent both cutting-edge directions in systems analysis of signaling processes and exciting settings to explore, making learning complex notions more enjoyable. Prerequisites: basic knowledge of biochemistry and cell biology, as well as programming experience and basic notions from probability theory and differential equations. MW 4–5:15

ENAS 570b[U]/C&MP 560b[U]/MCDB 560b[U]/PHAR 560b, Cellular and Molecular Physiology: Molecular Machines in Human Disease Emile Boulpaep, Fred Sigworth

The course focuses on understanding the processes that transfer molecules across membranes at the cellular, molecular, biophysical, and physiological levels. Students learn about the different classes of molecular machines that mediate membrane transport, generate electrical currents, or perform mechanical displacement. Emphasis is placed on the relationship between the molecular structures of membrane proteins and their individual functions. The interactions among transport proteins in determining the physiological 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. MWF 9:25–10:15

ENAS 575a[U]/CPSC 575a[U], Computational Vision and Biological Perception Steven Zucker

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. MW 2:30–3:45

[ENAS 576b[U]/AMTH 667b/CPSC 576b[U], Advanced Computational Vision]

ENAS 580a, Clinical Research in Biomedical Engineering W. Mark Saltzman, James Duncan

The course is designed to provide graduate students in Biomedical Engineering with a broad perspective of research topics in their field, with a particular focus on topics directed toward clinically oriented research. Students attend a series of lectures by speakers from both inside and outside the Yale BME research community covering the areas of biomaterials/tissue engineering, drug delivery systems, biomechanics, and bioimaging. The week after each lecture, students gather to address questions posed by the lecturing faculty and the course organizers, with discussion led by the students themselves. In addition, each student picks a topic related to one of the lectures given during the term and submits an extended written analysis. T 4–5:50

ENAS 585a[U], Fundamentals of Neuroimaging Fahmeed Hyder, Douglas Rothman

The neuroenergetic and neurochemical basis of several dominant neuroimaging methods, including fMRI. Topics range from technical aspects of different methods to interpretation of the neuroimaging results. Controversies and/or challenges for application of fMRI and related methods in medicine are identified. W 3:30–5:30

ENAS 600a[U], Computer-Aided Engineering Marshall Long
Aspects of computer-aided design and manufacture (CAD/CAM). The computer's role in the mechanical design and manufacturing process; commercial tools for two- and three-dimensional drafting and assembly modeling; finite-element analysis software for modeling mechanical, thermal, and fluid systems.

[**ENAS 601a, Materials Chemistry**]

ENAS 602b, Chemical Reaction Engineering Eric Altman
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. TTH 1–2:15

ENAS 603a, Energy, Mass, and Momentum Processes Michael Loewenberg
Application of continuum mechanics approach to the understanding and prediction of fluid flow systems that may be chemically reactive, turbulent, or multiphase.

[**ENAS 605b, Colloidal Chemical Engineering**]

[**ENAS 606b, Polymer Physics**]

[**ENAS 608b, Surface and Surface Processes**]

ENAS 609b, Nanotechnology for Energy Lisa Pfefferle
This is a comprehensive course with content at the intersection of nanoscale science, engineering, and technology, including application areas and nanofabrication technique. Topics include nanoscaled photovoltaic cells, hydrogen storage, fuel cells, and nanoelectronics; layer-by-layer assembly; organic-inorganic mesostructures; colloidal crystals, organic monolayers, proteins, DNA and abalone shells; synthesis of carbon nanotubes, nanowire, and nanocrystals; microelectromechanical systems (MEMs) devices; photolithography, electron beam lithography, and scanning probe lithography; lithium-based batteries; and nanomanufacturing (roll to roll, nanoimprint lithography, inkjet printing).

ENAS 610a[U], Biomolecular Engineering Corey Wilson
A survey of the principles and scope of biomolecular engineering. Discussion of concepts at the interface of applied mathematics, biology, biophysical chemistry, and chemical engineering that are used to develop novel molecular tools, materials, and approaches based on biological building blocks and machinery. Modeling the physicochemical properties that confer function in biological systems; low- and high-resolution protein engineering; the design of synthetic interactomes.

ENAS 611a[U], Separation Processes Lisa Pfefferle
Theory and design of separation processes for multicomputer and/or multiphase mixtures via equilibrium and rate phenomena. Included are single-stage and cascaded absorption, adsorption, extraction, distillation, filtration, and crystallization processes.

[**ENAS 612a[U], Biomolecular Engineering Laboratory**]

[**ENAS 614b, Surface and Thin-Film Characterization**]

[**ENAS 615a, Synthesis of Nanomaterials**]

[ENAS 616b, Multiscale Modeling and Design in Biology]

[ENAS 618a, Principles and Practice of Heterogeneous Catalysis]

ENAS 626a[U], Chemical Engineering Process Control Eric Altman
Transient regime modeling and simulations of chemical processes. Conventional and state-space methods of analysis and control design. Applications of modern control methods in chemical engineering. Course work includes a design project.

[ENAS 628b[U], Sensors and Biosensors]

ENAS 638a, Water Chemistry Desirée Plata
Aqueous inorganic chemistry for environmental engineering. Topics include acid-base chemistry, alkalinity, the carbonate system, speciation, precipitation/dissolution, redox chemistry, Eh/pH diagrams.

[ENAS 639a, Management of Water Resources and Environmental Systems]

ENAS 640b/F&ES 707b[U], Aquatic Chemistry Gaboury Benoit
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.

ENAS 641a[U], Biological Processes in Environmental Engineering Jordan Peccia
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, Environmental Physicochemical Processes Menachem Elimelech
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. TTH 2:30–3:45

ENAS 643b, Transport and Fate of Organic Chemicals in the Environment
Desirée Plata
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: the use of chemical and physical principles to quantify the thermodynamics and

kinetics of individual processes; the use of chemical structure to understand these processes at the molecular level; and a framework for evaluation of the relative importance of these processes so that the fate of a particular chemical in a particular environment may be predicted.

[**ENAS 644b, Environmental Chemical Kinetics**]

ENAS 645a/F&ES 884a, Industrial Ecology Marian Chertow, Edgar Hertwich
Industrial ecology studies (1) the flows of materials and energy in industrial and consumer activities, (2) the effects of these flows on the environment, and (3) the influences of economic, political, regulatory, and social factors on the flow, use, and transformation of resources. The goals of the course are to define and describe industrial ecology; to demonstrate the relationships among production, consumption, sustainability, and industrial ecology in diverse settings, from firms to cities to international trade flows; to show how industrial ecology serves as a framework for the consideration of environmental and sustainability-related aspects of science, technology, and policy; and to define and describe tools, applications, and implications of industrial ecology. MW 1–2:15

[**ENAS 646b/F&ES 714b[U], Environmental Hydrology**]

[**ENAS 648a[U], Environmental Transport Processes**]

ENAS 649a/MGT 611a, Policy Modeling Edward Kaplan
Building on earlier course work in quantitative analysis and statistics, Policy Modeling provides an operational framework for exploring the costs and benefits of public policy decisions. The techniques employed include "back of the envelope" probabilistic models, Markov processes, queuing theory, and linear/integer programming. With an eye toward making better decisions, these techniques are applied to a number of important policy problems. In addition to lectures, assigned articles and text readings, and short problem sets, students are responsible for completing a take-home midterm exam and a number of cases. In some instances, it is possible to take a real problem from formulation to solution, and compare the student's own analysis to what actually happened. Prerequisites: Decision Analysis and Game Theory, Data Analysis and Statistics, or a demonstrated proficiency in quantitative methods.

[**ENAS 655a[U], Environmental Risk Assessment**]

[**ENAS 658a, MEMS Design**]

ENAS 660b[U]/F&ES 885b, Green Engineering and Sustainability Julie Zimmerman
This hands-on course highlights the key approaches to advancing sustainability through engineering design. The class begins with discussions on sustainability, metrics, general design processes, and challenges to sustainability. The current approach to design, manufacturing, and disposal is discussed in the context of examples and case studies from various sectors. This provides a basis for what and how to consider when designing products, processes, and systems to contribute to furthering sustainability. The fundamental engineering design topics to be addressed include toxicity and benign alternatives, pollution prevention and source reduction, separations and disassembly, material and energy efficiencies and flows, systems analysis, biomimicry, and life cycle design, management,

and analysis. Students tackle current engineering and product design challenges in a series of class exercises and a final design project. MW 1–2:15

[**ENAS 673b[U], Air Quality and Energy**]

ENAS 703a[U], Introduction to Nanomaterials and Nanotechnology
Survey of nanomaterial synthesis methods and current nanotechnologies. Approaches to synthesizing nanomaterials; characterization techniques; device applications that involve nanoscale effects.

ENAS 704a, Theoretical Fluid Dynamics Juan de la Mora
Derivation of the equations of fluid motion from basic principles. Potential theory, viscous flow, flow with vorticity. Topics in hydrodynamics, gas dynamics, stability, and turbulence. TTH 11:35–12:50

[**ENAS 705b/MB&B 715b/PHYS 705b, Numerical Simulations of Liquids**]

[**ENAS 708a, Fundamentals of Combustion**]

[**ENAS 711b[U], Biomedical Microtechnology and Nanotechnology**]

[**ENAS 718a[U], Heterojunction Devices**]

ENAS 725b[U]/APHY 725b[U], Advanced Synchrotron Techniques and Electron Spectroscopy of Materials Charles Ahn
This course provides descriptions of advanced concepts in synchrotron X-ray and electron-based methodologies for studies of a wide-range of materials at atomic and nano-scales. Topics include X-ray and electron interactions with matter, X-ray scattering and diffraction, X-ray spectroscopy and inelastic methods, time-resolved applications, X-ray imaging and microscopy, photo-electron spectroscopy, electron microscopy and spectroscopy, among others. Emphasis is on applying the fundamental knowledge of these advanced methodologies to real-world materials studies in a variety of scientific disciplines. T 1:30–3:20

ENAS 747a[U], Applied Numerical Methods I Beth Anne Bennett
The derivation, analysis, and implementation of various numerical methods. Topics include root-finding methods, numerical solution of systems of linear and nonlinear equations, eigenvalue/eigenvector approximation, polynomial-based interpolation, and numerical integration. Additional topics such as computational cost, error analysis, and convergence are addressed in a variety of contexts. TTH 11:35–12:50

[**ENAS 748b[U], Applied Numerical Methods II**]

[**ENAS 752a, Solidification and Phase Transformations**]

[**ENAS 758b[U], Multiscale Models of Biomechanical Systems**]

[**ENAS 777, Introduction to Robot Analysis**]

[**ENAS 787b, Forces on the Nanoscale**]

[**ENAS 802a[U], Nano and Microsystem Technology**]

ENAS 805b[U], Biotechnology and the Developing World Anjelica Gonzalez
This interactive course explores how advances in biotechnology enhance the quality of life in the developing world. Implementing relevant technologies in developing countries is not without important challenges; technical, practical, social, and ethical aspects of the growth of biotechnology are explored. Readings from *Biomedical Engineering for Global Health* as well as recent primary literature; case studies, in-class exercises, and current events presentations. Guest lecturers include biotechnology researchers, public policy ethicists, preventive research physicians, public-private partnership specialists, and engineers currently implementing health-related technologies in developing countries. TTH 1–2:15

ENAS 806b[U], Photovoltaic Energy Minjoo Lee
Electricity from photovoltaic solar cells is receiving increasing attention due to growing world demand for clean power sources. This course primarily emphasizes device physics of photovoltaics; statistics of charge carriers in and out of equilibrium; design of solar cells; and optical, electrical, and structural properties of semiconductors relevant to photovoltaics. Two laboratory sessions and a final project aid students in understanding both the applications and limitations of photovoltaic technology. The main objectives of this course are to equip students with the necessary background and analytical skills to understand and assess established and emerging photovoltaic technologies; to familiarize students with the diverse range of photovoltaic materials; and to connect materials properties to aspects of cell design, processing, and performance.

[**ENAS 812b/INP 612b, Molecular Transport and Intervention in the Brain**]

[**ENAS 821b[U], Physics of Medical Imaging**]

ENAS 825b, Physics of Magnetic Resonance Spectroscopy in Vivo Graeme Mason, Robin de Graaf
The physics of chemical measurements performed with nuclear magnetic resonance spectroscopy, with special emphasis on applications to measurement studies in living tissue. Concepts that are common to magnetic resonance imaging are introduced. Topics include safety, equipment design, techniques of spectroscopic data analysis, and metabolic modeling of dynamic spectroscopic measurements. MW 11:35–12:50

ENAS 830b, Biomedical Optical Imaging Michael Choma
This course is an introduction to biomedical imaging using light. It covers different mechanisms of image formation as well as the physical properties of light that enable these different mechanisms. There is a particular emphasis on confocal microscopy and optical coherence tomography. The course also discusses the clinical use of biomedical optical imaging. Prerequisites: prior course work in medical imaging and/or optics is preferable. Please contact the instructor with questions. M 9:25–11:15

[**ENAS 836a[U], Biophotonics and Optical Microscopy**]

[**ENAS 848a/PHYS 528a, Soft Condensed Matter Physics**]

ENAS 850a[U] and 851b[U]/APHY 548a[U] and 549b[U]/PHYS 548a[U] and 549b[U], Solid State Physics I and II Victor Henrich [F], Michel Devoret [Sp]
A two-term sequence covering the principles underlying the electrical, thermal, magnetic, and optical properties of solids, including crystal structures, phonons, energy bands, semiconductors, Fermi surfaces, magnetic resonance, phase transitions, and superconductivity. Fall: TTH 1–2:15; Spring: TTH 1–2:15

ENAS 866a[U], CMOS Transistors and Beyond Tso-Ping Ma
This course covers the science and technology of current and future CMOS devices, including transistor physics, device processing, and characterization. In addition to weekly lectures, students are expected to make an in-depth study of a relevant topic (to be determined jointly with the instructor), write a term paper, and make an associated oral presentation to the class. T 3:30–5:30

[**ENAS 875a[U], Introduction to VLSI System Design**]

ENAS 880a/INP 523a, Imaging Drugs in the Brain Evan Morris, Kelly Cosgrove, Michelle Hampson
Seminar course to explore the uses of PET, SPECT, and fMRI to study the mechanisms of action and long-term effects of drugs (legal and illegal) on brain function. Basic research is the main focus, augmented by two class periods allotted to uses of imaging in drug development by Pharma. Syllabus is comprised of review articles, book chapters, and journal articles. Some class periods begin with a short lecture to cover methodological concepts, followed by discussion of reading material. Topics include basic understanding of imaging technology (physics, biochemistry, and mathematics) as it relates to imaging of drugs, receptors, neurotransmitters; understanding the primary outcomes of imaging experiments; imaging experiment design; recent findings related to drug abuse; common neurophysiological pathways of addictive drugs (how to image reward); and uses of imaging in drug development (what do drug companies want to measure?). T 3:30–5:20

ENAS 900b, Distributed Computation and Decision Making A. Stephen Morse
Within the field of network science there has long been interest in distributed computation and distributed decision-making problems of many types. Among these are consensus and flocking problems, the multi-robot rendezvous problem, distributed averaging, distributed solutions to linear algebraic equations, social networking problems, localization of sensors in a multisensor network, and the distributed management of robotic formations. The aim of this course is to explain what these problems are and to discuss their solutions. Related concepts from spectral graph theory, rigid graph theory, nonhomogeneous Markov chain theory, stability theory, and linear system theory are covered. Prerequisite: although most of the mathematics needed are covered in the lectures, students taking this course should have a working understanding of basic linear algebra.

ENAS 902a[U], Linear Systems A. Stephen Morse
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 feedback control, signal and image processing, robotics, econometrics, and social and biological networks. MW 1–2:15

ENAS 907a[U], Computer Architectures for Cognitive Processing and Machine Learning Richard Lethin
Introduction to the development of computer architectures specialized for cognitive processing, both offline "thinking machines" as well as embedded devices. History of machines starting with early conceptions in defense systems to contemporary initiatives. Instruction sets, memory systems, parallel processing, analog architectures, probabilistic architectures, graph computing architectures, machine-learning architectures. Application and algorithm characteristics. TH 1:30–3:20

[**ENAS 912a[U], Biomedical Image Processing and Analysis**]

[**ENAS 913b, Probability and Estimation Theory for Image Analysis**]

[**ENAS 915b, Tracer Kinetics and Modeling**]

[**ENAS 920b, Programming for Image Analysis**]

[**ENAS 921a, Advanced Topics in Computer Engineering**]

ENAS 930b[U], Energy Semiconductor Fundamentals Jung Han
Topics to include semiconductor physics, optical properties, electrical transport properties, thermal properties, and piezoelectric properties. TTH 9–10:15

ENAS 936a[U], Systems and Control Kumpati Narendra
Design of feedback control systems with applications to engineering, biological, and economic systems. Topics include stat-space representation, stability, controllability, and observability of discrete-time systems; system identification; optimal control of systems with multiple outputs. TTH 11:35–12:50

ENAS 938b[U], Neural Networks for Pattern Recognition, Identification, and Control Kumpati Narendra
Following a brief introduction to the theory of artificial neural networks and linear adaptive control, the course discusses in detail adaptive identification and control problems in nonlinear dynamical systems. Students work on individual projects, and the final grade depends on their performance in the midterm, problem sets, and the final project report. Prerequisite: ENAS 936a or permission of the instructor. TTH 11:35–12:50

ENAS 944b[U], Digital Communications Systems Wenjun Hu
An introduction to the rapidly expanding field of mobile and fixed, voice and data communications systems. A review of analog and digital signals and their time and frequency domain representations. Topics include modulation methods, including amplitude; frequency and time division multiplexing for continuous and discrete/digital signals; an overview of modern voice and data communications networks; and an overview of information theory, including entropy, the quantification of information, data rates, coding, and compression. Examples and demonstrations are drawn from radio, telephone, television, computer, cellular, and satellite communications networks. MW 9–10:15

ENAS 951b[U], Wireless Communications Wenjun Hu
This course aims to weave together fundamental theory of wireless communications, its application, and the design and implementation of wireless network architectures. The concepts are illustrated using examples such as WiFi and LTE. Particular emphasis is placed on the interplay between concepts and their implementation in real systems. Students can expect to learn background knowledge of some everyday wireless technologies and how to design systems based on the fundamental communications concepts. MW 9–10:15

ENAS 954b[U]/STAT 664b[U], Information Theory Yihong Wu
Foundations of information theory in communications, statistical inference, statistical mechanics, probability, and algorithmic complexity. Quantities of information and their properties: entropy, conditional entropy, divergence, redundancy, mutual information, channel capacity. Basic theorems of data compression, data summarization, and channel coding. Applications in statistics. TTH 9–10:15

[ENAS 960a[U]/CPSC 536a[U], Networked Embedded Systems and Sensor Networks]

ENAS 962a, Theoretical Challenges in Network Science Amin Karbasi
This is an interdisciplinary course with a focus on the emerging science of complex networks and their mathematical models. Students learn about the recent research on the structure and analysis of such networks, and on models that abstract their basic properties. Topics include random graphs and their properties, probabilistic techniques for link analysis, centralized and decentralized search algorithms, random walks, diffusion and epidemic processes, and spectral methods. TTH 1–2:15

ENAS 963b, Network Algorithms and Stochastic Optimization Leandros Tassiulas
This course focuses on resource allocation models as well as associated algorithms and design and optimization methodologies that capture the intricacies of complex networking systems in communications computing as well as transportation, manufacturing, and energy systems. Max-weight scheduling, back-pressure routing, wireless opportunistic scheduling, time-varying topology network control, and energy-efficient management are sample topics to be considered, in addition to Lyapunov stability and optimization, stochastic ordering, and notions of fairness in network resource consumption. TTH 9–10:15

[ENAS 964b, Communication Networks]

ENAS 967a[U], Computer Organization and Architecture Jakub Szefer
Introduction to computer architecture, including computer organization, microprocessors, caches and memory hierarchies, I/O, and storage. Issues involving performance, energy, and security; processor benchmarking. Selected readings from current academic literature. TTH 2:30–3:45

ENAS 986b[U], Semiconductor Silicon Devices and Technology Tso-Ping Ma
Introduction to 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. MW 9–10:15

ENAS 990a and b, Special Investigations
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 994b[U], Mechatronics Laboratory
Hands-on synthesis of control systems, electrical engineering, and mechanical engineering. Review of Laplace transforms, transfer functions, software tools for solving ODEs. Review of electronic components and introduction to electronic instrumentation. Introduction to sensors; mechanical power transmission elements; programming microcontrollers; PID control.

ENGLISH LANGUAGE AND LITERATURE

Linsly-Chittenden Hall, 203.432.2233
http://english.yale.edu
M.A., M.Phil., Ph.D.

Chair
Langdon Hammer [F]
Ruth Bernard Yeazell [Sp]

Director of Graduate Studies
Ardis Butterfield (106a LC, 203.432.2226, graduate.english@yale.edu)

Professors Jessica Brantley, Leslie Brisman, David Bromwich, Ardis Butterfield, Jill Campbell, Janice Carlisle (*on leave* [Sp]), Joe Cleary, Michael Denning, Wai Chee Dimock, Roberta Frank, Paul Fry (*on leave* [F]), Jacqueline Goldsby, Langdon Hammer, Margaret Homans (*on leave* [Sp]), Amy Hungerford, David Scott Kastan, Jonathan Kramnick (*on leave*), Lawrence Manley, Stefanie Markovits (*on leave* [F]), Alastair Minnis (*on leave* [Sp]), Stephanie Newell, Caryl Phillips (*on leave* [Sp]), David Quint, Joseph Roach, Marc Robinson, John Rogers, Caleb Smith (*on leave*), Robert Stepto (*on leave* [F]), Katie Trumpener (*on leave* [F]), Michael Warner, Ruth Bernard Yeazell

Associate Professors Catherine Nicholson, Anthony Reed (*on leave* [F]), R. John Williams

Assistant Professors Marta Figlerowicz, Benjamin Glaser (*on leave* [F]), Joseph North, Jill Richards (*on leave*), Sunny Xiang

Fields of Study

Fields include English language and literature from Old English to the present, American literature, and Anglophone world literature.

Special Admissions Requirements

Application should be accompanied by scores from the GRE and the GRE "Literature in English" subject test, a personal statement of purpose, and a writing sample of up to twenty pages.

Special Requirements for the Ph.D. Degree

In order to fulfill the basic requirements for the program, a student must:

1. Complete twelve courses—six courses with at least one grade of Honors and a maximum of one grade of Pass by July 15 following the first year; at least twelve courses with grades of Honors in at least four of these courses and not more than one Pass by July 15 following the second year. One of these twelve courses must be The Teaching of English (ENGL 990). Courses selected must include one medieval, one early-modern, one eighteenth- and/or nineteenth-century, one twentieth- and/or twenty-first-century.

2. Satisfy the language requirement by the end of the second year. Two languages appropriate to the student's field of specialization, each to be demonstrated by (a) *passing a translation exam* administered by a Yale language department or (for languages not tested elsewhere at Yale) by the English department; (b) *passing an advanced literature course at Yale* (graduate or upper-level undergraduate, with DGS approval); or (c) *passing both ENGL 500 and ENGL 501*.
3. Pass the oral examination before or as early as possible in the fifth term of residence. The exam consists of questions on five topics, developed by the student in consultation with examiners and subject to approval by the DGS.
4. Submit a dissertation prospectus, normally by January 15 of the third year.
5. Teach a minimum of two terms.
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

The Department of English Language and Literature also offers, in conjunction with the Department of African American Studies, a combined Ph.D. degree in English Language and Literature and African American Studies. For further details, see African American Studies.

ENGLISH AND FILM AND MEDIA STUDIES

The Department of English Language and Literature also offers, in conjunction with the Film and Media Studies Program, a combined Ph.D. degree in English Language and Literature and Film and Media Studies. For further details, see Film and Media Studies.

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 Degree Requirements under Policies and Regulations. Additionally, students in English are eligible to pursue a supplemental M.Phil. degree in Medieval Studies. 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 seven courses with at least one grade of Honors and a maximum of one grade of Pass, and the passing of one foreign language.

Terminal 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 DGS). There must be at least one grade of Honors, and there may not be more than one grade of Pass. Students must also demonstrate proficiency in one foreign language (as described under Ph.D. Requirements, above).

Courses

For expanded course descriptions, please visit the English department Web site: http://english.yale.edu/courses.

ENGL 500a/LING 500a, Introduction to Old English Language and Literature
Roberta Frank
The essentials of the language, some prose readings, and close study of several celebrated Old English poems. TTH 9–10:15

ENGL 501b/LING 501b, *Beowulf* and the Northern Heroic Tradition Roberta Frank
A close reading of *Beowulf,* with some attention to shorter heroic poems. W 9:25–11:15

ENGL 545a/CPLT 582a/FREN 802a, Medieval Translation Ardis Butterfield
Using modern postcolonial as well as medieval theories of translation, memory, and bilingualism we explore how texts are transformed, cited, and reinvented in the medieval period. What happens to language under the pressure of crosslingual reading practices? How can the freedom and inventiveness of medieval poetic practices illuminate modern theories of translation? Texts include material in French, English, Latin, and Italian. Proficiency in any one or more of these languages is welcome, but every effort will be made to use texts available in modern English translation, so as to include as wide a participation as possible in the course. W 9:25–11:15

ENGL 548a/CPLT 670a/ITAL 601a, Ariosto and Cervantes David Quint
The year 2016 marks the 500th anniversary of the *Orlando furioso* and the 400th anniversary of the death of Cervantes. This course reads the *Orlando furioso,* Ariosto's *Cinque canti,* and *Don Quijote* as depictions of the crisis of chivalry, and it charts, in the case of *Don Quijote,* the birth of the modern novel. It examines the use in these works of mirroring episodes—*entrelacement*—and interpolated tales. It also looks at similar techniques in Apuleius's *The Golden Ass,* in the *Thousand and One Nights,* and in Sir Philip Sidney's *New Arcadia*. T 10:30–12:20

ENGL 551a, Spenser's Readers Catherine Nicholson
This course has two complementary, though sometimes divergent, objects of interest: the first is the poetry of Edmund Spenser, particularly his immense allegorical epic-romance, *The Faerie Queene;* the second is that poem's varied and often vexed reception history, from the late sixteenth century through the present. *The Faerie Queene* is a poem about interpretation—its pleasures and its discontents—and we often find ourselves reading over the shoulders of readers in the poem. But it is also possible to read the poem through the eyes of other historical readers, adopting their (often alien) expectations, ambitions, and preoccupations as a way of discovering new things in the text and of reflecting on the biases and assumptions of our own critical practices. In this sense, this is a course about readerly methods and the history of reading as well as a course about Spenser, and participants whose primary interests lie outside the English Renaissance are warmly welcomed. TH 1:30–3:20

ENGL 561a, Studies in Seventeenth-Century English Literature John Rogers
A survey of seventeenth-century poetry and prose, exclusive of Milton. Authors include Bacon, Donne, Hobbes, Herbert, Browne, Crashaw, Marvell, Cavendish, Bunyan, and Dryden. T 1:30–3:20

ENGL 623b, Jacobean Shakespeare Lawrence Manley
A study of Shakespeare's later plays, emphasizing form and dramaturgy, in relation to works by his contemporaries and to the institutions of the Jacobean theater. Nine plays by Shakespeare and masques and plays by Marston, Middleton, Chapman, Tourneur, Webster, and Beaumont and Fletcher. M 3:30–5:20

ENGL 708b/AFAM 705b/AMST 708b/HIST 708b/HSHM 729b, The History of Race Greta LaFleur
This course offers a broad survey of the history of racial science and racialist thinking in the Atlantic world from the early modern period through the late nineteenth century. Rather than attempting to detail the histories of specific racial formations (such as blackness or whiteness), the course tracks the intellectual history of the emergence of "race" as a specific category of human differentiation and traces a swath of its most muscular—and pernicious—permutations through the eighteenth and nineteenth centuries. W 1:30–3:20

ENGL 742b/WGSS 769b, Fiction, Didacticism, and Political Critique: 1789–1818 Jill Campbell
A study of writings that seek a specific effect in their reader—whether didactic instruction and moral formation, or an instigation to take action toward political change—and their uneasy alliance in the late eighteenth and early nineteenth centuries with the literary genre of prose fiction. How do writings that seek to inform or reform the real person or the real world put fictional narratives to use? How is the genre of the novel shaped, explicitly or implicitly, by writing to a specific "end"? Texts include novels, tales for children, life-writing, poetry with a "cause," polemical essays; possible authors include Olaudah Equiano, Edmund Burke, William Godwin, Mary Wollstonecraft, Hannah More, Maria Edgeworth, Jane Austen, Anna Barbauld, and Mary Shelley. T 1:30–3:20

ENGL 756a, The Possibilities of Romanticism: Byron, Shelley, Keats Paul Fry
Poetry and prose of Byron, Shelley, and Keats with emphasis on both their differences and their common qualities. Special attention is given to the complex interactions of these poets with Wordsworth and Coleridge. TH 10:30–12:20

ENGL 810b[U], Victorian Poetry Leslie Brisman
The major Victorian poets, Tennyson and Browning, in the context of the romanticism they inherited and transformed. A selection of other Victorians whose genius or popularity warrants attention, including Morris, the Rossettis, Hardy, Swinburne, Hopkins, and Barrett Browning. MW 11:35–12:50

ENGL 838b[U]/AMST 775b[U], Performing American Literature Wai Chee Dimock
A broad selection of short stories, poems, and novels, accompanied by class performances throughout the term, culminating in a term project with a significant writing component. "Performance" here includes a wide range of activities, from staging to the making of videos and films, digital game design, and the creative use of social media. Readings include

poetry by Walt Whitman, Emily Dickinson, Yusef Komunyakaa, and Claudia Rankine; fiction by F. Scott Fitzgerald, Jhumpa Lahiri, and Junot Díaz. W 1:30–3:20

ENGL 853b/AMST 848b, Inventing the Environment in the Anthropocene
Michael Warner

Although the concept of the Anthropocene can be dated in various ways, two of the most important benchmarks seem to be the beginning of industrial production in the late eighteenth century and the uptick in carbon dioxide emissions from the mid-nineteenth century (petroleum came into use during the Civil War). The period between these two moments is also that in which the modern language of the environment took shape, from Cuvier's discovery of extinction and Humboldt's holistic earth science to the transformative work of Thoreau and George P. Marsh. This course shuttles between the contemporary debate about the significance and consequences of the Anthropocene and a reexamination of that environmental legacy. We look at the complexity of "nature," beginning with the Bartrams, Jefferson, Cuvier, and the transatlantic literatures of natural history; georgics and other genres of nature writing; natural theology; ambiguities of pastoral in American romantic writing (Bryant, mainly); the impact of Humboldt (Emerson, Thoreau, Whitman); westward expansion and Native American writing about land; Hudson School painting and landscape architecture. We also think about the country/city polarity and the development of "grid" consciousness in places like New York City. One aim is to assess the formation and legacy of key ideas in environmentalism, some of which may now be a hindrance as much as a foundation. Secondary readings from Leo Marx, Henry Nash Smith, and William Cronon, as well as more recent attempts to reconceive environmental history (Joachim Radkau), ecocriticism (Lawrence Buell), and related fields, as well as science journalism (Elizabeth Kolbert). We attend and discuss Dipesh Chakrabarty's Tanner lectures in February. Students are invited to explore a wide range of research projects; and one assignment is to devise a teaching unit for an undergraduate class on the same topic. TH 1:30–3:20

ENGL 911a, British Literature and Culture, 1930–1960 David Bromwich

Intensive survey of British literature from the depression to the Cold War. We begin with the later writings of Lawrence and Yeats, and end with John Osborne and Thom Gunn, allowing for particular attention to the careers of Orwell and Auden. Among the other assigned authors: Woolf, MacDiarmid, Churchill, Gandhi, Isherwood, Bowen, Amis, Larkin, Hughes, Greene, and Green; along with films by Michael Powell, Carol Reed, and Tony Richardson. T 1:30–3:20

ENGL 936b/AFST 746b, Postcolonial World Literature and Theory
Stephanie Newell

Introduction to key debates about post-1945 world literature in English, the politics of English as a language of world literature, and theories of globalization and postcolonial culture. Course themes include colonial history, postcolonial migration, translation, national identity, cosmopolitanism, writing the self, global literary prizes. TH 9:25–11:15

ENGL 938b[U]/AFAM 660b[U]/AFST 678b[U]/CPLT 678b[U]/JDST 678b[U], The Literatures of Blacks and Jews in the Twentieth Century Marc Kaplan
This seminar compares representative writings by African, Caribbean, and African American authors of the past one hundred years, together with European, American, and South African Jewish authors writing in Yiddish, Hebrew, French, and English. This comparison examines the paradoxically central role played by minority, "marginal" groups in the creation of modern literature and the articulation of the modern experience. TH 1:30–3:20

ENGL 948b[U]/AFAM 588b[U]/AMST 710b[U], Autobiography in America Robert Stepto
A study of autobiographical writings from Mary Rowlandson's Indian captivity narrative (1682) to the present. Classic forms such as immigrant, education, and cause narratives; prevailing autobiographical strategies involving place, work, and photographs. Authors include Franklin, Douglass, Jacobs, Antin, Kingston, Uchida, Balakian, Als, and Karr. M 1:30–3:20

ENGL 950a/AFAM 514a/AMST 735a, A Sound Theory of Blackness: African American Literature and Music in High Fidelity Daphne Brooks
An exploration of sonic theory and the African American literary tradition from the nineteenth century through the millennium with special emphasis on major debates in jazz studies and a critical (re)examination of blues ideologies, as well as the politics and poetics of spirituals, R&B and soul, funk, Afrofuturism, punk, pop, and hip-hop. The course places the work of a range of cultural theorists (Douglass, Du Bois, Adorno, Hurston, Ellison, Murray, Baraka, Mackey, Carby, Spillers, O'Meally, Griffin, Moten, Edwards, Radano, Nancy, Szendy, Perry, Weheliye, etc.) in conversation with key texts and epochs in black letters. T 1:30–3:20

ENGL 953b/AMST 681b/DRAM 496b, The American Avant-Garde Marc Robinson
Topics include the Living Theater, Happenings, Cunningham/Cage, Open Theater, Judson Dance Theater, Grand Union, Bread and Puppet Theater, Ontological-Hysteric Theater, Theater of the Ridiculous, Meredith Monk, Robert Wilson, and the Wooster Group. TH 10–11:50

ENGL 955b/AFAM 793b/AMST 694b, Colonial Theater, Postcolonial Drama, and World Performance Joseph Roach
Uniting the approaches of theater history, dramaturgy, and performance studies, this seminar begins with the case study of Lolita Chakrabarti's *Red Velvet* (2012, revived 2016), a play about the life of Ira Aldridge (1807–1867), the African American actor who is said to be the first black man to play Othello. Readings include plays, critical theories, and historical documents from the eighteenth century to the twenty-first. The seminar is organized around selected genealogies of performance as represented by adaptations, revivals, and critical rewritings: Aphra Behn's *Oroonoko* by Thomas Southerne and Biyi Bandele-Thomas; John Gay's *The Beggar's Opera* by Bertolt Brecht, Wole Soyinka, and P.L. Deshpande; Daniel Defoe's *Robinson Crusoe* by Richard Brinsley Sheridan and Derek Walcott; and Samuel Beckett's *Waiting for Godot* by Femi Osofisan and Suzan-Lori Parks. W 3:30–5:20

ENGL 973a, Modernity and the Time of Literature R. John Williams
This course examines transformations in temporality that occurred in the sciences and arts during the twentieth century. From the arrival of Einsteinian relativity to more contemporary proofs on quantum nonlocality, the question of time in the twentieth century threatened to overturn some of our oldest assumptions about cause and effect, duration, history, presentness, and futurity. These new temporalities were as scientifically and philosophically vexing as they were rife with spiritual and aesthetic possibility—a dynamic reflected in the literary and artistic forms that were central to these transformations. Our reading reflects this deeply cross-cultural and interdisciplinary trajectory, including histories of science and technology (Peter Galison, N. Katherine Hayles, David Kaiser), philosophies of time (Heidegger, Bruno Latour, Bernard Stiegler, McLuhan, Luhmann), critical theories of temporal form (Derrida, Adorno, Jameson, Pamela Lee, Kojin Karatani), a wide array of literary texts (William Burroughs, Thomas Pynchon, Ursula K. Le Guin, Tom McCarthy, and others), as well as important cinematic innovations (Jodorowsky, Godard, Kubrick). What is the "time" of literature? of film? How does art transform or reinforce theories of temporal flow? How do new technologies of composition and circulation alter the temporal effects of a given work? What was the "End of History"? W 3:30–5:20

ENGL 975b, Modernism and Historical Poetics Benjamin Glaser
Poetry and related writings from the first half of the twentieth century, with emphasis on expanding notions of modernism and recent critical reevaluations of poetic genres and forms. What, for instance, is the relation between new formalism and modernism's "formal" poets (Yeats, Hart Crane, Stevens, Louise Bogan)? How do women poets (Bogan, Loy, Millay, Georgia Douglas Johnson) concerned with sentimentality and the figure of the poetess illuminate the role of gender in lyric theory? We look at Robert Frost and Sterling Brown to explore theories of voice and vernacular sound; read Eliot and Pound to rethink periodization and the emergence of literary criticism as an institution; and pursue the legacy of Stein, Williams, and others in debated canons of lyric, language, and conceptual poetry. The Beinecke's Pound, H.D., Loy, and James Weldon Johnson collections serve as a starting point for exploring new work in modernism's print and digital archives. T 10:30–12:20

ENGL 981a/AFAM 775a/AMST 771a, Affect Theory Tavia Nyong'o
This seminar traces the emergence of affect, sense, feeling, and mood as critical keywords in American studies. Particular attention is paid to the manner in which queer theorists such as Eve Kosofsky Sedgwick, Lauren Berlant, Ann Cvetkovich, Heather Love, Jennifer Doyle, Jonathan Flatley, and José Esteban Muñoz developed the concept in what has been called "the affective turn" in queer and feminist aesthetics. The philosophical basis of affect theory in the writings of Spinoza, Heidegger, and Deleuze form the core of the seminar. We also look to an alternate genealogy for affect politics in the writings of Bergson and Deleuze on fabulation. We consider the psychoanalytic take on affect, in particular the object relations school of Klein and Winnicott, and we read critics who contrast affect theory with trauma theory. Marxist contributions to affect theory include readings from Virno (on humor), Hardt and Negri (on affective labor), and Rancière (on the distribution of the sensible). The writings of Jasbir Puar and Brian Massumi

on the affective politics of contemporary war, empire, and societies of control are also considered, as are writings by Fred Moten, Saidiya Hartman, and Frank Wilderson on optimism and pessimism as moods/modalities of black studies. M 1:30–3:20

ENGL 990a, The Teaching of English Alfred Guy
An introduction to the teaching of literature and writing with attention to the history of the profession and current issues in higher education. Weekly seminars address a series of issues about teaching: guiding classroom discussion; introducing students to various literary genres; formulating aims and assignments; grading and commenting on written work; lecturing and serving as a teaching assistant; preparing syllabuses and lesson plans. W 1:30–3:20

ENGL 995a/b, Directed Reading
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 DGS.

EUROPEAN AND RUSSIAN STUDIES

The MacMillan Center
332 Luce Hall, 203.432.3423
www.yale.edu/macmillan/europeanstudies
M.A.

Chair
Francesca Trivellato (*History; on leave*)

Acting Chair
Philip Gorski (*Sociology*)

Director of Graduate Studies
Bruce Gordon (*Divinity; History; Religious Studies;* 334 Luce, 203.432.3423)

Professors Bruce Ackerman (*Law*), Julia Adams (*Sociology*), Rolena Adorno (*Spanish & Portuguese*), Vladimir Alexandrov (*Slavic Languages & Literatures*), Dudley Andrew (*Film & Media Studies*), Seyla Benhabib (*Political Science; on leave* [Sp]), Dirk Bergemann (*Economics*), R. Howard Bloch (*French*), Paul Bracken (*Management*), David Bromwich (*English*), Paul Bushkovitch (*History*), David Cameron (*Political Science*), Francesco Casetti (*Humanities; Film & Media Studies; on leave* [Sp]), Katerina Clark (*Slavic Languages & Literatures*), Mirjan Damaška (*Emeritus, Law*), Carolyn Dean (*History; on leave*), Carlos Eire (*History*), Paul Franks (*Philosophy*), Paul Freedman (*History*), Bryan Garsten (*Political Science*), John Geanakoplos (*Economics*), Harvey Goldblatt (*Slavic Languages & Literatures*), Bruce Gordon (*Divinity; History; Religious Studies*), Philip Gorski (*Sociology*), Timothy Guinnane (*Economics*), Stathis Kalyvas (*Political Science*), David Scott Kastan (*English*), Paul Kennedy (*History*), John MacKay (*Slavic Languages & Literatures; on leave* [F]), Lawrence Manley (*English*), Ivan Marcus (*History*), Millicent Marcus (*Italian*), Stefanie Markovits (*English; on leave* [F]), Robert Nelson (*History of Art; on leave* [F]), Paul North (*German*), Steven Pincus (*History*), David Quint (*English*), Susan Rose-Ackerman (*Law*), Sophia Rosenfeld (*History*), Maurice Samuels (*French*), Frank Snowden (*History*), Timothy Snyder (*History*), Alec Stone Sweet (*Law*), Peter Swenson (*Political Science; on leave* [F]), Francesca Trivellato (*History; on leave*), Katie Trumpener (*Comparative Literature; on leave* [F]), Miroslav Volf (*Divinity*), Kirk Wetters (*German*), James Whitman (*History*), Keith Wrightson (*History*)

Associate Professors Molly Brunson (*Slavic Languages & Literatures*), Bella Grigoryan (*Slavic Languages & Literatures*), Karuna Mantena (*Political Science*), Douglas Rogers (*Anthropology; on leave* [F]), Marci Shore (*History*)

Assistant Professors Jennifer Allen (*History*), Marijeta Bozovic (*Slavic Languages & Literatures*), Sigrun Kahl (*Political Science; Sociology*), Isaac Nakhimovsky (*History*), Ayesha Ramachandran (*Comparative Literature; on leave* [F])

Senior Lectors Irina Dolgova (*Slavic Languages & Literatures*), Krystyna Illakowicz (*Slavic Languages & Literatures*), Maria Kaliambou (*Hellenic Studies*), Rita Lipson

(*Slavic Languages & Literatures*), Constantine Muravnik (*Slavic Languages & Literatures*), George Syrimis (*Hellenic Studies*), Julia Titus (*Slavic Languages & Literatures*), Karen von Kunes (*Slavic Languages & Literatures*)

The European Studies Council promotes research programs about Europe's culture, history, and current affairs. The geographical scope of the council's activities extends from Ireland to Italy, and from Portugal to the lands of the former Soviet Union. The council's definition of Europe transcends conventional divisions between Western, Central, and Eastern Europe, and includes the Balkans and Russia. The U.S. Department of Education has repeatedly designated the council a National Resource Center and a FLAS Center under its HEA Title VI program. Further information on the council and the Graduate Certificate of Concentration in European Studies is provided under Non-Degree-Granting Programs, Councils, and Research Institutes in this bulletin.

The council administers an M.A. program in European and Russian Studies. This M.A. program is unusual in its embrace of the entire spectrum of European nations and cultures. Its requirements allow students to choose a particular national or thematic focus, geared to their individual interests and language skills, but also ensure that students acquaint themselves with the traditions and issues associated with the other parts of Europe. Students specializing in Russia and Eastern Europe, for example, will concentrate their efforts in that area, but will also take courses that address Europe-wide problems or the countries of Central or Western Europe. The program is suited both to students who wish to pursue further academic studies and to students whose interests are policy-oriented.

Fields of Study

European languages and literatures; economics; history; political science; law; music; sociology and other social sciences.

Special Requirements for the M.A. Degree

When applying to the program, students will specify as an area of primary concentration either (1) Russia and Eastern Europe, or (2) Central and Western Europe. All students must complete sixteen term courses (or their equivalent) in the various fields related to European and Russian studies. E&RS 900, Europe: Who, What, When, Where?, is required in addition to the sixteen courses and should be taken in the first year of the program. E&RS 900 is taken as Satisfactory/Unsatisfactory and may not be taken for audit.

Students are required to take at least one course in at least three of the four fields relevant to the program, that is, history (including history of art, history of science, and history of music), literature, social sciences, and law. Students can fulfill this three-field requirement by taking Europe-related graduate-level courses from across the University. One of the sixteen term courses may be taken for audit. With special approval under certain circumstances, a course graded Satisfactory/Unsatisfactory may count as one of the sixteen required courses. For students focusing on Russia and Eastern Europe, two of the sixteen required courses (excluding language courses) must concern the nations of Central and Western Europe. Conversely, for those focusing on Central and Western Europe, two courses must concern Russia and Eastern Europe.

For the purposes of this program, language courses in European languages count toward the sixteen required courses, even though they have undergraduate course numbers and undergraduate grade modes. If a student takes a language course to fulfill the 16-credit degree requirement, the language course may not be taken for audit. Students with previous language preparation may in certain cases receive documentation of their language proficiency on the basis of this work. By the time the degree is completed, all students must demonstrate at least L4 proficiency in two modern European languages other than English. Those wishing to focus on Russia and Eastern Europe will need to demonstrate knowledge of Russian or an Eastern European language; those focusing on Central and Western Europe will need to demonstrate knowledge of one of the appropriate languages. In all cases, students are required to demonstrate proficiency in two European languages by the end of the third term at Yale. The only exception to this rule is completion of the appropriate full sequence of Yale language classes, certified by the Yale instructor or the director of graduate studies. Students who wish to take Yale department examinations in French, German, Italian, Spanish, or other West European languages should register for a complete examination (with reading, oral, and grammar portions) with the appropriate Yale department. Students with Russian competence must receive the grade of 1+ or higher on the ACTFL/ETS Rating Scale as administered by the Slavic Languages and Literatures department at Yale, including reading, oral, and grammar portions. Students with competence in an East European language (such as Polish, Czech, Ukrainian, Hungarian, and others by special arrangement) or other European languages must take Yale department-administered examinations.

In all cases, students will comply with the Policies and Regulations of the Yale Graduate School of Arts and Sciences, especially regarding degree requirements and academic standing.

Through agreements negotiated by the MacMillan Center, the European Studies Council offers joint master's degrees with the Law School, the School of Management, the School of Forestry & Environmental Studies, and the School of Public Health. Application for admission must be made to both the Graduate School and the applicable professional school, with notation made on each application that this is to be considered for the joint-degree program. Refer to www.yale.edu/macmillan/joint.htm and contact the European Studies director of graduate studies (DGS) for up-to-date information.

The Master's Thesis

A master's thesis is required. The master's thesis is based on research in a topic approved by the DGS and advised by a faculty member with specialized competence in the chosen topic. M.A. students must register for E&RS 950, which may count toward the sixteen required courses. E&RS 950 may not be taken for audit. Students may register for one additional independent study to prepare topics and begin research. The master's thesis must be prepared according to department guidelines and is due in two copies in the student's second year on an early-April date as specified by the council.

Program materials are available upon request to the European Studies Council, Yale University, PO Box 208206, New Haven CT 06520-8206.

Courses

E&RS 900a, Europe: Who, What, When, Where? Bruce Gordon
An interdisciplinary seminar designed to provide broad exposure to key topics in modern European studies. Special attention is given to Eastern and Western Europe as well as the humanities and social science disciplines. The seminar is framed by some key theoretical questions, including: What are Europe's boundaries? When and where is "Europe"? Is there a narrative to European history? If so, what is it? What makes a European? The seminar also focuses on developing academic writing skills and examining research methodologies. Seminar meetings are combined with the Europe in/and the World Colloquia and feature speakers from the Yale faculty and from other academic institutions. The course is required of all first-year European and Russian Studies M.A. students but is open to all graduate and professional students. W 3:30–5:20

E&RS 940a or b, Independent Study
By arrangement with faculty.

E&RS 950a or b, Master's Thesis
By arrangement with faculty.

EXPERIMENTAL PATHOLOGY

140 Brady Memorial Laboratory, 203.785.3624
http://medicine.yale.edu/pathology/education/graduateprogram
M.S., M.Phil., Ph.D.

Chair
Jon Morrow

Director of Graduate Studies
Themis Kyriakides (10 Amistad St., Rm. 301C, 203.737.2214)

Professors Richard Bucala (*Internal Medicine*), Young Choi (*Emeritus*), José Costa (*Internal Medicine/Oncology*), Gary Friedlaender (*Orthopaedics & Rehabilitation*), Patrick Gallagher (*Pediatrics*), Earl Glusac (*Dermatology*), Robert Homer, S. David Hudnall, Pei Hui, Peter Humphrey, Dhanpat Jain (*Internal Medicine*), Michael Kashgarian (*Emeritus, Molecular, Cellular & Developmental Biology*), Jung Kim (*Emeritus*), Diane Krause (*Laboratory Medicine*), Gary Kupfer (*Pediatrics*), Themis Kyriakides, Janina Longtine (*Molecular Diagnostics; Laboratory Medicine*), Joseph Madri (*Emeritus*), Vincent Marchesi (*Director, Boyer Center for Molecular Medicine; Cell Biology*), Jennifer McNiff (*Dermatology*), Wang Min, Mark Mooseker (*Molecular, Cellular & Developmental Biology*), Jon Morrow (*Molecular, Cellular & Developmental Biology*), Jordan Pober (*Immunobiology; Dermatology*), Manju Prasad, David Rimm, Marie Robert (*Internal Medicine*), John Rose, Gerald Shadel (*Genetics*), John Sinard (*Ophthalmology & Visual Science*), Jeffrey Sklar (*Laboratory Medicine*), David Stern, A. Brian West (*Emeritus*), Wendall Yarbrough (*Surgery/Otolaryngology*)

Associate Professors Adebowale Adeniran, Marcus Bosenberg (*Dermatology*), Demetrios Braddock, Janet Brandsma (*Adjunct; Comparative Medicine*), Guoping Cai, Sandy Chang (*Laboratory Medicine*), Shawn Cowper (*Dermatology*), Carlos Fernandez-Hernando (*Comparative Medicine*), Liming Hao, Malini Harigopal, Steven Kleinstein, Yuval Kluger, Christine Ko (*Dermatology*), Diane Kowalski (*Surgery/Otolaryngology*), Michael Krauthammer, Gary Kupfer (*Pediatrics*), Rossitza Lazova (*Dermatology*), Gilbert Moeckel, Raffaella Morotti, Vinita Parkash, Antonio Subtil-Deoliveira (*Dermatology*), Alexander Vortmeyer, Zenta Walther, Qin Yan

Assistant Professors Rebecca Baldassarri, Andrea Barbieri, Ranjit Bindra (*Therapeutic Radiology*), Veerle Bossuyt, Natalia Buza, Keith Choate (*Dermatology*), Paul Cohen, Susan Fernandez, Karin Finberg, Anjela Galan (*Dermatology*), Joanna Gibson, Bonnie Gould Rothberg (*Yale Cancer Center; Medicine*), Shilpa Hattangadi (*Pediatrics*), Michael Hurwitz (*Yale Cancer Center; Medicine*), Anita Huttner, Ryan Jensen (*Therapeutic Radiology*), Anita Kamath, Samuel Katz, Angelique Levi, Don Nguyen, Marguerite Pinto, Katerina Politi (*Yale Cancer Center*), Yibing Qyang (*Internal Medicine*), Yajaira Suarez (*Comparative Medicine*), Narendra Wajapeyee, Mina Xu, Xuchen Zhang

Fields of Study

Fields include molecular and cellular basis of diseases, including cancer; biology, biochemistry, genetics, and pathology of molecules, cells, tissues, and organ systems, including plasma membrane dynamics, mitochondrial dysfunction, signal transduction, and response to stimuli of connective tissue; assembly of viruses and their interactions with animal cells; somatic cell genetics and birth defects; biology of endothelial cells; and computational and high-throughput approaches to understanding disease pathology.

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 Molecular Medicine, Pharmacology, and Physiology track, within the interdepartmental graduate program in Biological and Biomedical Sciences (BBS), http://bbs.yale.edu.

Special Requirements for the Ph.D. Degree

Course requirements Experimental Pathology students must pass PATH 650b, Cellular and Molecular Biology of Cancer, and PATH 690a, Molecular Mechanisms of Disease. Passes in three additional graduate-level, one-term courses are required, which can include courses in biochemistry, genetics, immunology, cell biology, and pathology, to be chosen in consultation with the director of graduate studies (DGS), according to the student's background and interest. All requirements of the Graduate School of Arts and Sciences, including the Honors requirement, must be met. In year one, students must also take a seminar course (one in each term) and do three laboratory rotations. Prior to registering for a second year of study, students must successfully complete PATH 660, The Responsible Conduct of Research. In their fourth year of study, all students must successfully complete B&BS 503b, RCR Refresher for Senior BBS Students.

Honors requirement Students must meet the Graduate School's Honors requirement by the end of the fourth term of full-time study. Students must also maintain an overall High Pass average. Student progress toward these goals is reviewed at the end of the second term.

Qualifying examination The qualifying examination of the Experimental Pathology graduate program comprises: (1) enrollment in the BBS/Pathology course Developing and Writing a Scientific Research Proposal in the fall term of year two and preparation of a proposal on the topic of the student's research; student will receive assistance from a faculty member who will later be part of the qualifying committee; (2) two literature reading periods in the spring term of year two that are specifically related to the grant proposal; and (3) an oral exam in which the student is examined by the qualifying exam committee on the research proposal, the reading periods, and general knowledge of experimental pathology. This exam is usually taken in the second term of the second year and is described below.

1. The qualifying examination committee, consisting of three faculty members, will be chosen to examine the student. At least one of the committee members must have a primary appointment in the Department of Pathology, and the thesis adviser is not on the exam committee. The student will read with two committee members. The faculty member who assisted the student during the proposal writing period will serve as the third person on the committee. At the oral exam itself, one member of the committee will be selected as the chairperson responsible for documenting the results of the exam for submission to the DGS. Members of the exam committee should have expertise in areas chosen for reading.
2. All oral exams will follow the same general format. The oral examination will focus on the student's ability to present and defend the research proposal. The student should come to the exam with a short (30–40 minute) presentation of the thesis-related proposal, with visual aids. The actual presentation will take longer since exam committee faculty will interrupt with questions. The committee can also ask questions on topics covered during the reading period and general topics in experimental pathology that will have been covered in courses. The final evaluation by the exam committee faculty takes into account the student's performance on the examination and performance in lab (based on the adviser's evaluation, solicited by the DGS). A written summary of the qualifying examination evaluation will be prepared by the examination committee chairperson and submitted to the DGS. If the student does not pass the exam, the committee has the option of recommending an additional course of reading and/or written work. The DGS has final discretion in approving or modifying the recommendations of the committee.

Prospectus Upon successful completion of the qualifying examination, the student will constitute a dissertation committee including at minimum three members in addition to the dissertation/thesis adviser. At least two of the committee members must be Pathology department faculty. The membership of the committee must be approved by the DGS. The student will prepare a written thesis prospectus, consisting of a summary of background information in the field of interest, the specific questions to be answered, a rationale for choosing those questions, and a research plan for addressing those questions. 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. This should take place by the end of the third year, and preferably in the second year. Students must then submit a written thesis describing the research and present a thesis research seminar.

Additional requirements There is no foreign language requirement. In accordance with the BBS program, 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. Teaching assignments in fulfillment of the requirement must be approved in advance by the DGS.

M.D./Ph.D. Students

M.D./Ph.D. students must satisfy the requirements listed above for the Ph.D. with the following modifications: Two laboratory rotations are required. Assisting in teaching of one course is required. Four courses are required for the Ph.D., including PATH 650b,

Cellular and Molecular Biology of Cancer, and PATH 690a, Molecular Mechanisms of Disease. In addition, students are required to register for School of Medicine courses in OCS (Online Course Selection), https://students.yale.edu/ocs.

Master's Degrees

M.Phil. See Degree Requirements under Policies and Regulations. Awarded only to students who are continuing for the Ph.D. Students are not admitted for this degree.

M.S. Students are not admitted for this degree. On a case-by-case basis and subject to faculty vote, students who are not continuing for the Ph.D. may be considered for this degree if they have successfully completed the course requirements for the Ph.D. degree (three laboratory rotations, PATH 650b, PATH 660, PATH 690a, three elective courses, and two seminar courses), and received a grade of Honors in at least one core course (i.e., excluding rotations and seminar courses). Students who are eligible for or who have already received the M.Phil. will not be awarded the M.S.

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, http://medicine.yale.edu/pathology/education/graduateprogram.

Courses

PATH 620a and b, Laboratory Rotations in Experimental Pathology
Themis Kyriakides
Laboratory rotations for first-year graduate students.

PATH 630b/ENAS 535b[U], Biomaterial-Tissue Interactions Themis Kyriakides
The course addresses the interactions between tissues and biomaterials, with an emphasis on the importance of molecular- and cellular-level events in dictating the performance and longevity of clinically relevant devices. In addition, specific areas such as biomaterials for tissue engineering and the importance of stem/progenitor cells, and biomaterial-mediated gene and drug delivery are addressed. TTH 9–10:15

PATH 640a/B&BS 640a, Developing and Writing a Scientific Research Proposal
Katerina Politi, Nicole Calabro
The course covers the intricacies of scientific writing and guides students in the development of a scientific research proposal on the topic of their research. All elements of an NIH fellowship application are covered, and eligible students submit their applications for funding. Enrollment limited to fifteen. T 2–4

PATH 650b, Cellular and Molecular Biology of Cancer David Stern, Qin Yan
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. MWF 1–2

PATH 660/C&MP 650/PHAR 580, The Responsible Conduct of Research
Barbara Ehrlich, Demetrios Braddock
Organized to foster discussion, the course is taught by faculty in the Pharmacology, Pathology, and Physiology departments and two or three senior graduate students. Each session is based on case studies from primary literature, reviews, and two texts: Francis Macrina's *Scientific Integrity* and Kathy Barker's *At the Bench*. Each week, students are required to submit a reaction paper discussing the reading assignment. Students take turns leading the class discussion; a final short paper on a hot topic in bioethics is required. TH 11–12:15

PATH 670b, Biological Mechanisms of Reaction to Injury S. David Hudnall, Joanna Gibson, Gilbert Moeckel, Jon Morrow, Jeffrey Sklar
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. TTH 11:35–12:50

PATH 680a/C&MP 630a/PHAR 502a, Seminar in Molecular Medicine, Pharmacology, and Physiology Don Nguyen, Titus Boggon, Susumu Tomita
Readings and discussion on a diverse range of current topics in molecular medicine, pharmacology, and physiology. The class emphasizes analysis of primary research literature and development of presentation and writing skills. Contemporary articles are assigned on a related topic every week, and a student leads discussions with input from faculty who are experts in the topic area. The overall goal is to cover a specific topic of medical relevance (e.g., cancer, neurodegeneration) from the perspective of three primary disciplines (i.e., physiology: normal function; pathology: abnormal function; and pharmacology: intervention).

PATH 681a/B&BS 681a, Advanced Topics in Cancer Biology Qin Yan
This advanced course focuses on readings and discussion on three or four major topics in cancer biology, such as targeted therapy, tumor immunology, tumor metabolism, and genomic evolution of cancer. For each topic, the class starts with an interactive lecture, followed by critical analysis of primary research literature. Recent research articles are assigned, and a student leads discussions with input from faculty who are experts in the topic area. Prerequisite: PATH 650b or permission of the instructor. Open to all Ph.D., M.D./Ph.D., and M.P.H. students and to advanced undergraduates at the discretion of the instructor. F 2–4

PATH 690a, Molecular Mechanisms of Disease Narendra Wajapeyee
This course covers aspects of the fundamental molecular and cellular mechanisms underlying various human diseases. Many of the disorders discussed represent major forms of infectious, degenerative, vascular, neoplastic, and inflammatory disease. Additionally, certain rarer diseases that illustrate good models for investigation and/or application of basic biologic principles are covered in the course. The objective is to highlight advances in experimental and molecular medicine as they relate to understanding the pathogenesis of disease and the formulation of therapies. TTH 2–3:30

FILM AND MEDIA STUDIES

53 Wall Street, Rm. 216, 203.436.4668
http://filmstudies.yale.edu
M.Phil., Ph.D.

Chair
Francesco Casetti (*on leave* [Sp])

Acting Chair [Sp]
To be announced

Director of Graduate Studies
Dudley Andrew (53 Wall St., Rm. 219, dudley.andrew@yale.edu)

Professors Dudley Andrew, Francesco Casetti (*on leave* [Sp]), Katerina Clark, Aaron Gerow, John MacKay (*on leave* [F]), Millicent Marcus, Charles Musser, Brigitte Peucker, Katie Trumpener (*on leave* [F]), Laura Wexler

Associate Professor R. John Williams

Senior Lecturer Ronald Gregg (*on leave* [Sp])

Fields of Study

Film and Media Studies is an interdisciplinary field drawing on the study of the history of art, national cultures and literatures, literary theory, philosophy, anthropology, feminist and queer studies, race and representation, and other areas. To study film and media at Yale, every doctoral student must be accepted into a combined program involving another discipline. Film and Media Studies offers a combined Ph.D. with African American Studies, American Studies, Comparative Literature, East Asian Languages and Literatures, English, French, German, History of Art, Italian, and Slavic Languages and Literatures. In addition to acquiring a firm grounding in the methods and core material of both film-media studies and another discipline, the candidate is advised to coordinate a plan of study involving comprehensive knowledge of one or more areas of specialization. Such areas include:

1. Historiography, including archival history, history of technology, silent film.
2. Aesthetics: theories of the image, adaptation, film/philosophy, avant-garde film.
3. European film: British-Irish, French, German and Nordic, Italian, Slavic.
4. American culture: Hollywood, independent film, African American cinema.
5. World film: global image exchange; cinema in Asia, Latin America, and Africa.
6. Documentary as an aesthetic, cultural, and ideological practice.
7. Cinema in its relations with other arts and other media.
8. Screen cultures, screened images, post-cinema, theory and history of media.

Through course work, examinations, and the dissertation, the candidate links a film and media specialty with material and methods coming from the participating discipline. Directors of graduate studies from both programs monitor the candidate's plans and progress.

Special Admissions Requirements

Combined-program applicants should familiarize themselves fully not only with the Film and Media Studies entrance requirements but with those of the other graduate program as well. Since combined-program applicants must be admitted both by Film and Media Studies and by the other department, candidates should make sure that the material they submit with the application clearly addresses the requirements and mission of both graduate programs.

The application for Film and Media Studies is administered by the Office of Graduate Admissions. All applications are to be completed online and can be accessed by visiting its Web site at http://gsas.yale.edu/admission-graduate-school. In the "Programs of Study" section of the application, the applicant should do the following: choose Film and Media Studies in Step 1 and the combined department in Step 3. All applications including writing samples are read by the admissions committees in both units.

Special Requirements for the Ph.D. Degree

Every student selected for the combined program is subject to the supervision of the Film and Media Studies program and the relevant participating department. A written protocol between each department and Film and Media Studies outlines the requirements and schedule to be borne in mind as a plan of study is worked out in consultation with the director of graduate studies of Film and Media Studies and the director of graduate studies of the participating department. In all cases, students are required to take two core seminars in Film and Media Studies (FILM 601 and FILM 603) as well as at least four additional Film and Media Studies seminars. Course requirements vary for participating departments. By October 1 of the third year, all students must have fulfilled an assignment related to foundational texts and films. Later that year, students advance to candidacy by completing qualifying examinations and a dissertation prospectus.

1. Qualifying examinations follow the regulations of the participating department with at least one member of the Film and Media Studies Executive Committee participating.
2. The dissertation prospectus is presented to a faculty committee or the entire faculty of the participating department. The prospectus is also circulated to the entire Film and Media Studies Executive Committee for their information and ratification.
3. A defense of method occurs when the dissertation is nearing completion, one or two terms before submission. The purpose of this defense is to provide guidance and feedback at a critical stage, in order to assist the dissertation's final form. At least three faculty readers meet with the student; the DGS of Film and Media Studies and the DGS of the participating department are also invited to participate. At least one examiner of the dissertation must be a member of the Film and Media Studies Executive Committee and one must be from the participating department.

The faculty in Film and Media Studies considers participation in the Teaching Fellows Program to be essential to the professional preparation of graduate students. Students normally teach in years three and four. Every student may expect to assist in two Film and Media Studies courses, one of which will almost certainly be Introduction to Film.

Master's Degree

M.Phil. See Degree Requirements under Policies and Regulations.

Courses

FILM 603a/AMST 814a, Historical Methods in Film Study Charles Musser
A range of historiographic issues in film studies, including the roles of technology, exhibition, and spectatorship. Topics include intermediality and intertextuality. Consideration of a range of methodological approaches through a focus on international early cinema and American race cinema of the silent period. Particular attention to the interaction between scholars and archives. T 3:20–6:20

FILM 609a/CPLT 521a, Issues in World Literature and Cinema Dudley Andrew
Can there be disciplinary areas named "World Literature" and "World Cinema," or does the adjective "world" defy perimeters? What about competing adjectives like international, transnational, global, planetary, etc.? Undergraduate courses and textbooks with "world" in their titles have proliferated this century, but what are they aiming to define, organize, and explore? What topics, principles, methods, and conundrums do they address? This seminar aims to quickly survey the history of the "world quest" of literary studies from Goethe to Moretti, and to see if the more recent shift from International to World Cinema marks a parallel quest or something entirely different. Students debate positions taken by literary scholars (Damrosch, Casanova, Spivak, Prendergast, et al.) and by a phalanx of film scholars. We investigate infrastructure (festivals, translation, subtitles, prizes) via the kind of collaborative effort often required by the scale of this "area." Meanwhile each student develops an essay on one problem lurking today in literary or film history as these fields are pushed to their geographical limit. Questions could concern corpus, system, distribution, influence, translation, mediation, genre, etc. W 9:25–11:15

FILM 624b/CPLT 930b/ITAL 785b/JDST 843b, The Holocaust in Italian Literature and Film Millicent Marcus
Though Italy was among the Nazi-occupied countries with the highest survival rate of its Jewish population, the Holocaust has continued to haunt the Italian literary and cinematic imagination in ways that warrant close critical scrutiny. The aesthetic and moral problem of how to represent this event in art gains special urgency in the Italian context, where a realist tradition dating back to Dante and Giotto joins forces with a postwar neorealist impulse to create a series of compelling literary treatments (Primo Levi's above all), as well as cinematic works. In keeping with the Holocaust's invitation to interdisciplinary study, the course examines the intersection of a number of discourses—historical, literary, cinematic—viewed from a variety of perspectives—feminist, generic, philosophical, theological, and historiographic. Since several of the authors are women, the question of the "voce femminile" and its creation of an alternative, or anti-history, is also raised. W 3:30–5:20, screenings M 7:30

FILM 705a[U], Film History and Theory of Animation Aaron Gerow
A survey of the history and theory of animation. Examples from around the world, from various traditions, and from different periods. MW 2:30–3:45, screenings M 7–9

FILM 733b[U]/AMST 834b[U], Documentary and the Environment Charles Musser
The environmental documentary has emerged as one of cinema's most vital genres of the past ten years (in documentary, its only rivals are probably those concerned with the Second Gulf War). As the world's environment faces a growing crisis, documentary has come to serve as a key means to draw public attention to specific issues. This course combines screenings with readings on documentary such as Bill Nichols's important book *Representing Reality*. Often films have book tie-ins, and we consider how they complement each other and work together to maximize the impact of their message. Readings also focus on news items, debates, Web sites, and other media forms that are employed in conjunction with the films. T 1:30–3:20, screenings M 7

FILM 735a[U]/736b[U]/AMST 832a[U]/833b[U], Documentary Film Workshop Charles Musser
This workshop in audiovisual scholarship explores ways to present research through the moving image. Students work within a Public Humanities framework to make a documentary that draws on their disciplinary fields of study. Designed to fulfill requirements for the M.A. with a concentration in Public Humanities. W 12:30–3:20, screenings W 7–9

FILM 739a, The World of Screens Francesco Casetti, Bernard Georghegan
There is an astonishing explosion of screens around us: they proliferate in number, expand in size, find new locations in public or domestic spaces, abandon their usual quadrangular shape, lie horizontally instead of standing vertically, need to be touched instead of simply watched, connect devices instead of being isolated. There is something "excessive" in such an explosion. Yet screens are not an absolute novelty. This excessiveness is rooted in the past: in the imagination of new optical machines, developed by nineteenth-century literature and science; in the work of painters on surface and frame; in cinema's evolution toward bigger and more inclusive screens; in the evolution of early television sets; etc. To retrace the roots of the current explosion allows us to understand better what a screen is, and why it is becoming the most typical object of our time. T 9:25–11:15

FILM 760b[U]/CPLT 905b[U]/GMAN 760b[U], Intermediality in Film Brigitte Peucker
Film is a hybrid medium, the meeting point of several others. This course focuses on the relationship of film to theater and painting, suggesting that where two media are in evidence, there is usually a third. Topics include space, motion, color, theatricality, tableau vivant, *ekphrasis,* spectatorship, and new media. Readings feature art historical and film theoretical texts as well as essays pertinent to specific films. Films by Fassbinder, Bergman, Murnau, von Trier, Rohmer, Godard, Kiarostami, and others, concluding with three films by Peter Greenaway. T 3:30–5:20

FILM 775a/RUSS 696a, Post-Stalin Literature and Film Katerina Clark
The main developments in Russian and Soviet literature and film from Stalin's death in 1953 to the present. W 1:30–3:20

FILM 804a/DRAM 406a/MUSI 837a, Opera, Media, Technology Gundula Kreuzer
To what extent does Wagner prefigure, as Friedrich Kittler has argued, modern "media technologies"? And what are the implications of opera's increasing mediatization? In search of answers, this seminar explores opera from the perspectives of media archaeology and other recent approaches in opera, media, and science and technology studies.

Topics include the roles of architecture and stage technologies from Renaissance spectacle to twenty-first-century "mobile opera"; Wagner's theory of the *Gesamtkunstwerk;* immersion, illusion, and the cinematic; the orchestra as sound technology; and nineteenth-century attempts at "recording" productions. From there we turn to recent hybridizations in the form of onstage video and HD broadcasts, as well as alternative conceptions of opera. Does technology offer a saving grace for opera in the digital age?

FILM 873b[U]/EALL 581b[U], Japanese Cinema and Its Others Aaron Gerow
A critical inquiry into the myth of a homogeneous Japan through analyzing how Japanese film and media historically represent "others" of different races, ethnicities, nationalities, genders, and sexualities, including blacks, ethnic Koreans, Okinawans, Ainu, undocumented immigrants, LGBT minorities, the disabled, youth, and "monstrous" others like ghosts. TTH 11:35–12:50, screenings W 6:30

FILM 880a/EALL 872a, Theories of Popular Culture in Japan: Television
Aaron Gerow
Exploration of postwar theories of popular culture and subculture in Japan, particularly focusing on the intellectual debates over television and new media. M 1:30–3:20, screenings HTBA

FILM 900, Directed Reading

FILM 901, Individual Research

FORESTRY & ENVIRONMENTAL STUDIES

Kroon Hall, 203.432.5100
http://environment.yale.edu
M.S., M.Phil., Ph.D.

Dean
To be announced

Director of Doctoral Studies
Karen Seto (380 Edwards St., Rm. 102, 203.432.9784, karen.seto@yale.edu)

Professors Mark Ashton, Michelle Bell, Gaboury Benoit, Graeme Berlyn, Benjamin Cashore, Michael Dove, Daniel Esty, Timothy Gregoire, Edgar Hertwich, Matthew Kotchen, Xuhui Lee, Robert Mendelsohn, Chadwick Oliver, Peter Raymond, James Saiers, Oswald Schmitz, Karen Seto, David Skelly, John Wargo, Julie Zimmerman

Associate Professors Mark Bradford, Marian Chertow

Assistant Professors Craig Brodersen, Liza Comita, Justin Farrell, Alexander Felson, Eli Fenichel, Kenneth Gillingham, Nadine Unger

Fields of Study

Fields include agroforestry; biodiversity conservation; biostatistics and biometry; climate science; community ecology; ecosystems ecology; ecosystems management; environmental anthropology; environmental biophysics and meteorology; environmental chemistry; environmental ethics; environmental governance; environmental health risk assessment; environmental history; environmental law and politics; environmental and resource policy; forest ecology; hydrology; industrial ecology; industrial environmental management; plant physiology and anatomy; pollution management; population ecology; resource economics; energy and the environment, silviculture, social ecology; stand development, tropical ecology and conservation; urban planning; water resource management; environmental management and social ecology in developing countries; urban ecology.

Special Admissions Requirements

Applicants should hold a bachelor's or master's degree in a field related to natural resources, such as forestry, or in a relevant discipline of the natural or social sciences, such as biology, chemistry, economics, or mathematics. The GRE General Test is required but Subject Tests are optional.

Special Requirements for the Ph.D. Degree

Students are required to take Doctoral Student Seminar and Responsible Conduct of Research (F&ES 900a) in the first year 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 year, although this can be extended to the third year in cases with appropriate extenuating circumstances. 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 doctoral studies. Copies of the approved dissertation must be submitted to the Graduate School. Depending upon the nature of the dissertation topic, completion of the Ph.D. degree normally requires four years.

Teaching and research experiences are regarded as integral parts of the graduate training program in Forestry & Environmental Studies. All students are required to serve as teaching fellows (10 hours per week) for four terms. The nature of the teaching assignment is determined in cooperation with the student's major adviser and the director of doctoral studies. With the permission of the director of doctoral studies, the total teaching requirement may be reduced for students who are awarded fellowships supported by outside funding. Regardless of outside funding, all doctoral students must serve as teaching fellows for a minimum of two terms.

Master's Degrees

M.Phil. (en route to the Ph.D.) Students may petition for this degree after they have passed the qualifying exam and advanced to candidacy. Applications for this master's degree are not accepted.

M.S. (en route to the Ph.D.) This degree is normally granted only to students who are withdrawing from the Ph.D. program. Applications for this master's degree are not accepted. Requirements that must be met for award of the M.S. are (1) successful completion of two years of course work in residence with two grades of Honors; (2) a written prospectus; (3) fulfillment of one term of the teaching requirement. Students who are eligible for or who have already received the M.Phil. will not be awarded the M.S.

For information on the terminal master's degrees offered by the Yale School of Forestry & Environmental Studies (the Master of Forestry, Master of Forest Science, Master of Environmental Management, and Master of Environmental Science degrees), visit the School's Web site, www.yale.edu/environment, or contact Admissions Director, Yale School of Forestry & Environmental Studies, 195 Prospect Street, New Haven CT 06511.

Courses

For course descriptions, see the School of Forestry & Environmental Studies bulletin, available online in both html and pdf versions at www.yale.edu/bulletin.

FOUNDATIONS

[F&ES 500a[U], Landscape Ecology]
F&ES 505a, Economics of the Environment
F&ES 510a, Introduction to Statistics in the Environmental Sciences
F&ES 510Ea, Introduction to Statistics in the Environmental Sciences
F&ES 515a, Physical Sciences for Environmental Management
F&ES 520a/ANTH 581a, Society and Environment: Introduction to Theory and Method
F&ES 525a, The Politics and Practice of Environmental and Resource Policy
F&ES 530a, Ecosystems and Landscapes

PROFESSIONAL SKILLS COURSES

F&ES 576b, PSC: Collaboration and Conflict Resolution Skills for Environmental Professionals
F&ES 577b, PSC: Environmental Communicator
F&ES 578b, PSC: Financial Concepts for Environmental Managers

INTEGRATIVE FRAMEWORKS

F&ES 610a, Science to Solutions
[F&ES 620a, Integrative Assessment]

CAPSTONE

F&ES 950b, Life Cycle Assessment Practicum
F&ES 953a,b, Business and the Environment Consulting Clinic
F&ES 954a, Management Plans for Protected Areas
F&ES 955a,b, Seminar in Research Analysis and Communication in Forest Ecology
F&ES 961a,b, Entrepreneurial Venture Creation
F&ES 964b, Large-Scale Conservation: Integrating Science, Management, and Policy
F&ES 965b/ANTH 598b, Advanced Readings: Social Science of Conservation and Development
F&ES 966a, The Entrepreneurial Approach to Environmental Problem Solving
[F&ES 969b, Rapid Assessments in Forest Conservation]
F&ES 970a,b/LAW 30164, Environmental Protection Clinic
F&ES 971b, Land Use Clinic
F&ES 972a,b/LAW 30165, Advanced Environmental Protection Clinic
[F&ES 976b, Cities in Hot Water: Urban Climate Mitigation and Adaptation]
F&ES 977a, Creating Science Narratives for Solutions
F&ES 978b, Creating Science Networks for Solutions

ECOLOGY

Community and Ecosystem Ecology
[F&ES 681a, Ethnobotany]
F&ES 717b, Tropical Field Ecology
F&ES 723a, Wetlands Ecology, Conservation, and Management
F&ES 731b, Tropical Field Botany
[F&ES 733b, Synthesizing Environmental Science for Policy]
F&ES 734b, Biological Oceanography
F&ES 741b, Introduction to Indigenous Silviculture
[F&ES 752a, Ecology and Conservation of Tropical Forests]
[F&ES 768a, Pests, Pathogens, and Parasites in Natural and Managed Systems]

Wildlife Ecology and Conservation Biology
[F&ES 736b, Ecology Seminar]
[F&ES 738a^{U}, Aquatic Ecology]
[F&ES 739b, Species and Ecosystem Conservation: An Integrated, Interdisciplinary Approach]
[F&ES 740b, Dynamics of Ecological Systems]
[F&ES 744b, Conservation Science]

Environmental Education and Communication
F&ES 742b, Fundamentals of Working with People
[F&ES 745a, Environmental Writing]
F&ES 746b, Archetypes and the Environment
F&ES 747a, Global Communication Skills
F&ES 750a, Writing the World
F&ES 900a, Doctoral Student Seminar and Responsible Conduct of Research

FORESTRY

Forest Biology
F&ES 650b, Fire: Science and Policy
[F&ES 652b, Wood: Structure and Function]
F&ES 654a/MCDB 660a, Anatomy, Physiology, and Development of Trees and Other Vascular Plants
[F&ES 655b, Research Methods of the Anatomy and Physiology of Trees]
F&ES 656b, Tree Physiology and Ecophysiology
[F&ES 671a, Natural History and Taxonomy of Trees]
[F&ES 674b, Seminar in Forest Health]
F&ES 682a, Multifunctional Carbon-Sequestering Agroforestry
[F&ES 691a, Trees: Environmental Biology]

Forest Management
F&ES 657b, Managing Resources
[F&ES 658a, Global Resources, International Resource Exchanges, and the Environment]
F&ES 659b, Principles in Applied Ecology: The Practice of Silviculture
F&ES 660a, Forest Dynamics: Growth and Development of Forest Stands

[F&ES 661b, Analysis and Development of Silvicultural Prescriptions]
F&ES 668b, Field Trips in Forest Resource Management and Silviculture
F&ES 669b, Forest Management Operations
F&ES 670b, Southern Forest and Forestry Field Trip
F&ES 675b, Growth and Yield
F&ES 680a, Forest and Ecosystem Finance
F&ES 683b, Seminar in Tropical Forest Restoration in Human-Dominated Landscapes

PHYSICAL SCIENCES

Atmospheric Sciences
F&ES 700b, Alpine, Arctic, and Boreal Ecosystems Seminar
[F&ES 701b, Climate Change Policy and Science Seminar]
[F&ES 702b, Climate Change Seminar]
[F&ES 703b, Climate and Society]
[F&ES 704a, Workshop on Remote Sensing with Drones]
[F&ES 705b, Climate and Air Pollution]
[F&ES 722a, Boundary Layer Meteorology]
[F&ES 771a, Climate Modeling]

Environmental Chemistry
F&ES 706a[U], Organic Pollutants in the Environment
F&ES 707b[U]/ENAS 640b, Aquatic Chemistry
[F&ES 708a, Biogeochemistry and Pollution]
[F&ES 711a[U], Atmospheric Chemistry]
F&ES 715b, Advanced Reading in Biogeochemistry

Soil Science
F&ES 709a, Soil Science

Water Resources
[F&ES 690a, Plant Hydraulics]
F&ES 710b, Coastal Governance
F&ES 712b, Water Resource Management
[F&ES 713a, Coastal Ecosystems]
[F&ES 714b[U]/ENAS 646b, Environmental Hydrology]
[F&ES 719a, River Processes and Restoration]
[F&ES 724b, Watershed Cycles and Processes]
F&ES 729b, Caribbean Coastal Development: Cesium and CZM

QUANTITATIVE AND RESEARCH METHODS

F&ES 550a, Natural Science Research Methods
F&ES 551a, Qualitative Social Science Research
F&ES 552b, Master's Student Research Colloquium
F&ES 638b, Carbon Footprints—Modeling and Analysis
F&ES 720a, Introduction to R
[F&ES 725b, Remote Sensing of Land Cover and Land Use Change]
F&ES 726b/ARCG 762b[U]/EMD 548b/G&G 562b[U], Observing Earth from Space
[F&ES 751b, Sampling Methodology and Practice]

F&ES 753a, Regression Modeling of Ecological and Environmental Data
F&ES 754a, Geospatial Software Design
F&ES 755b, Modeling Geographic Space
F&ES 756a, Modeling Geographic Objects
[F&ES 757b, Statistical Design of Experiments]
F&ES 758b, Multivariate Statistical Analysis in the Environmental Sciences
F&ES 762a, Foundations for Measuring and Modeling Environmental and Socio-environmental Systems: Applied Math for Environmental Studies
[F&ES 780b, Seminar in Forest Inventory]
F&ES 781b/STAT 674b, Applied Spatial Statistics
F&ES 794b, Confronting Models with Data

SOCIAL SCIENCES

Economics

F&ES 795b, Nature as Capital: Merging Ecological and Economic Models
F&ES 802b, Valuing the Environment
F&ES 803b, Green Markets: Voluntary and Information Approaches to Environmental Management
F&ES 804b, Economics of Natural Resource Management
F&ES 805a,b, Seminar in Environmental and Natural Resource Economics
[F&ES 904a, Doctoral Seminar in Environmental Economics]
F&ES 905b, Doctoral Seminar in Environmental and Energy Economics

Energy and the Environment

F&ES 617a/AMST 744a/HIST 744a/HSHM 747a, Readings and Research in Energy History
F&ES 635b, Renewable Energy Project Finance
[F&ES 716b, Renewable Energy]
F&ES 798Eb, China's Energy and Environmental Sustainability Challenge
F&ES 800b, Energy Economics and Policy Analysis
[F&ES 812b, Energy's Impact on Freshwater Resources]
F&ES 814a/MGT 563a, Energy Systems Analysis
F&ES 816b, Electric Utilities: An Industry in Transition
[F&ES 818a/MGT 561a, Energy Technology Innovation]
F&ES 847a/LAW 20620, Decarbonizing the U.S. Power Sector: Driving U.S. Climate Policy under the Clean Air Act

Environmental Policy

[F&ES 718a, IPCC AR5 Assessment: The Physical Science Basis]
[F&ES 759b/MGT 697b/PLSC 727b^{U}, Capitalism: Success, Crisis, and Reform]
F&ES 799a, Sustainable Development Goals and Implementation
F&ES 807a/LAW 20490/MGT 688a, Corporate Environmental Management and Strategy
F&ES 808b/LAW 21107/REL 926b, Law, Environment, and Religion: A Communion of Subjects
[F&ES 815a, The New Corporate Social Responsibility: Public Problems, Private Solutions, and Strategic Responses]

F&ES 817a, Urban, Suburban, and Regional Planning Practice
F&ES 819b, Strategies for Land Conservation
F&ES 820b, Land Use Law and Environmental Planning
F&ES 821b, Private Investment and the Environment: Legal Foundations and Tools
F&ES 824b/LAW 21033, Environmental Law and Policy
[F&ES 825a, International Environmental Law]
F&ES 826a, Foundations of Natural Resource Policy and Management
F&ES 828b, Comparative Environmental Law in Global Legal Systems
[F&ES 829b[U], International Environmental Policy and Governance]
F&ES 835a, Seminar on Land Use Planning
F&ES 835Ea,b, Seminar on Land Use Planning
F&ES 837b, Seminar on Leadership in Natural Resources and the Environment
[F&ES 840b/LAW 21754, Climate Change and Clean Energy]
[F&ES 843b, Readings in Environmental History]
F&ES 845b/LAW 21508, Law and Globalization
F&ES 849b, Natural Resource Policy Practicum
[F&ES 850b, International Organizations and Conferences]
F&ES 851b, Environmental Diplomacy Practicum
[F&ES 855a, Climate Change Mitigation in Urban Areas]
F&ES 860b, Learning to Lead from Leaders: Creating Change in Policies and Company Practices
F&ES 862b/HPM 601b/LAW 21141/PSYC 601b, The Science of Science Communication
[F&ES 866b/LAW 21566, The Law of Climate Change]
F&ES 874a/MGT 862a, Introduction to Responsible Business: Oil and Wine
F&ES 875Ea/MGMT 955a, Urban Resilience: Complexity, Collaborative Structures, and Leadership Challenges

Social and Political Ecology

F&ES 628b, Understanding and Building Resistance in Developing Countries
F&ES 645b, Global Public Goods and Cooperation in International Politics
F&ES 738Eb, Himalayan Diversities: Environment, Livelihood, and Culture
F&ES 760b, Conservation in Practice: An International Perspective
[F&ES 763b, Translating the Science of Wildlife Conservation into Practice]
[F&ES 764a, The American West as an Environmental, Cultural, and Political Case Study]
F&ES 767b, Building a Conservation Toolkit: From Project Design to Evaluation
F&ES 769a/REL 969a, Christianity and Ecology
F&ES 772a, Social Justice in the Sustainable Food System
[F&ES 774a/NELC 774a[U], Agriculture: Origins, Evolution, Crises]
[F&ES 783b, Field Course in Culture, Environmental Politics, and Social Change]
F&ES 783Ea,b, Introduction to Religions and Ecology
[F&ES 784Ea, Western Religions and Ecology]
F&ES 785Eb, East Asian Religions and Ecology
F&ES 786Ea/REL 918Ha, Native American Religion and Ecology
[F&ES 787E/REL 911H, Thomas Berry: Life and Thought]

[F&ES 789E/REL 912H, Journey of the Universe]
F&ES 792Eb/REL 928Hb, South Asian Religions and Ecology
F&ES 793b/ANTH 773b[U]/ARCG 773b[U]/NELC 588b[U], Abrupt Climate Change and Societal Collapse
F&ES 797b/REL 906b, Christianity and Environmental Ethics
F&ES 831b, Society and Natural Resources
F&ES 836a/ANTH 541a/HIST 965a/PLSC 779a, Agrarian Societies: Culture, Society, History, and Development
F&ES 839a/ANTH 597a, Social Science of Conservation and Development
F&ES 846b, Perspectives on Environmental Injustices
F&ES 854b, Institutions and the Environment
[F&ES 857b, Urbanization, Global Change, and Sustainability]
F&ES 869b/ANTH 572b, Disaster, Degradation, Dystopia: Social Science Approaches to Environmental Perturbation and Change
F&ES 877b/ANTH 561b, Anthropology of the Global Economy for Development and Conservation
F&ES 878a, Climate and Society
[F&ES 882a, The Black Box of Implementation: Households, Communities, Gender]
F&ES 892a/ARCH 4021a, Introduction to Planning and Development

HEALTH AND ENVIRONMENT

F&ES 727a, The Future of Food
F&ES 736Eb, Environmental Ethics
F&ES 765b, Technological and Social Innovation in Global Food Systems
F&ES 893b/EHS 511b, Principles of Risk Assessment
F&ES 896b/EHS 503b, Public Health Toxicology
[F&ES 897b/EHS 508b, Assessing Exposures to Environmental Stressors]
[F&ES 898a/EHS 585a, The Environment and Human Health]
[F&ES 899b, Sustainable Development in Post-Disaster Context: Haiti]

INDUSTRIAL ECOLOGY, ENVIRONMENTAL PLANNING, AND TECHNOLOGY

F&ES 782a/ARCH 4216a, Globalization Space: International Infrastructure and Extrastatecraft
F&ES 788b, Applied Urban Ecology
F&ES 872b[U], Introduction to Green Chemistry
[F&ES 881a, FT: Field Experience in Industrial Operations]
F&ES 884a/ENAS 645a, Industrial Ecology
F&ES 885b/ENAS 660b[U], Green Engineering and Sustainability
[F&ES 888a/ARCH 4226a, Ecological Urban Design]
F&ES 894a, Green Building: Issues and Perspectives
F&ES 895a, Green Building Intensive: How Buildings Work

FRENCH

82-90 Wall Street, 3d floor, 203.432.4900
http://french.yale.edu
M.A., M.Phil., Ph.D.

Chair
Maurice Samuels

Director of Graduate Studies
Christopher Miller [F] (82-90 Wall St., Rm. 325, 203.432.4466)
R. Howard Bloch [Sp] (53 Wall St., Rm. 212, 203.432.4912)

Professors R. Howard Bloch, Ardis Butterfield (*English*), Carolyn Dean (*History; on leave*), Edwin Duval, Marie-Hélène Girard (*Visiting*), Alice Kaplan, Christopher Miller (*on leave* [Sp]), Pierre Saint-Amand, Maurice Samuels

Assistant Professors Morgane Cadieu, Thomas Connolly, Jill Jarvis, Christopher Semk

Affiliated Faculty Dudley Andrew (*Film & Media Studies*), Carol Armstrong (*History of Art*), John Merriman (*History*)

Fields of Study

Fields include French literature, criticism, theory, and culture from the early Middle Ages to the present, and the French-language literatures of Africa, the Caribbean, and the Maghreb.

Special Admissions Requirements

A thorough command of French is expected, as well as a good preparation in all fields of French literature. Applicants should submit a twenty-page writing sample in French. This can consist of one twenty-page paper or several shorter papers that total twenty pages.

Special Requirements for the Ph.D. Degree

(1) Candidates must demonstrate proficiency in two languages (in addition to English and French). Proficiency is defined as the successful completion of one year of study at the college level or reading proficiency at the graduate level. Students must fulfill one language requirement no later than the beginning of their third term of study. The second language requirement must be satisfied before the prospectus can be approved. (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 an approved language course 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 takes place during 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 three combined Ph.D.s: one in French and African American Studies (in conjunction with the Department of African American Studies), one in French and Renaissance Studies (in conjunction with the Renaissance Studies Program), and one in French and Film and Media Studies (in conjunction with the Film and Media Studies Program). Students in all of these combined degree programs are subject to all the requirements for a Ph.D. in French, with exceptions noted below. In addition, they must fulfill certain requirements particular to the combined program.

The combined Ph.D. in French and African American Studies is most appropriate for students who intend to concentrate in and write a dissertation on the literature of the francophone Caribbean. Students take sixteen term courses, including Theorizing Racial Formations (AFAM 505a), which is a required course for all first-year graduate students in the combined program, and three other graduate-level African American Studies courses: (1) a history course, (2) a social science course, and (3) a course in African American literature or culture. Ten of the remaining twelve courses are devoted to the full spectrum of periods and fields in French and francophone literature and culture; the two remaining courses can be in any field. Students in the combined degree program should fulfill the French department's language requirements by gaining proficiency in either a Creole language of the Caribbean or Spanish, as well as by demonstrating competence in a second foreign language that is directly relevant to the study of the Caribbean. The students' oral examinations normally include two topics of African American content. The dissertation prospectus must be approved by the director of graduate studies both in the French department and in African American Studies, and final approval of the dissertation must come from both departments. For further details see African American Studies.

Students in the combined Ph.D. program in French and Renaissance Studies will take nine courses in French and seven in Renaissance Studies. Students must learn Latin and Italian. The oral examination will consist of seven topics: four in French and three in Renaissance Studies. Both the dissertation prospectus and the final dissertation must be

approved by the French department and the program in Renaissance Studies. For further details see Renaissance Studies.

For students in the combined Ph.D. program in French and Film and Media Studies, the oral examination will normally include one topic on film theory and one on French film. Both the dissertation prospectus and the final dissertation must be approved by the French department and the program in Film and Media Studies. In addition, Film and Media Studies requires a dissertation defense. For further details see Film and Media Studies.

Master's Degrees

M.Phil. See Degree Requirements under Policies and Regulations. Additionally, students in French are eligible to pursue a supplemental M.Phil. degree in Medieval Studies. 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 one of the language requirements and eight courses, of which at least six are in French. Two grades of Honors in French graduate courses are required.

Program materials are available on the department's Web site at http://french.yale.edu/academics/graduate-program.

Courses

FREN 802a/CPLT 582a/ENGL 545a, Medieval Translation Ardis Butterfield
Using modern postcolonial as well as medieval theories of translation, memory, and bilingualism we explore how texts are transformed, cited, and reinvented in the medieval period. What happens to language under the pressure of crosslingual reading practices? How can the freedom and inventiveness of medieval poetic practices illuminate modern theories of translation? Texts include material in French, English, Latin, and Italian. Proficiency in any one or more of these languages is welcome, but every effort will be made to use texts available in modern English translation, so as to include as wide a participation as possible in the course. W 9:25–11:15

FREN 828a, Les Années 30 du XVIème Siècle Edwin Duval
Focus on the literature of a watershed decade, in which we find the first expressions of a conscious break with the newly invented and disparagingly named Moyen Âge. Readings include the first printed works by three great writers of the new modern age that will eventually come to be called the Renaissance: François Rabelais, Marguerite de Navarre, and Clément Marot. Conducted in French. M 1:30–3:20

FREN 854b, Corneille et Racine Christopher Semk
Ever since La Bruyère pitted Corneille against Racine in Les Caractères—Corneille "paints men as they should be," whereas Racine "paints them as they are"—it has become commonplace to place the two playwrights at opposing ends of classical tragedy. This course revisits the familiar Corneille-Racine parallel through close readings of the plays in their historical, political, and cultural context. We cover such topics as the poetics of classical tragedy, the (a)morality of the theater, the paradox of tragic pleasure, and

the limits of representation (what can and cannot be shown, and how). In addition to tragedies by Corneille and Racine, primary readings include texts by Aristotle, Augustine, d'Aubignac, and Fontenelle. Secondary readings by Guénoun, Marin, Rancière. Conducted in French. T 1:30–3:20

FREN 861b, Margins of the Enlightenment Pierre Saint-Amand
This course proposes a critical examination of the French Enlightenment, with a focus on issues of progress, universalism, and race. We confront these notions with approaches that have emerged in the postcolonial field of studies as well as gender studies. Authors from the clandestine and underground philosophical milieu are also studied. We are assisted by contemporary historians and critics of the Enlightenment, principally Foucault, Hunt, and Darnton. Readings are in Mme de Graffigny, Mme de Duras, Boyer d'Argens, Mairobert, Diderot, and Rousseau. Conducted in French. W 1:30–3:20

FREN 893a/CPLT 899a, Realism and Naturalism Maurice Samuels
This seminar interrogates the nineteenth-century French Realist and Naturalist novel in light of various efforts to define its practice. How does critical theory constitute Realism as a category? How does Realism articulate the aims of theory? And how do nineteenth-century Realist and Naturalist novels intersect with other discourses besides the literary? In addition to several works by Balzac, novels to be studied include Stendhal's *Le Rouge et le Noir,* Sand's *Indiana,* Flaubert's *Madame Bovary,* and Zola's *Nana*. Some attention also paid to Realist painting. Reading knowledge of French required. T 1:30–3:20

FREN 911a, Stéphane Mallarmé Thomas Connolly
This seminar explores the multiple aspects of Mallarmé's oeuvre, the authors and literary movements to which it responds, and the far-reaching repercussions it has had throughout the twentieth century and up to the present day. How has Mallarmé transformed the ways we read, write, and think about literature, art, music, dance, literary theory, and philosophy? In addition to extensive readings within Mallarmé's oeuvre, we read poems by Albiach, Bonnefoy, Celan, du Bouchet, Geoffrey Hill, Ponge, Ungaretti, and Valéry. Critical and theoretical texts include Badiou, Blanchot, de Man, Derrida, Gadamer, Johnson, Kristeva, Marchal, Mondor, and Richard. Reading knowledge of French required. M 9:25–11:15

FREN 929b/CPLT 728b, Chance and Constraints in Literature Morgane Cadieu
The course explores experimental prose in the twentieth and twenty-first centuries by focusing on 'pataphysics, surrealism, Oulipo, the Situationists, New Novel, and post-exoticism. Topics include inspiration and creativity; automatic writing and constrained literature; determinism and free will; the aesthetics of randomness; exceptions to the rule; materialism and atomism. Works by Jarry, Duchamp, Breton, Debord, Perec, Queneau, Garréta, Beckett, Calle, Volodine. Theoretical readings by Lucretius, Spinoza, Althusser, Derrida, Serres, Nancy. Conducted in French. TH 1:30–3:20

FREN 933a/CPLT 513a, One Hundred Years of *Swann's Way* Alice Kaplan
The first volume of Proust's *Recherche* has inspired generations of literary critics, psychoanalysts, philosophers, historians, translators, and critical theorists. Reading *Du côté de chez Swann* in light of their responses to the novel allows us to construct an intellectual and literary history of a century of reading Proust. TH 9:25–11:15

FREN 943a/AFAM 851a/CPLT 989a, Creole Identities and Fictions
Christopher Miller
Focusing on the French and English Caribbean, the course analyzes the quintessential but ambiguous American condition: that of the "Creole." Encompassing all non-native cultures, this term is inseparable from issues of race and slavery. Readings of historical and literary texts: Moreau de Saint-Méry, Bernardin de Saint-Pierre, Madame de Staël, Charlotte Brontë (and reinventions of *Wuthering Heights* by Jean Rhys and Maryse Condé), the Créolistes of Martinique. Attention to Louisiana and to the Haitian Revolution. Reading knowledge of French required. TH 1:30–3:20

FREN 965b, On Violence: Politics and Aesthetics Across the Maghreb Jill Jarvis
A study of twentieth-century Maghrebi texts and films that document, theorize, and critique forms of political violence. How might aesthetic works—novels, plays, poems, torture and prison testimonies, graphic narratives, political cartoons, films—run counter to state-sanctioned memory projects or compel rethinking practices of testimony and justice for a postcolonial time? Works by Kateb, Djebar, Méchakra, Farès, Laredj, Djaout, Toumi, Alleg, Boupacha, Meddeb, Barrada, Ben Jelloun, Binebine, Laâbi. Theoretical readings by Fanon, Mbembe, Khatibi, Kilito, Benjamin, Derrida, Butler and Athanasiou, Spivak. M 1:30–3:20

FREN 980a, Seminar on the Profession Christopher Miller
Open only to French department graduate students entering the job market, this workshop concentrates on the skills and the materials needed for candidacy. Individual and group activities throughout the fall term. Intense focus on the preparation of written materials, followed by training in performative skills. For credit (does not count toward sixteen-course requirement). Graded Satisfactory/Unsatisfactory.

GENETICS

Sterling Hall of Medicine I313, 203.785.5846
http://medicine.yale.edu/genetics
M.S., M.Phil., Ph.D.

Chair
To be announced

Director of Graduate Studies
Marc Hammarlund

Professors Allen Bale, Susan Baserga (*Molecular Biophysics & Biochemistry*), W. Roy Breg, Jr. (*Emeritus*), Lynn Cooley, Daniel DiMaio, Patrick Gallagher (*Pediatrics*), Joel Gelernter (*Psychiatry; Neuroscience*), Antonio Giraldez, Peter Glazer (*Therapeutic Radiology*), Jeffrey Gruen (*Pediatrics*), Murat Gunel (*Neurosurgery*), Karen Hirschi (*Internal Medicine/Cardiology*), Arthur Horwich, Kenneth Kidd, Haifan Lin (*Cell Biology*), Maurice Mahoney, Michael Nitabach (*Cellular & Molecular Physiology*), Charles Radding (*Emeritus*), Margretta Seashore, Nenad Sestan (*Neuroscience*), Gerald Shadel (*Pathology*), Carolyn Slayman, Stefan Somlo (*Internal Medicine/Nephrology*), Joann Sweasy (*Therapeutic Radiology*), Peter Tattersall (*Laboratory Medicine*), Sherman Weissman, Tian Xu, Hongyu Zhao (*Public Health; Biostatistics*)

Associate Professors Martina Brueckner (*Pediatrics/Cardiology*), Keith Choate (*Dermatology*), Valentina Greco, Marc Hammarlund, Natalia Ivanova, Mustafa Khokha (*Pediatrics*), Peining Li, Jun Lu, Arya Mani (*Internal Medicine*), James Noonan, In-Hyun Park, Valerie Reinke, Curt Scharfe, Zhaoxia Sun, Scott Weatherbee

Assistant Professors Kaya Bilguvar, Sidi Chen, Chris Cotsapas (*Neurology*), Smita Krishnaswamy, Janghoo Lim, Michele Spencer-Manzon, Andrew Xiao, Hui Zhang

Fields of Study

Molecular Genetics: chromosome structure and function, genetic recombination, viral genetics, DNA damage repair, ribosome biogenesis, protein folding, neurodegenerative diseases, non-coding RNA function, and the regulation of gene expression. Genomics: genome mapping, genome modification, high-throughput technology, evolutionary genetics, and functional genomics. Cellular and Developmental Genetics: limb development, kidney development, cilia function, stem cell development, genetic control of the cytoskeleton, cell death, aging, cell fate determination, cell cycle progression, cell migration, cell signaling, and growth control. Cancer Genetics: oncogenesis and tumor suppression, tumor progression and metastasis. Model Organism Genetics: forward genetic screens in *Drosophila, C. elegans,* yeast, zebrafish, frogs, and mouse, transposon and insertional mutagenesis, gene and protein trapping, mosaic genetics. Medical Genetics: genetic basis of human disease, chromosome rearrangements, population and quantitative genetics.

Special Admissions Requirements

The department welcomes applicants who have a bachelor's or master's degree in biology, chemistry, or a related field, with experience (from course work and/or research) in the field of genetics. GRE General Test scores are required. A pertinent Subject Test in Biochemistry and Molecular Biology, Biology, or Chemistry is recommended.

To enter the Ph.D. program, students apply to the Molecular Cell Biology, Genetics, and Development (MCGD) track within the interdepartmental graduate program in Biological and Biomedical Sciences (BBS), http://bbs.yale.edu.

Special Requirements for the Ph.D. Degree

The Ph.D. program in Genetics is designed to provide the student with a broad background in general genetics and the opportunity to conduct original research in a specific area of genetics. The student is expected to acquire a broad understanding of genetics, spanning knowledge of at least three basic areas of genetics, which include molecular, cellular, organismal, and population genetics. Normally this requirement is accomplished through the satisfactory completion of formal courses, many of which cover more than one of these areas. Students are required to pass at least five graduate-level courses that are taken for a grade. Advanced graduate study becomes increasingly focused on the successful completion of original research and the preparation of a written dissertation under the direct supervision of a faculty adviser along with the guidance of a thesis committee.

A qualifying examination is given during the second year of study. This examination consists of a period of directed reading with the faculty followed by the submission of two written proposals and an oral examination. Following the completion of course work and the qualifying examination, the student submits a dissertation prospectus and is admitted to candidacy for the Ph.D. degree. There is no language requirement. An important aspect of graduate training in genetics is the acquisition of communication and teaching skills. Students participate in presentation seminars and two terms (or the equivalent) of teaching at the TF-10 level. Teaching activities are drawn from a diverse menu of lecture, laboratory, and seminar courses given at the undergraduate, graduate, and medical school levels. Students are not expected to teach during their first year. In addition to all other requirements, students must successfully complete GENE 901b, First-Year Introduction to Research—Ethics: Scientific Integrity in Biomedical Research, prior to the end of their first year of study. In their fourth year of study, all students must successfully complete B&BS 503b, RCR Refresher for Senior BBS Students.

Honors Requirement

Students must meet the Graduate School's Honors requirement by the end of the fourth term of full-time study.

M.D./Ph.D. Students

M.D./Ph.D. students affiliate with the Department of Genetics graduate program via a different route than other incoming graduate students in the department, resulting in some modification of the academic requirements for the Ph.D. portion of the M.D./Ph.D. degree. Typically, one or more research rotations is done during the first two years

of medical school (in many cases, the first rotation is done during the summer between years one and two). No set number of research rotations is required. M.D./Ph.D. students officially affiliate with the Department of Genetics after selecting a thesis adviser and consulting with the DGS. M.D./Ph.D. students interested in Genetics are required to consult with the DGS prior to formal affiliation to determine an appropriate set of courses tailored to the student's background and interests.

The courses, rotations, and teaching requirements for M.D./Ph.D. students entering the Genetics graduate program (see below) are modified from the normal requirements for Ph.D. students. Besides the modifications in these three requirements, M.D./Ph.D. students in the Department of Genetics are subject to all of the same requirements as the other graduate students in the department.

Courses Four graduate-level courses taken for a grade are required (two Yale graduate-level courses taken for a grade during medical school may be counted toward this requirement at the discretion of the DGS). Course work is aimed at providing a firm basis in genetics and in cellular molecular mechanisms, with graduate-level proficiency in genetics, cell biology, and biochemistry.

Required courses: In addition to the four graduate-level courses, all M.D./Ph.D. students must take: Genomic Methods for Genetic Analysis (GENE 760b); Graduate Student Seminar: Critical Analysis and Presentation of Scientific Literature (2 terms; GENE 675a and b, graded Satisfactory/Unsatisfactory); Ethics: Scientific Integrity in Biomedical Research (as part of GENE 901b, graded Satisfactory/Unsatisfactory).

Recommended courses: Advanced Eukaryotic Molecular Biology (GENE 743b); Biochemical and Biophysical Approaches in Molecular and Cellular Biology (MCDB 630b); Molecules to Systems (CBIO 502); Molecular and Cellular Basis of Human Disease (CBIO 601).

Electives: Other courses may be taken in a wide variety of fields relevant to the biological and biomedical sciences.

Laboratory rotations One or more rotations are necessary to identify a thesis adviser. No set number of research rotations is required.

Teaching One term of teaching is required. Previous teaching while enrolled at the Yale School of Medicine may count toward this requirement at the discretion of the DGS.

Qualifying exam M.D./Ph.D. students take their qualifying exam in the term following the completion of their course work. The structure of the qualifying exam is identical to that for other Ph.D. students in Genetics. Students read with three faculty members for five weeks, one of whom supervises the reading on the thesis research topic, but who is not the thesis adviser. The following two weeks are devoted to writing two research proposals, one on the student's thesis research. An oral exam follows in the eighth week.

Prospectus M.D./Ph.D. students submit their prospectus once their qualifying exam has been completed, but no later than the 30th of June following their exam.

Candidacy M.D./Ph.D. students will be admitted to candidacy once they have completed their course work, obtained two Honors grades, passed their qualifying exam, and submitted their dissertation prospectus.

Thesis committee M.D./Ph.D. students are required to have one thesis committee meeting per year, beginning the term after passing their qualifying exam. However, students are strongly encouraged to consider having additional meetings if they feel their project could benefit from the assistance of members of the thesis committee.

Master's Degrees

M.Phil. See Degree Requirements under Policies and Regulations.

M.S. Students are not admitted for this degree. They may receive this recognition if they leave Yale without completing the qualifying exam but have satisfied the course requirements as described above, as well as the Graduate School's Honors requirement. Students who are eligible for or who have already received the M.Phil. will not be awarded the M.S.

Prospective applicants are encouraged to visit the BBS Web site (http://bbs.yale.edu), MCGD Track.

Courses

GENE 555a/CPSC 553a[U], Computational Methods for the Analysis and Modeling of Biological Data Smita Krishnaswamy

This course introduces biology as a systems and data science through open computational problems in biology, the types of high-throughput data that are being produced by modern biological technologies, and computational approaches that may be used to tackle such problems. We cover applications of machine-learning methods in the analysis of high-throughput biological data, especially focusing on genomic and proteomic data, including denoising data; nonlinear dimensionality reduction for visualization and progression analysis; unsupervised clustering; and information theoretic analysis of gene regulatory and signaling networks. Students' grades are based on programming assignments, a midterm, a paper presentation, and a final project. Prerequisite: GENE 760 or permission of the instructor. TTH 9–10:15

GENE 625a/MB&B 625a[U]/MCDB 625a[U], Basic Concepts of Genetic Analysis Tian Xu and staff

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. MW 11:35–12:50

[GENE 645b/BIS 645b/CB&B 647b, Statistical Methods in Human Genetics]

GENE 655a/CBIO 655a, Stem Cells: Biology and Application In-Hyun Park, Haifan Lin, and faculty

This course is designed for first-year or second-year students to learn the fundamentals of stem cell biology and to gain familiarity with current research in the field. The course is presented in a lecture and discussion format based on primary literature. Topics include stem cell concepts, methodologies for stem cell research, embryonic stem cells, adult stem cells, cloning and stem cell reprogramming, and clinical applications of stem cell

research. Prerequisites: undergraduate-level cell biology, molecular biology, and genetics. TH 1:30–3

GENE 675a and b, Graduate Student Seminar: Critical Analysis and Presentation of Scientific Literature Valentina Greco and staff
Students gain experience in preparing and delivering seminars and in discussing presentations by other students. A variety of topics in molecular, cellular, developmental, and population genetics are covered. Required of all second-year students in Genetics. Graded Satisfactory/Unsatisfactory. W 1:30–3

GENE 703b, The Mouse in Biomedical Research Caroline Zeiss
This course describes aspects of comparative genomics, construction of genetically altered mice, mouse phenotyping, and study design relevant to the use of mice in the study of human disease. Prerequisites: undergraduate-level knowledge of genetics and mammalian anatomy and physiology.

GENE 734a/MB&B 734a/MBIO 734a, Molecular Biology of Animal Viruses Brett Lindenbach
Lecture course with emphasis on mechanisms of viral replication, oncogenic transformation, and virus-host cell interactions. MW 10–11:30

GENE 743b/MB&B 743b[U]/MCDB 743b, Advanced Eukaryotic Molecular Biology Mark Hochstrasser, Karla Neugebauer, Matthew Simon, Patrick Sung
Selected topics in transcriptional control, regulation of chromatin structure, mRNA processing, mRNA stability, RNA interference, translation, protein degradation, DNA replication, DNA repair, site-specific DNA recombination, somatic hypermutation. Prerequisite: biochemistry or permission of the instructor. TTH 11:35–12:50

GENE 749a/MB&B 749a[U], Medical Impact of Basic Science Joan Steitz, I. George Miller, Andrew Miranker, Karla Neugebauer, David Schatz, Thomas Steitz, and staff
Consideration of examples of recent discoveries in basic science that have elucidated the molecular origins of disease or that have suggested new therapies for disease. Emphasis is placed on the fundamental principles on which these advances rely. Reading is from the primary scientific and medical literature, with emphasis on developing the ability to read this literature critically. Aimed primarily at undergraduates. Prerequisite: biochemistry or permission of the instructor. MW 1–2:15

GENE 760b, Genomic Methods for Genetic Analysis James Noonan
Introduction to the analysis and interpretation of genomic datasets. The focus is on next-generation sequencing (NGS) applications including RNA-seq, ChIP-seq, and exome and whole genome sequencing. By the end of the course, each student will be able to process and analyze large-scale NGS datasets and interpret the results. This course is intended only for graduate students who are interested in applying genomic approaches in their thesis research. At a minimum, students must have basic familiarity with working in a UNIX/Linux computing environment. Prior experience with shell scripting or a scripting language such as Perl, Python, or Ruby is strongly recommended. Interested students must contact the instructor early in the fall term to discuss their prior experience

and expectations for the course. Enrollment limited to twenty. Prerequisite: permission of the instructor.

GENE 777b/MCDB 677b, Mechanisms of Development Valerie Reinke and staff
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 participation in critical analysis of primary literature and a research proposal term paper. W 1:30–3:20

GENE 840a and b, Medical Genetics Margretta Seashore
Clinical rotation offering medical and graduate students the opportunity to participate in the Genetic Consultation Clinic, genetic rounds, consultation rounds, and genetic analysis of clinical diagnostic problems.

GENE 900a/CBIO 900a/MCDB 900a, First-Year Introduction to Research—Grant Writing and Scientific Communication Scott Holley and faculty
Grant writing, scientific communication, and laboratory rotation talks for Molecular Cell Biology, Genetics, and Development track students. M 4–5:30

GENE 901b/CBIO 901b/MCDB 901b, First-Year Introduction to Research—Ethics: Scientific Integrity in Biomedical Research Joerg Bewersdorf
Ethics and laboratory rotation talks for Molecular Cell Biology, Genetics, and Development track students. TH 4:15–5:45

GENE 911a/CBIO 911a/MCDB 911a, First Laboratory Rotation
First laboratory rotation for Molecular Cell Biology, Genetics, and Development track students.

GENE 912b/CBIO 912b/MCDB 912b, Second Laboratory Rotation Craig Crews
Second laboratory rotation for Molecular Cell Biology, Genetics, and Development track students.

GENE 913b/CBIO 913b/MCDB 913b, Third Laboratory Rotation Craig Crews
Third laboratory rotation for Molecular Cell Biology, Genetics, and Development track students.

GENE 921a and b, Reading Course in Genetics and Molecular Biology
Directed reading with faculty. Term paper required. Prerequisite: permission of Genetics DGS.

GEOLOGY AND GEOPHYSICS

Kline Geology Laboratory, 203.432.3124
http://earth.yale.edu
M.S., M.Phil., Ph.D.

Chair
Jay Ague

Director of Graduate Studies
Jun Korenaga

Professors Jay Ague, David Bercovici, Ruth Blake, Mark Brandon, Derek Briggs, David Evans, Alexey Fedorov, Debra Fischer, Jacques Gauthier, Shun-ichiro Karato, Jun Korenaga, Mark Pagani, Jeffrey Park, Peter Raymond, Danny Rye, James Saiers, Ronald Smith, John Wettlaufer

Associate Professors William Boos, Kanani Lee, Maureen Long, Trude Storelvmo, Mary-Louise Timmermans

Assistant Professors Bhart-Anjan Bhullar, Pincelli Hull, Noah Planavsky, Nadine Unger

Fields of Study

Fields include geochemistry and petrology, geophysics, ice physics, mineral physics, seismology and geodynamics, structural geology and tectonics, paleontology and paleoecology, oceanography, meteorology, cryospheric dynamics, 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, geophysical, and geochemical sciences. Scores from a pertinent GRE Subject Test are desirable but not required. The TOEFL or IELTS exam is required of 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 adviser to meet individual interests and needs and to lay the foundations for dissertation research. 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 and maintained a better than passing record in the areas of concentration. Also, a student must have satisfied the requirements of the Qualifying Exam by

having completed two Research Discourses termed (according to their degree of development) the Minor and the Major Discourses. The Major Discourse will be presented at the Qualifying Presentation, followed by an extended question period wherein the student must successfully defend both Discourses. Remaining degree requirements include a dissertation review in the third year; the preparation and defense of the dissertation; and the submission of the dissertation to the Graduate School. The department requires that an additional copy, for which the student will be reimbursed, be deposited with the librarian of the Kline Geology Library.

Teaching experience is regarded as an integral part of the graduate training program in Geology and Geophysics. For that reason all students are required to serve as teaching fellows (5 hours per week) for two terms during the course of their predoctoral training.

In addition to all other requirements, students must successfully complete G&G 710b, Responsible and Ethical Conduct of Research, prior to the end of their first year of study.

Master's Degrees

M.Phil. See Degree Requirements under Policies and Regulations.

M.S. Awarded only to students who are not continuing for the Ph.D. Students are not admitted for this degree. Minimum requirements include satisfactory performance in a course of study (typically six or more courses with at least one Honors grade in a graduate-level class) that is approved by the director of graduate studies (DGS), and a research project with the approval of the DGS and the student's thesis committee.

Program materials are available at http://earth.yale.edu or upon request to the Director of Graduate Studies, Department of Geology and Geophysics, Yale University, PO Box 208109, New Haven CT 06520-8109; e-mail, dgs@geology.yale.edu.

Courses

[G&G 501b^{U}/ASTR 540b^{U}, Radiative Processes in Astrophysics/Stellar Atmospheres]

G&G 502a^{U}, Introduction to Geochemistry Mark Pagani
Basic principles of geochemistry and their use in geological science. Thermodynamics of aqueous and igneous systems. Element fractionation and isotope geochemistry. Biogeochemical cycles, geochronology, cosmochemistry. TTH 11:35–12:50

[G&G 504a^{U}, Minerals and Human Health]

G&G 507a, Experimental Methods in Earth Sciences Shun-ichiro Karato
Methods of experimental studies under high pressures and temperatures. Methods of quantitative laboratory analysis of rocks, minerals, and fluids in geological and planetary sciences. A seminar course that includes laboratory exercises providing background on interdisciplinary techniques such as electron microscopy; optical, infrared, and Raman spectroscopy; and x-ray diffraction techniques.

[G&G 508b, The Global Carbon Cycle]

[G&G 510a, Introduction to Isotope Geochemistry]

G&G 512a^{U}, Structure and Deformation of the Lithosphere Mark Brandon
An examination of the equations governing rotating stratified flows with application to oceanic and atmospheric circulation as well as climate. Mathematical models are used to illustrate the fundamental dynamical principles of geophysical fluid phenomena such as waves, boundary layers, flow stability, turbulence, and large-scale flows. The course aims to provide a general theoretical framework for understanding the structure and circulation of the ocean and the atmosphere. MW 11:35–12:50

G&G 513a^{U}, Invertebrate Paleontology: Evolving Form and Function Derek Briggs
Exploration of the basic constraints and potentials that controlled adaptive radiation in the evolution of the invertebrate skeleton. MW 11:35–12:50

G&G 519a^{U}, Introduction to the Physics and Chemistry of Earth Materials Kanani Lee
Basic principles that control the physical and chemical properties of Earth materials. Equation of state, phase transformations, chemical reactions, elastic properties, diffusion, kinetics of reaction, and mass/energy transport. TTH 1–2:15

G&G 521b^{U}, Geophysical Fluid Dynamics Mary-Louise Timmermans
An examination of the equations governing rotating stratified flows with application to oceanic and atmospheric circulation as well as climate. Mathematical models are used to illustrate the fundamental dynamical principles of geophysical fluid phenomena such as waves, boundary layers, flow stability, turbulence, and large-scale flows. The course aims to provide a general theoretical framework for understanding the structure and circulation of the ocean and the atmosphere. MW 11:35–12:50

G&G 522a^{U}, Physics of Weather and Climate William Boos
The climatic system; survey of atmospheric behavior on time scales 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. TTH 1–2:15

G&G 523b^{U}, Climate Dynamics Alexey Fedorov
A survey of fluid dynamics with application to circulation in the ocean and atmosphere, as well as mantle and core. Mathematical models are used to illustrate the fundamental dynamical principles of geophysical fluid phenomena such as convection, waves, boundary layers, flow stability, turbulence, and large-scale flows. The course aims to provide a general theoretical framework for understanding the structure and circulation of the ocean, atmosphere, and Earth's interior. MW 11:35–12:50

[**G&G 524a, Mathematical Methods in Geophysics**]

[**G&G 526a^{U}, Introduction to Earth and Planetary Physics**]

G&G 528a^{U}, Science of Complex Systems Jun Korenaga
Introduction to the quantitative analysis of systems with many degrees of freedom. Fundamental components in the science of complex systems, including how to simulate complex systems, how to analyze model behaviors, and how to validate models using

observations. Topics include cellular automata, bifurcation theory, deterministic chaos, self-organized criticality, renormalization, and inverse theory. MW 9–10:15

G&G 529b, Introduction to Geodynamics Jun Korenaga
This introductory course starts with the basics of continuum mechanics and covers a range of topics in geodynamics and relevant fields including the structure and dynamics of lithosphere, thermal convection and magmatism, Rayleigh-Taylor instability and plume dynamics, geoid and dynamic topography, and the thermal history of the core and geodynamo. MW 9–10:15

[G&G 533a[U], Paleogeography]

G&G 535a[U], Physical Oceanography Alexey Fedorov
An introduction to ocean dynamics and physical processes controlling the large-scale ocean circulation, ocean stratification, the Gulf Stream, wind-driven waves, tides, tsunamis, coastal upwelling, and other oceanic phenomena. Equations of motion. Modern observational, theoretical, and numerous other techniques used to study the ocean. The ocean role in climate and global climate change. MW 11:35–12:50

[G&G 536b, Atmospheric Waves, Convection, and Vortices]

G&G 538a/ASTR 520a, Computational Methods in Astrophysics and Geophysics
Paolo Coppi
The analytic and numerical/computational tools necessary for effective research in astronomy, geophysics, and related disciplines. Topics include numerical solutions to differential equations, spectral methods, and Monte Carlo simulations. Applications are made to common astrophysical and geophysical problems including fluids and N-body simulations.

[G&G 540a[U], Methods in Geomicrobiology]

[G&G 545a, Marine Micropaleontology]

[G&G 555a[U], Thermodynamics of Mountain Belts]

G&G 556b[U], Introduction to Seismology Maureen Long
Earthquakes and seismic waves, P and S waves, surface waves and free oscillations. Remote sensing of Earth's deep interior and faulting mechanisms. Prerequisites: MATH 120, 222, and PHYS 181, or equivalents.

[G&G 557b, Advanced Seismology]

G&G 562b[U]/ARCG 762b[U]/EMD 548b/F&ES 726b, Observing Earth from Space
Xuhui Lee
A practical introduction to satellite image analysis of Earth's surface. Topics include the spectrum of electromagnetic radiation, satellite-borne radiometers, data transmission and storage, computer image analysis, the merging of satellite imagery with GIS and applications to weather and climate, oceanography, surficial geology, ecology and epidemiology, forestry, agriculture, archaeology, and watershed management.

[G&G 567b[U], Geochemical Approaches to Archaeology]

[G&G 570b, Cloud Physics and Dynamics]

G&G 602b[U], Paleoclimates Mark Pagani
A study of the dynamic evolution of Earth's climate. Topics include warm (the Cretaceous, the Eocene, the PETM, the Pliocene) and cold (the "snowball Earth") climates of the past, glacial cycles, abrupt climate changes, the climate of the past thousand years, and the climate of the twentieth century. TTH 11:35–12:50

[G&G 610b[U], Advanced Topics in Macroevolution]

[G&G 616a, Advanced Petrology]

[G&G 618a, 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
The seminar offers a detailed look at current issues in the phylogeny, anatomy, and evolution of fossil and recent vertebrates. Lectures review the broad outline of vertebrate phylogeny and evolution. Lab section is required. HTBA

[G&G 644b, Mantle Dynamics and Geochemistry]

[G&G 650b[U], Deformation of Earth Materials]

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

[G&G 657a, Marine, Atmospheric, and Surficial Geochemistry]

[G&G 658b, Seismic Data Analysis]

[G&G 659a, Time Series Analysis with Geoscience Applications]

G&G 666a/AMTH 666a/ASTR 666a, Classical Statistical Thermodynamics
John Wettlaufer
Classical thermodynamics is derived from statistical thermodynamics. Using the multiparticle nature of physical systems, we derive ergodicity, the central limit theorem, and the elemental description of the second law of thermodynamics. We then develop kinetics, transport theory, and reciprocity from the linear thermodynamics of irreversible processes. Topics of focus include Onsager reciprocal relations, the Fokker-Planck equation, stability in the sense of Lyapunov, and time invariance symmetry. We explore phenomena that are of direct relevance to astrophysical and geophysical settings. No quantum mechanics is necessary as a prerequisite.

[G&G 675b, Quantitative Tectonics]

G&G 690a and b, Directed Research in Geology and Geophysics
By arrangement with faculty.

G&G 691a or b, Independent Research
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. Prerequisite: approval of DGS and adviser.

G&G 701b, The Warming Papers Trude Storelvmo
Weekly presentation and discussion of papers representing the scientific foundation for the climate change forecast. Open to graduate students and advanced undergraduate students. No formal prerequisites, but basic calculus and university-level physics are helpful.

G&G 703a, Seminar in Systematics Jacques Gauthier
3 HTBA

G&G 710a, Responsible and Ethical Conduct of Research Alexey Fedorov
A 5-to-6-week lecture course (1 hour) that is required of all graduate students and must be completed within the first year. Course topics include record keeping and data management/retention; plagiarism and fraud; collaboration, coauthorship, and ownership of research materials and intellectual property; laboratory dynamics and sexual harassment. G&G 710a is in addition to the existing online ethics module, "The Yale Guide to Professional Ethics" (https://www.sis.yale.edu/pls/rcr/login_c_pkg.go_to_front_door), that must be completed by all GSAS students within the first term of study, regardless of source of financial support.

G&G 719b, Topics in Mineral Physics Kanani Lee
The seminar focuses on advanced topics in planetary structure, composition, and evolution from the perspective of mineral physics. The seminar relies on both classic mineral physics papers as well as recently published results. T 3:30–5

[**G&G 735a, Principles in Organic Geochemistry**]

[**G&G 740a, Student Research Seminar**]

G&G 742b, Seminar in Polar Processes and Climate John Wettlaufer, Mary-Louise Timmermans
This course is a forum for reading and discussing a selection of papers related to the climate of the polar regions. Atmosphere, ice, and ocean processes and interactions are studied in the context of arctic and global climate.

G&G 744b, Seminar in Mantle and Core Processes David Bercovici
T 4–5:30

[**G&G 746a or b, Seminar in Climate and Energy**]

G&G 747a or b, Topics in Geochemistry

[**G&G 757b, Studies in Global Geoscience**]

G&G 765b, General Circulation of Planetary Atmospheres William Boos
TTH 1–2:15

G&G 767b, Seminar in Ice Physics John Wettlaufer
We bring together the basic thermodynamics and statistical mechanics of crystal growth, surface phase transitions, metastability, and instability to explore the many faces of the

surface of ice. These processes control the macroscopic growth shapes of ice crystals, underlie the enigma of the snowflake, and have implications in, inter alia, the atmosphere, the oceans, basic materials science, and astrophysics.

G&G 775a and b, Seminar in Lithosphere and Surface Processes Noah Planavsky, Mark Brandon

The seminar focuses on advanced topics in the evolution and structure of the lithosphere. The theme for the seminar changes each term, covering topics such as the restoration of continents in deep time, true polar wander, lithospheric instabilities, orogenesis at convergent plate boundaries, interactions between climate and tectonics. Meetings are for 1.5 hours, once a week, and are organized around readings from the primary research literature.

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, 203.432.0788
http://german.yale.edu
M.A., M.Phil., Ph.D.

Chair
Kirk Wetters

Director of Graduate Studies
Brigitte Peucker [F]
Carol Jacobs [Sp]

Professors Rüdiger Campe (*on leave* [F]), Carol Jacobs (*on leave* [F]), Rainer Nägele (*Emeritus*), Paul North, Brigitte Peucker, Henry Sussman (*Visiting*), Kirk Wetters

Affiliated Faculty Jeffrey Alexander (*Sociology*), Seyla Benhabib (*Political Science; Philosophy; on leave* [Sp]), Karsten Harries (*Philosophy*), Gundula Kreuzer (*Music*), Patrick McCreless (*Music; on leave* [Sp]), Steven Smith (*Political Science; on leave* [Sp]), David Sorkin (*History*), Nicola Suthor (*History of Art*), Katie Trumpener (*Comparative Literature; English; on leave* [F])

Fields of Study

German literature and culture from the Middle Ages to the twenty-first century in Germany, Austria, and Switzerland; literary and cultural theory; literature and philosophy; literature and science; media history and theory; visuality and German cinema.

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 one other foreign language in the third term of study. French is recommended, although occasionally, on consultation with the director of graduate studies (DGS), other relevant languages may be substituted. The faculty in German considers teaching to be essential to the professional preparation of graduate students. Four terms of teaching are required beginning in the third year of study. Students normally teach undergraduate language courses under supervision for at least three terms. Other teaching experiences are available thereafter in literature, theory, film, etc.

In the first two years of study, students take four courses per term. Three of these sixteen courses in the first four terms may be audited.

Oral examinations must be passed in the fifth and sixth terms of study, and a dissertation prospectus should be submitted no later than the end of the sixth term. 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 May of the sixth 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 mainly 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 members of their committee, so that faculty members in addition to the dissertation adviser can make suggestions well before the dissertation is submitted. Drafts of each chapter must be submitted in a timely fashion to all members of the student's committee: The first chapter should be submitted to the committee by February 1 of the fourth year of study; the second chapter should be submitted by January 1 of the fifth year. There will be a formal review of the first chapter.

Two concentrations are available to graduate students: Germanic Literature and German Studies. There is a special combined degree with Film and Media Studies; see below.

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. Three courses may be audited.

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. Three of those courses may be audited. Students are asked to define an area of concentration and will meet with appropriate advisers from both within and outside the department.

Combined Ph.D. Program with Film and Media Studies

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

Master's Degrees

M.Phil. See Degree Requirements under Policies and Regulations.

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.

Further information is available upon request to the Registrar, Department of Germanic Languages and Literatures, Yale University, PO Box 208210, New Haven CT 06520-8210; e-mail, german@yale.edu.

Courses

GMAN 559b^{U}/CPLT 560b^{U}, Rilke and Yeats Carol Jacobs
Study of the works of two twentieth-century authors who, in very different ways, challenge conventional modes in which to think about the relationship between literature and what we tend to call reality. We ask how to think about the performance of art and

its implicit theorizations as crucial to this issue, and ponder the difference between the commitment to and lack of interest in a thematics of lived life. The nature and purpose of the course are to practice close reading as a mode of thinking and a path to theorizing. We explore how that theorization of the text takes place, not in a separate sphere, but out of the details and performance of individual literary works. Although our classes settle on individual works, students are expected to read much more widely in the corpus of the two poets. TH 1:30–3:20

GMAN 607a[U], Goethe's *Faust* Kirk Wetters
Goethe's *Faust,* with special attention to *Faust II* and to the genesis of *Faust* in its various versions throughout Goethe's lifetime; emphasis on the work in context of Goethe's time and in the later reception and criticism. W 3:30–5:20

GMAN 642b[U], Büchner: Between Comedy and Science Rudiger Campe
Close reading of works by Georg Büchner, romantic poet and founder of the anticlassical tradition in German literature. The range of Büchner's writings in terms of discourse and performative style, including comedy, tragedy, psychological case study, political pamphlet, philosophical lecture, and scientific paper. Attention to the interrelation between literary and nonliterary semantics. Readings in English and German. Discussion in English.

GMAN 647b[U]/CPLT 651b[U]/PHIL 606b[U], Systems and Their Theory
Henry Sussman
Conceptual systems that have, since the outset of modernity, furnished a format and platform for rigorous thinking at the same time that they have imposed on language the attributes of self-reflexivity, consistency, repetition, purity, and dependability. Texts by Kant, Hegel, Bergson, Kafka, Proust, and Borges. T 3:30–5:20

GMAN 651a/PHIL 734a/PLSC 583a, Contemporary Critical Theory
Seyla Benhabib
An examination of the themes of statelessness, migration, and exile in the works of Arendt, Benjamin, Adorno, Shklar, and Berlin. W 9:25–11:15

GMAN 711a[U], Literature of Travel and Tourism Kirk Wetters
A critical, historical introduction to the functions of travel narratives in the modern period. Topics include travel and autobiography, cosmopolitanism, travel as a means of individual experience and education, the rise and fall of anthropology, and the contemporary culture of tourism. T 1:30–3:20

GMAN 722a/HSAR 718a, Mimesis in Art and Nature Paul North
Influential theories postulate that visual art and literature imitate nature. Recent scientific theories postulate that nature also imitates. We investigate what it means for anything to "look like" anything else, in readings of literature, art, and criticism. Authors and topics include Edgar Allan Poe, Nikolai Gogol, Oscar Wilde, and Gerhard Richter on portraiture; Emanuel Swedenborg, Charles Baudelaire, Walter Benjamin, and René Magritte on correspondence; Aristotle, Erich Auerbach, and Philippe Lacoue-Labarthe on mimesis; Goethe, Darwin, Kafka, and Günter Wagner on natural similarities and homology; Peirce, Warburg, and Walker Evans on iconicity. TH 3:30–5:20

GMAN 741a, Reading Late Capitalism Henry Sussman
This is a course on the fate of Marxian literature in view of the sociocultural history of the nineteenth and twentieth centuries. The course not only explores the parameters and dimensions of Marx's core texts but also pursues the fate of such major constructs as the commodity, alienation, class conflict, and assembly-line manufacture in the literature, cinema, and theoretical oversight of both centuries. As much attention is devoted to the Marxian imaginary as to the isolation and analysis of the key arguments. With key amplifying readings by Flaubert, Zola, Kafka, Lukács, Benjamin, Derrida, Jameson, and Piketty. T 3:30–5:20

GMAN 757b[U], Medieval German Romance and Epic Mary Paddock
Study of three great medieval works of Arthurian romance and courtly epic: *Parzival, Tristan,* and the *Nibelungenlied*. Literary transmission in both oral and written cultures, conventions and inventions of courtly narrative, courtly patronage and its historical context, moral and religious codes of knighthood and chivalric heroism. Readings in English translation. TH 3:30–5:20

GMAN 760b[U]/CPLT 905b[U]/FILM 760b[U], Intermediality in Film Brigitte Peucker
Film is a hybrid medium, the meeting point of several others. This course focuses on the relationship of film to theater and painting, suggesting that where two media are in evidence, there is usually a third. Topics include space, motion, color, theatricality, tableau vivant, *ekphrasis,* spectatorship, and new media. Readings feature art historical and film theoretical texts as well as essays pertinent to specific films. Films by Fassbinder, Bergman, Murnau, von Trier, Rohmer, Godard, Kiarostami, and others, concluding with three films by Peter Greenaway. T 3:30–5:20

GMAN 900a,b, Directed Reading
By arrangement with the faculty.

GLOBAL AFFAIRS

Jackson Institute for Global Affairs
Horchow Hall, 203.432.3418
http://jackson.yale.edu/academics
M.A.S., M.A.

Director
James Levinsohn (*Global Affairs; School of Management*)

Director of Graduate Studies
Lloyd Grieger (*Sociology*)

Director of Student Affairs
Cristin Siebert (203.432.5954, cristin.siebert@yale.edu)

Professors Julia Adams (*Sociology*), Elizabeth Bradley (*Public Health*), John Gaddis (*History; on leave* [F]), Jeffrey Garten (*School of Management*), Jacob Hacker (*Political Science*), Oona Hathaway (*Law*), Stathis Kalyvas (*Political Science*), Paul Kennedy (*History*), James Levinsohn (*School of Management*), A. Mushfiq Mobarak (*School of Management*), Catherine Panter-Brick (*Anthropology*), W. Michael Reisman (*Law*), Susan Rose-Ackerman (*Political Science; Law*), Peter Schott (*Economics; School of Management*), Ian Shapiro (*Political Science*), Timothy Snyder (*History*), Aleh Tsyvinski (*Economics*), Christopher Udry (*Economics*), Steven Wilkinson (*Political Science*), Elisabeth Wood (*Political Science*), Ernesto Zedillo (*International Economics & Politics*)

Associate Professors Konstantinos Arkolakis (*Economics*), Ana De La O Torres (*Political Science*), Alexandre Debs (*Political Science*), Kaveh Khoshnood (*Public Health*), Jason Lyall (*Political Science*), Nuno Monteiro (*Political Science*), Nancy Qian (*Economics*), Jonathan Wyrtzen (*Sociology; International Affairs; on leave*)

Assistant Professors Katharine Baldwin (*Political Science; on leave*), Lorenzo Caliendo (*Economics; School of Management*), Zack Cooper (*Public Health*), Lloyd Grieger (*Sociology*), Daniel Keniston (*Economics*), Thania Sanchez (*Political Science*)

Senior Lecturers Charles Hill (*International Security Studies*), Justin Thomas

Lecturers Michael Boozer (*Economics*), Christopher Fussell, William Casey King, Matthew Kocher (*Political Science*), Alice Miller (*Public Health; Law*), Vimal Ranchhod

Visiting Professors*

Senior Fellows* Sigga Benediktsdottir, Eric Braverman, David Brooks, Howard Dean, Rosemary DiCarlo, Robert Ford, Thomas Graham, Unni Karunakara, Clare Lockhart, Stanley McChrystal, Stephen Roach, Dennis Ross, Emma Sky

*For a complete list of visiting professors and senior fellows, see the Jackson Institute Web site.

The Jackson Institute for Global Affairs nurtures degree programs and scholarship with a strong interdisciplinary and policy-oriented international focus. The programmatic interests of the institute focus on development and security.

The Jackson Institute for Global Affairs administers the two-year Master of Arts (M.A.) and the one-year Master of Advanced Study (M.A.S.) degrees in Global Affairs. The fifty to sixty students in the M.A. program combine fundamental training in core disciplines in Global Affairs with an individualized concentration that has relevance to current international issues. Students in the M.A.S. program select courses based on their individual academic and professional goals. In addition to courses in the Global Affairs program, students take courses throughout the Yale Graduate School of Arts and Sciences and Yale's professional schools.

Fields of Study

The programs are designed to combine breadth of knowledge of the basic disciplines of global affairs with depth of specialization in a particular academic discipline, geographic area, specialized functional issue, and/or professional field. The M.A. program is designed primarily for students seeking an advanced degree before beginning a career in global affairs; joint degrees are offered with the School of Forestry & Environmental Studies, the Law School, the School of Management, and the School of Public Health. The M.A.S. program is aimed at midcareer professionals with extensive experience in a field of global affairs such as, but not limited to, international security, diplomacy, and development.

Special Admissions Requirements

Applicants to either program must take the GRE General Test; students whose native language is not English and who did not earn their undergraduate degree at an English-language university must take the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS). The minimum score on the TOEFL is 610 on the paper-based test or 102 on the Internet-based test. Entering M.A. students are strongly encouraged to have taken introductory courses in microeconomics and macroeconomics prior to matriculation.

Special Requirements for the M.A. Degree

The M.A. in Global Affairs requires two years of graduate study at Yale. To complete the degree, students must pass sixteen courses that fulfill the core and concentration requirements, demonstrate proficiency in a modern language, complete a summer internship or project, and maintain the grade average specified below.

Core Students take GLBL 801, 802, and 803 during the first term of enrollment.

Concentration Beyond the core courses and courses taken in fulfillment of the language requirement, each student must identify and demonstrate the academic integrity of a coherent set of courses as a proposed concentration for approval by the director of graduate studies (DGS). Students are able to develop concentrations based on a topical, regional, or disciplinary focus, or a combination of a topical and regional focus. Sample concentrations are available from the Jackson Institute Web site.

Language requirement The equivalent of four terms of language study at Yale is required to graduate. This competence must be demonstrated through successful completion of a Yale L4 class or by testing into a Yale L5 class. International students who

completed secondary school or a university degree in a language other than English will be considered to have met the language requirement. Students may study language as part of their Yale program.

Summer internship requirement All students enrolled in the Global Affairs M.A. program are required to use the summer between the first and second years of the program to further their professional or academic education. It is expected that this requirement be fulfilled by obtaining experience through full-time employment or a full-time internship. The requirement may also be fulfilled by completing language study, other relevant course work, or independent research on an approved topic.

Each first-year student must file a form with the director of career services before June 1 stating the nature of his or her summer internship or approved alternative and submit a self-evaluation form by September 1.

Expectation of academic performance M.A. candidates are required to achieve at least two grades of Honors, while maintaining a High Pass average. To remain in good academic standing at the end of the first year, M.A. students are expected to complete half of the course work required for the degree, with at least a High Pass average and one grade of Honors. Students who do not have at least a High Pass average or the required number of courses at the end of the first year will not be allowed to continue in the program.

Special Requirements for the M.A.S. Degree

The M.A.S. in Global Affairs requires one year of graduate study at Yale. To complete the degree, students must pass eight courses in one year of full-time study. Courses are chosen in consultation with the director of graduate studies (DGS) at the start of each term. The program of study is customized to a student's individual academic and professional goals.

Special Requirements for the M.A. Joint-Degree Programs

Joint-degree candidates must fulfill all of the requirements of both programs in which they are enrolled before receiving either degree. 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 toward the Global Affairs program requirements. Three of these will be GLBL 801, 802, and 803, though the DGS may waive a portion of the Core for a joint-degree candidate. Two of the twelve courses may be language courses. Under no circumstances will students be allowed a Global Affairs 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 Global Affairs M.A. 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.

For more information, visit http://jackson.yale.edu/academics, e-mail jackson.institute@yale.edu, or call 203.432.3418.

Courses

GLBL 504b[U], International Economics Peter Schott
Introduction to conceptual tools useful for understanding the strategic choices made by countries, firms, and unions in a globalized world. Prerequisite: two terms of introductory economics.

GLBL 529a/CDE 585a/LAW 20568, Sexuality, Gender, Health, and Human Rights Alice Miller
This course explores the application of human rights perspectives and practices to issues in regard to sexuality and health. Through reading, interactive discussion, paper presentation, and occasional outside speakers, students learn the tools and implications of applying rights and law to a range of sexuality and health-related topics. The overall goal is twofold: to engage students in the world of global sexual health and rights policy making as a field of social justice and public health action; and to introduce them to conceptual tools that can inform advocacy and policy formation and evaluation. Class participation, short reaction papers, and a final paper required. TH 9:25–11:15

GLBL 530a, Human Trafficking in the Global Context William Casey King
Human trafficking has been described as the largest human rights violation in the history of mankind. It is the third-largest criminal activity in the world (after drug smuggling and arms dealing). The estimated twenty-seven million enslaved individuals represent the highest number of slaves in human history. This course applies both a historical and contemporary context on slavery and anti-slavery and quantitative analysis to study the challenges confronting law enforcement and diplomatic agencies around the world. Questions students address include: How effective are the current methods for tracking and prosecuting human trafficking? What laws and/or policy changes could be enacted to eradicate human trafficking? How is the problem understood in different ways throughout the world? What is the role of the Internet and dark web in human trafficking? How can data inform anti-human trafficking efforts, and what is the limit of data? What should the role of the United States be in combatting human trafficking? What are other countries doing to confront the issue, and do they understand the problem in similar terms? Guest speakers from global NGOs, the Department of Homeland Security, survivors of human trafficking, policy makers, and anti-slavery activists.

GLBL 543b/MGT 672b, Practicum in Data Analysis Using Stata Justin Thomas
This course provides students with practical hands-on instruction in the analysis of survey data using the statistical package Stata. It serves as a bridge between the theory of statistics/econometrics and the practice of social science research. Throughout the term students learn to investigate a variety of policy and management issues using data from the United States as well as several developing countries. The course assumes no prior knowledge of the statistical package Stata. Prerequisites: graduate course in statistics and permission of the instructor.

GLBL 554a[U], Violence: State and Society Matthew Kocher
The course examines violence that occurs mainly within the territory of sovereign states. We focus on violence as an object of study in its own right. For the most part, we look at violence as a dependent variable, though in some instances it functioned as an independent variable, a mechanism, or an equilibrium. We ask why violence happens, how

it "works" or fails to work, why it takes place in some locations and not others, why violence takes specific forms (e.g., insurgency, terrorism, mass killing), what explains its magnitude (the number of victims), and what explains targeting (the type or identity of victims). Special attention to connecting theoretical literatures in the social sciences with policy-relevant debates in government and nongovernmental service.

GLBL 555b/PLSC 665b[U], Causes of War Allan Dafoe
Examination of social, symbolic, and psychological aspects of international relations, with emphasis on the roles of perception and reputation in militarized conflict. Topics include deterrence, honor, prestige, signaling, audience costs, and international law. Rationalist, psychological, and cultural perspectives. Some attention to research design.

GLBL 567a/CDE 543a/EMD 543a, Global Aspects of Food and Nutrition Debbie Humphries
The course presents a core topic in global health and development that is at the intersection of science, society, and policy. The course familiarizes students with leading approaches to analyzing the causes of malnutrition in countries around the world and to designing and evaluating nutrition interventions. It covers micronutrient and macronutrient deficiencies; approaches to reducing malnutrition; the cultural, economic, environmental, agricultural, and policy context within which malnutrition exists; and the relationships between common infections and nutritional status.

GLBL 569a/EHS 537a/EMD 537a, Water, Sanitation, and Global Health Ying Chen, Elsio Wunder
Water is essential for life, and yet unsafe water poses threats to human health globally, from the poorest to the wealthiest countries. More than two billion people around the world lack access to clean, safe drinking water, hygiene, and sanitation (WASH). This course focuses on the role of water in human health from a public health perspective. The course provides a broad overview of the important relationships between water quality, human health, and the global burden of waterborne diseases. It discusses the basics of water compartments and the health effects from exposures to pathogenic microbes and toxic chemicals in drinking water. It also covers different sanitation solutions to improve water quality and disease prevention and discusses future challenges and the need for intervention strategies in the new millennium.

GLBL 618a[U]/MGT 911a, The Next China Stephen Roach
Born out of necessity in the post-Cultural Revolution chaos of the late 1970s, modern China is about reforms, opening up, and transition. The Next China will be driven by the transition from an export- and investment-led development model to a pro-consumption model. China's new model could unmask a dual identity crisis—underscored by China's need to embrace political reform and the West's long-standing misperceptions about China. Prerequisite: basic undergraduate macroeconomics. MW 10:30–11:20, 1 HTBA

GLBL 627b, Complex Emergencies: The Case of South Sudan Unni Karunakara
This seminar is designed to provide an understanding of complex emergencies. Using South Sudan as a case, we examine a long-standing humanitarian context and discuss the impact of history, politics, economics, and the environment on human security and suffering.

GLBL 693b[U], U.S.-Russian Relations since the End of the Cold War
Thomas Graham
Examination of the factors—political, socioeconomic, and ideological—that have shaped U.S. and Russian relations since the end of the Cold War and how each country constructs relations with the other to advance its own national interests. Topics include specific issues in bilateral relations, including arms control, counterterrorism, energy, and regional affairs.

GLBL 695a[U], Multilateral Institutions and U.S. Policy Rosemary DiCarlo
The multilateral system developed after the Second World War has served as the foundation for peace and prosperity for seventy years. Today's threats are, however, no longer limited to cross-border conflicts between states but increasingly involve actions by nonstate actors, conflicts within states, and global issues. This course examines the relevance of these institutions to meeting these challenges and to addressing U.S. foreign policy interests. It also explores the relations among existing and emerging powers and regional groupings.

GLBL 790b, Leadership Stanley McChrystal
This course examines the practical execution of leadership in today's environment. Using a combination of historical case studies and recent events, we review how dramatic changes in technology, society, politics, media, and globalization have increased the complexity of the tasks facing modern leaders. Although the course includes the military aspects of leadership, the overall objective is to study leadership in a wider context, identifying the common factors shared by politics, business, education, warfare, and other fields. Specific topics include the changing leadership environment; the role of the leader; driving change; making difficult decisions; dealing with risk; coping with failure; navigating politics; and the effect of modern media. Application and course dates at http://jackson.yale.edu/glbl-790-leadership-seminar-application.

GLBL 791b, Moral Dilemmas in Humanitarian Action Unni Karunakara
This course discusses cases that examine ethical and moral dilemmas in the delivery of humanitarian assistance at the organizational, operational and individual levels.

GLBL 799a or b, Independent Project
By arrangement with Jackson Institute Senior Fellows.

GLBL 801a, Economics: Principles and Applications James Levinsohn, Zack Cooper
This course deals with the application of basic microeconomic analysis to public policy issues. The principal goal is to teach students the process of economic reasoning and how to apply that reasoning to policy issues in the real world. The course covers the basic topics in microeconomic theory: consumer theory, production theory, market models from competition to monopoly, theories of labor and capital markets, and models of externalities and other common market failures. Some calculus will be used without apology along with a great deal of algebra and graphical analysis.

GLBL 802a, Applied Methods of Analysis Lloyd Grieger
The course focuses on useful analytical approaches in public policy and the social sciences. The first part of the course focuses on mathematical skills. The second part focuses

on methods for analyzing empirical data and builds on the mathematical skills from the first part of the course. Special focus is devoted to developing the skills necessary to synthesize and evaluate empirical evidence from the social sciences. Students leave the class with an applied understanding of how quantitative methods are used as tools for analysis in public affairs.

GLBL 803a, History of the Present Timothy Snyder
The first half of the course presents some of the major diplomatic (and sometimes military) confrontations of the twentieth century, beginning with the First Balkan War, including the breakdowns of the late 1930s and progressing through the end of the Cold War. The second half introduces the history of Ukraine and closes with a case study of the Russian invasion of Ukraine's south and east as the end of the post-cold war order. In both parts emphasis is placed upon a close reading of primary documents and upon the reconstruction of possible alternatives.

GLBL 823a[U]/ANTH 583a[U], Health Disparities and Health Equity: Biocultural Perspectives Catherine Panter-Brick
A biocultural perspective on debates in medical anthropology and global health that focus on health disparities and equity. The intersection of biological and cultural issues in matters of health research and intervention. Application of theoretical frameworks to case studies in global health inequality. W 3:30–5:20

GLBL 883b, Challenges to Security and Stability in Central and Eastern Europe Yuriy Sergeyev
This course examines the geopolitical, political, military, socioeconomic, and ideological factors that are challenging security and stability in the region of Central and Eastern Europe after collapse of the USSR. The goal is to give students a broad understanding of the reasons for the worsening security and stability in the region, particularly the Baltic states, Visegrad states, and GUAM member states, and to model further potential developments. The influence of the global players—United States, European Union, Russia—on the security situation in the region is considered.

GLBL 885b, World Order Charles Hill
International peace and security as humanity's primary moral-philosophical problem, reflected in works beyond the policy realm, from Confucius to Kant, Hegel, Wittgenstein, and Niebuhr. Early writings of Kissinger and his diplomatic papers now at Yale provide case studies. Open to graduate and undergraduate students with permission of the instructor.

GLBL 910a/HIST 980a, Genocide in History and Theory Benedict Kiernan
Comparative research and analysis of genocidal occurrences around the world from ancient times to the present; theories and case studies; an interregional, interdisciplinary perspective. Readings and discussion, guest speakers, research paper. TH 1:30–3:20

GLBL 999a or b, Directed Reading
By arrangement with faculty.

HISTORY

240 Hall of Graduate Studies, 203.432.1366
http://history.yale.edu
M.A., M.Phil., Ph.D.

Chair
Naomi Lamoreaux

Director of Graduate Studies
Daniel Botsman (236 HGS, 203.432.1361)

Professors Jean-Christophe Agnew, Abbas Amanat, Ned Blackhawk, David Blight, Daniel Botsman, Paul Bushkovitch, George Chauncey (*on leave* [Sp]), Henry Cowles, Stephen Davis, Carolyn Dean (*on leave*), Fabian Drixler, Carlos Eire, Paul Freedman, Joanne Freeman (*on leave* [Sp]), John Gaddis (*on leave* [F]), Beverly Gage (*on leave* [Sp]), Glenda Gilmore (*on leave* [Sp]), Bruce Gordon, Valerie Hansen (*on leave* [F]), Robert Harms, Jonathan Holloway, Matthew Jacobson (*on leave*), Gilbert Joseph (*on leave* [Sp]), Paul Kennedy, Benedict Kiernan (*on leave* [Sp]), Jennifer Klein, Naomi Lamoreaux (*on leave* [F]), Noel Lenski (*on leave* [F]), Kathryn Lofton, Mary Lui, J.G. Manning (*on leave*), Ivan Marcus, John Merriman, Joanne Meyerowitz, Alan Mikhail, Peter Perdue (*on leave* [Sp]), Steven Pincus, Stephen Pitti, Sophia Rosenfeld, Paul Sabin, Lamin Sanneh, Stuart Schwartz, Frank Snowden, Timothy Snyder, David Sorkin, Harry Stout (*on leave* [Sp]), Francesca Trivellato (*on leave*), John Harley Warner, Anders Winroth, John Witt, Keith Wrightson

Associate Professors Paola Bertucci, Crystal Feimster, Daniel Magaziner, Naomi Rogers, Edward Rugemer, Marci Shore, Eliyahu Stern

Assistant Professors Jennifer Allen, Rosie Bsheer (*on leave*), Rohit De (*on leave*), Marcela Echeverri, Anne Eller, Denise Ho, Isaac Nakhimovsky, Joanna Radin, William Rankin, Jenifer Van Vleck

Lecturers* Adel Allouche, Annping Chin (*Senior Lecturer*), Ivano Dal Prete, Chitra Ramalingam, Stuart Semmel (*Senior Lecturer*)

*For a complete list of lecturers, see the undergraduate bulletin, *Yale College Programs of Study*.

Fields of Study

Fields include ancient, medieval, early modern, and modern Europe (including Britain, Russia, and Eastern Europe), United States, Latin America, East Asia, Southeast Asia, Middle East, Africa, Jewish history; and diplomatic, environmental, ethnic, intellectual, labor, military, political, religious, social, and women's history, as well as the history of science and medicine (see the section in this bulletin on the History of Science and Medicine).

Special Admissions Requirements

The deadline for submission of the application for the History graduate program is December 15.

The department requires a short book review (maximum 1,000 words) to accompany the application. It should cover the book that has most shaped the applicant's understanding of the kind of work he or she would like to do as a historian.

In addition, the department requires submission of an academic writing sample of not more than 25 pages, double spaced. Normally, the writing sample should be based on research in primary source materials.

Special Requirements for the Ph.D. Degree

LANGUAGE REQUIREMENTS

All students must pass examinations in at least one foreign language 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 director of graduate studies (DGS) and the faculty adviser.

American One language relevant to the student's research interests.

Ancient German, French, or Italian and two ancient languages, one of which must be Greek or Latin and the second of which can be either the second classical language or another ancient language (e.g., Hebrew, Aramaic/Syriac, Demotic, Coptic, Classical Armenian, Sanskrit).

Chinese Chinese and Japanese; additional languages like French, Russian, or German may be necessary for certain dissertation topics.

East European The language of the country of the student's concentration plus two of the following: French, German, Russian, or an approved substitution.

Global/International Two languages to be determined by the DGS in consultation with the adviser.

Japanese Japanese and French or German; Chinese may be necessary for certain fields of Japanese history.

Jewish Modern Hebrew and German, and additional languages such as Latin, Arabic, Yiddish, Russian, or Polish, as required by the student's areas of specialization.

Latin American Spanish, Portuguese, and French.

Medieval French, German, and Latin.

Middle East Arabic, Persian, or Turkish (or modern Hebrew, depending on area of research) and a major European research language (French, German, Russian, or an approved substitute).

Modern Western European (including British) French and German; substitutions are permitted with the approval of the DGS.

Russian Russian plus French or German with other languages as required.

Southeast Asian Choice of Dutch, French, Spanish, Portuguese, Chinese, Sanskrit, or Arabic, plus one or more Southeast Asian language (e.g., Bahasa Indonesian, Burmese, Khmer, Lao, Malay, Tagalog, Thai, Tetum, or Vietnamese). In certain cases, Ph.D. dissertation research on Southeast Asia may also require knowledge of a regional or local language, e.g., Balinese or Cham.

Foreign students whose native language is not English may receive permission during their first year to hand in some written work in their own language. Since, however, the dissertation must be in English, they are advised to bring their writing skills up to the necessary level at the earliest opportunity.

ADDITIONAL REQUIREMENTS

These new regulations will be observed by students admitted in 2013 and following years. Students admitted earlier may opt to observe either the new or the old regulations.

During the first year of study, students normally take six term courses, including Approaching History (HIST 500). During the second year of study, they may opt to take four to six term courses, with the approval of their adviser and the DGS. Students who plan to apply for outside grants at the beginning of their third year are recommended to take the Prospectus Tutorial (HIST 995) during their second year, and it is required for students in European history. The tutorial should result in a full draft of the dissertation prospectus. The ten courses taken during the first two years should normally include at least six chosen from those offered by the department. Students must achieve Honors in at least two courses in the first year, and Honors in at least four courses by the end of the second year, with a High Pass average overall. Courses graded in the Satisfactory/Unsatisfactory mode count toward the course work requirement but do not count toward the Honors requirement.

Two of the ten courses must be research seminars in which the student produces an original research paper from primary sources. The Prospectus Tutorial does not count as a research seminar. All graduate students, regardless of field, will be required to take two seminar courses in a time period other than their period of specialty.

Students in their second year should choose their courses so that at least one course will prepare them for a comprehensive examination field in their third year. Some fields offer reading seminars specifically designed to help prepare students for examination; others encourage students to sign up for examination tutorials (HIST 994) with one of their examiners.

By the end of their fifth term, at the latest, students are expected to take comprehensive examinations. Students will have a choice of selecting three or four fields of concentration: a major field and either two or three minor fields. The examination must

contain one minor field that deals 50 percent or more with the historiography of a region of the world other than the area of the student's major field. The examination will have a written component that will be completed before the oral component. For their major field, students will write a historiographical essay of maximum 8,000 words. For each of the minor fields, the student will prepare a syllabus for an undergraduate lecture class in the field. All of these are to be written over the course of the examination preparation process and will be due on a definite, uniform date toward the end of the students' fifth term, typically on the Friday before Thanksgiving break (or on a corresponding date in the spring term). The oral examination examines the students on their fields and will, additionally, include discussion of the materials produced for the written component of the examination. If the student selects the four-field option, the major field will be examined for thirty minutes. If the student selects the three-field option, the major field will be examined for sixty minutes and each minor field for thirty minutes.

By the end of their sixth term, at the latest, students are expected to hold a prospectus colloquium, but those who took the Prospectus tutorial (HIST 995) during their second year are encouraged to hold the colloquium at the beginning of their third year. The prospectus colloquium offers students an opportunity to discuss the dissertation prospectus with their dissertation committee in order to gain the committee's advice on the research and writing of the dissertation and its approval for the project. The dissertation prospectus provides the basis of grant proposals.

Completion of ten term courses (including HIST 500), the language requirements of the relevant field, the comprehensive examinations, and the prospectus colloquium 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.

It is also possible for students who have completed extensive graduate work prior to entering the Yale Ph.D. program to complete course work sooner. Students may petition for course waivers based on previous graduate work (up to three term courses) only after successful completion of the first year.

Students normally serve as teaching fellows during four terms to acquire professional training. Ordinarily, students teach in their third and fourth years. During their first term of teaching, students must attend training sessions run by the Graduate Teaching Center and work with the associate director of graduate studies to discuss any matters of concern. Students may teach, normally in their fourth term of teaching, as seminar fellows, teaching an undergraduate seminar in conjunction with a faculty member, if such positions are available.

By the end of their ninth term, students are required to submit a chapter of their dissertation to the dissertation committee. This chapter will then be discussed with the student by the committee, in a chapter conference, to give the student additional advice and counsel on the progress of the dissertation. This conference is designed to be an extension of the conversation begun in the prospectus colloquium and is not intended as a defense: its aim is to give students early feedback on the research, argument, and style of the first writing accomplished on the dissertation. No less than one month before students plan to submit their dissertations, a relatively polished full draft of the dissertation should be discussed with the student by the dissertation committee, in a dissertation defense of one to two hours, to give the students additional advice and counsel on completing the

dissertation or on turning it into a book, as appropriate. Students are required to submit the draft to their committee in sufficient time for the committee to be able to read it. This defense is designed to give students advice on the overall arguments and the final shape of the dissertation or book, and to leave time for adjustments coming out of the discussion.

The fellowship package offered to Ph.D. students normally includes twelve months of University Dissertation Fellowship (UDF), which finances a full year of research and writing without any teaching duties. Students may choose to take the UDF at any point after they have advanced to candidacy and before the end of their sixth year. Students are prohibited from teaching when they are on the UDF. The department strongly recommends that students apply for a UDF only after completing the first chapter conference and that they have drafted at least two chapters before starting the fellowship.

Students who have not submitted the dissertation by the end of the sixth year need not register in order to submit. If, however, students wish to register for a seventh year for good academic reasons, they may petition the Graduate School for extended registration. The petition, delivered through the History DGS, will explain the academic reasons for the request. Only students who have completed the first chapter conference will be considered for extended registration.

Evaluation of First- and Second-Year Graduate Students

At the end of each term, the DGS will ask faculty members whether they have serious concerns about the academic progress of any first- or second-year students in the Ph.D. program. Faculty members who have such concerns will provide written feedback to the DGS at his or her request. The DGS will use his or her discretion to ensure that feedback is provided to any students about whom there are concerns in a clear and effective manner. We expect such concerns to be rare.

Toward the end of the academic year, the History faculty will hold a special meeting to review each first- and second-year student in the program. The purpose of the meeting is to assess students' academic progress. In order for second-year students to proceed to the third year, they must demonstrate through written work, classroom performance, and participation in departmental activities that they have the ability to: (a) speak and write clearly; (b) conduct independent research at a high level; and (c) develop coherent scholarly arguments. A faculty vote will be taken at the conclusion of the review meeting to decide whether each second-year student may stay in the program. In the unusual case that a majority of faculty present and voting determine that a student may not continue, the student will be informed in writing and withdrawn from the program. The review meeting must be a full faculty meeting, but faculty members with no knowledge of the students under review may abstain from the vote, and their abstentions will not count in the total. Those members of the faculty who have worked with or know the students being evaluated are required to attend. In the event that any necessary faculty members absolutely cannot be present, they may send their views in writing to the DGS, who will read them at the meeting.

Once a student has been informed that he or she is to be dismissed from the program, the student may submit a formal letter of appeal within two weeks, accompanied by supporting documentation (research or other scholarly work), to the Graduate Advisory Committee. The Graduate Advisory Committee will render a final decision within

two weeks of receipt of the appeal. Any members of the Graduate Advisory Committee who have worked directly with the student will recuse themselves from the final vote on the case.

Combined Ph.D. Programs

HISTORY AND CLASSICS

The Department of History also offers, in conjunction with the Department of Classics, a combined Ph.D. in History and Classics, with a concentration in Ancient History. For further details, see Classics.

HISTORY AND AFRICAN AMERICAN STUDIES

The Department of History also offers, in conjunction with the Department of 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. Additionally, students in History are eligible to pursue a supplemental M.Phil. degree in Medieval Studies. 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 seven graduate term courses at Yale, of which two must have earned Honors grades and the other five courses must average High Pass overall. 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.

Terminal Master's Degree Program For this terminal master's degree, students must pass seven 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. Of the seven required courses, one should be a language or relevant technological language course. An undergraduate language course, statistics course, or other applicable course in a technological "language" counts for credit toward the graduate degree. All students in this program must pass an examination in one foreign language. Financial aid is not available for this program.

More information is available on the department's Web site, http://history.yale.edu.

Courses

HIST 500a, Approaching History: Problems, Methods, and Theory
Daniel Botsman, Jennifer Klein
An introduction to the professional study of history, which offers new doctoral students an opportunity to explore (and learn from each other about) the diversity of the field, while also addressing issues of shared concern and importance for the future of the discipline. By the end of the term participants have been exposed to some of the key methodological and theoretical approaches historians have developed for studying different time periods, places, and aspects of the human past. Required of all first-year doctoral students. T 9:25–11:15

HIST 502b/ANTH 531b/ARCG 531b/CLSS 815b/CPLT 547b/JDST 653b/NELC 533b/RLST 803b, Fakes, Forgeries, and the Making of Antiquity Eckart Frahm, Irene Peirano Garrison
A comparative exploration of notions of forgery and authenticity in the ancient and premodern world, in a variety of civilizations (ancient Greece, Mesopotamia, Egypt, Israel, China, India, etc.) and different political, religious, literary, and artistic contexts. Emphasis is also placed on the pivotal role played by the "authentic" in the modern era in disciplines such as philology and aesthetics, the manipulative uses of ancient history for purposes of modern nation building and identity formation, copies and reconstructions of ancient artifacts, and the role of forgeries in today's antiquities trade. TH 2:30–4:30

HIST 533a/MDVL 599a, The Twelfth Century Paul Freedman
The growth of European institutions and intellectual life in the twelfth century. Particular emphasis on Anglo-American historiography of the period beginning with Charles Homer Haskins's 1927 study, *The Renaissance of the Twelfth Century.* TH 1:30–3:20

HIST 540b, Introduction to Research in Medieval History Anders Winroth
The seminar provides an introduction to research in medieval European history: often-used source genres, methods, and research tools. We focus on working with primary sources in original languages, occasionally in their original manuscript and early printed form. A working knowledge of a medieval language is, therefore, desirable. In 2017 the seminar focuses on the Bible in the Middle Ages. Yale is particularly fortunate in that the Beinecke Rare Book and Manuscript Library possesses much relevant material, including medieval manuscripts and early printed bibles. We focus both on the text of the Bible and on how it was understood by medieval interpreters. M 1:30–3:20

HIST 577a/AFAM 558a/AMST 688a/RLST 688a/WGSS 695a, Historicizing Religion Kathryn Lofton
What does it mean to offer a history of religion? How is a history of religion distinct from, or overlapping with, the history of race or gender? This course takes as its central subject a key methodological problem of modernity, namely the task to offer material accounts for human perception, social organization, and epistemological vantage. We read new historical monographs and relevant classic theories that consider what religion is, how its categorization is like and unlike other concepts for human distinction, and why it became something in modernity requiring historical diagnosis. Included in our

topical survey are examinations of secularization and disenchantment; myth and narrative; church history and hagiography; objectivity and positivism; world religions and comparative religions; Orientalism and colonialism; sectarianism and secularism. Works read include Elizabeth A. Clark, *History, Theory, Text: Historians and the Linguistic Turn;* Sylvester Johnson, *African American Religions, 1500–2000: Colonialism, Democracy, and Freedom;* and Suzanne Marchand, *German Orientalism in the Age of Empire: Religion, Race, and Scholarship.* M 9:25–11:15

HIST 578b/RLST 677b, The Catholic Reformation Carlos Eire
Reading and discussion of scholarship on the Catholic Reformation and of key primary texts written between 1500 and 1600. W 3:30–5:20

HIST 580a/REL 764a/RLST 681a, Martin Luther and the Reformation Carlos Eire, Bruce Gordon
Readings in key texts by Martin Luther and his contemporaries, as well as in classic and recent scholarship on his life, work, and legacy. M 3:30–5:20

HIST 587b[U]/JDST 793b[U]/RLST 799b[U], Introduction to Modern Jewish Thought Eliyahu Stern
An overview of Jewish philosophical trends, movements, and thinkers from the seventeenth to the twenty-first century. Topics include enlightenment, historicism, socialism, secularism, religious radicalism, and Zionism. MW 2:30–3:20, 1 HTBA

HIST 590b[U]/JDST 764b[U]/RLST 777b[U], Jews in Muslim Lands from the Seventh through the Sixteenth Century Ivan Marcus
Introduction to Jewish culture and society in Muslim lands from the Prophet Muhammad to Suleiman the Magnificent. Topics include Islam and Judaism; Jerusalem as a holy site; rabbinic leadership and literature in Baghdad; Jewish courtiers, poets, and philosophers in Muslim Spain; and the Jews in the Ottoman Empire. TTH 11:35–12:50

HIST 596a[U]/JDST 761a[U]/RLST 773a[U], Jewish History and Thought to Early Modern Times Ivan Marcus
A broad introduction to the history of the Jews from biblical beginnings until the European Reformation and the Ottoman Empire. Focus on the formative period of classical rabbinic Judaism and on the symbiotic relationships among Jews, Christians, and Muslims. Jewish society and culture in its biblical, rabbinic, and medieval settings. TTH 11:35–12:50

HIST 598b/JDST 846b/RLST 771b, Jewish Emancipation in the Twentieth Century David Sorkin
Conventional wisdom has it that the process of "Jewish emancipation," or the acquisition of citizenship and equality, culminated with the Russian Revolution of 1917 or the minority rights treaties of the early 1920s. In fact, emancipation did not cease. In the 1930s and 1940s right-wing, fascist, and Nazi governments across Europe abrogated Jews' citizenship. Postwar governments restored citizenship, sometimes reluctantly, sometimes belatedly, sometimes inconsistently. The controversies over reparations and the restoration of property that continue today belong to this process as well. The establishment of Israel with its own specific concept of citizenship was yet another aspect. Finally, the laws that

prohibited discrimination in schools, housing, employment, and secondary associations in the 1950s–1970s were an installment in creating equality for Jews in the United States. This seminar casts its nets broadly to study the extant scholarship on "Jewish emancipation" in the twentieth century. TH 3:30–5:20

HIST 601b/JDST 790b/RLST 776b, Jewish History, Thought, and Narratives in Medieval Societies Ivan Marcus

Research seminar that focuses on the two medieval Jewish subcultures of Ashkenaz (northern Christian Europe) and Sefarad (mainly Muslim and Christian Spain). TH 9:25–11:15

HIST 615a, The Enlightenment: Approaches to the Intellectual and Cultural History of the Eighteenth Century Sophia Rosenfeld

The purpose of this course is to introduce students to the philosophical, methodological, and historiographical questions involved in the study of the Enlightenment as a historical phenomenon. Among the topics to be considered are the geography, social actors, and spaces of Enlightenment; the history of books and reading; the relationship between ideas and revolutions; and the nature and legacy of Enlightenment thinking on subjects ranging from the nature of God to slavery and colonialism. Readings include a sampling of important primary sources (i.e., Kant, Rousseau, Hume, Wollstonecraft, Franklin), but the focus is primarily on the evolution in historians' responses to the question "What is Enlightenment?" W 9:25–11:15

HIST 618b, Inventing Federalism in the Age of the American Revolution Steven Pincus, Isaac Nakhimovsky

This research seminar explores the emergence of federalism in early modern Europe and America. The course asks students to consider federalism in relation to composite monarchies, republics, empires, and confederations, and to reexamine the historiography of the nation-state. The course explores these modes of sovereignty not only on their own but also as modes of addressing new problems of political economy, in particular the relationship between the history of capitalism and institutional arrangements. These issues are then related to contemporary problems of governance—such as the European Union—since the nineteenth century. T 9:25–11:15

HIST 619a, Readings in the Social and Economic History of Britain, 1500–1750 Keith Wrightson

Reading and discussion of central works in the social and cultural history of the period. The class begins with the fundamental issues of social structure and population dynamics. Thereafter the weekly agenda is decided in consultation, selecting from such topics as urbanization; poverty; household and family relationships; gender and sexuality; community structures; crime and the law; protest and rebellion; education, literacy, and print culture; material culture; popular religion; witchcraft; national identities; agrarian custom and change; history and social memory. W 9:25–11:15

HIST 628b, Microhistories Keith Wrightson

A 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 (though not exclusively) drawn from the literature on the

early modern period. Particular attention is paid to questions of sources and their use. Thereafter members of the class undertake individual microhistorical studies on subjects of their choice and present work-in-progress papers to the seminar. W 9:25–11:15

HIST 658b, Utopia and Counterculture in Postwar Germany Jennifer Allen
This reading seminar explores the themes of utopia and counterculture in postwar Germany. With an emphasis on recent scholarship, we investigate the ideals that guided how Germans—East and West—rebuilt politics, society, and culture after the Second World War. The seminar covers topics like youth culture; Americanization; the Student Movement and new politics of the left; the New Social movements, including the women's movement, environmental movement, and peace movement; and the efforts to redefine national identity in the wake of reunification. W 9:25–11:15

HIST 670b/CPLT 870b/WGSS 860b, Gender Theories and Their Politics
Moira Fradinger
A historical survey of the intellectual tradition that takes for its object the interrogation and theorization of systems of power whereby inequality is associated with gender, sex, and sexuality. These categories are studied in terms of the politics of location that created them: we read from the corpus written in the context of movements such as classical liberal and radical feminism, anarchism, and socialism; the psychoanalytic international community; or institutional academic settings such as the fields of film studies, women's studies, and gay and lesbian studies. Authors include Sor Juana Inés de la Cruz, Flora Tristán, Emma Goldman, Simone de Beauvoir, Maria Mies, Heidi Hartmann, Audre Lorde, Adrienne Rich, Hortense Spillers, Gayle Rubin, Jacqueline Rose, Juliet Mitchell, Eve K. Sedgwick, Luce Irigaray, Monique Wittig, Teresa de Lauretis, Rosi Braidotti, Luisa Muraro, Adriana Cavarero, Chandra Mohanty, Gloria Anzaldúa, Nira Yuval-Davis, Gayatri Chakravorty Spivak, and Maxine Molyneux. W 7–9

HIST 683b, Global History of Eastern Europe Timothy Snyder
A thematic survey of major issues in modern east European history, with emphasis on recent historiography. A reading course with multiple brief writing assignments. TH 9:25–11:15

HIST 687a, Russia, the USSR, and the World, 1855–1945 Paul Bushkovitch
Political and economic relations of Russia/Soviet Union with Europe, the United States, and Asia from tsarism to socialism. W 1:30–3:20

HIST 702a/AMST 802a, Readings in Early National America Joanne Freeman
An introduction to the early national period and its scholarship, exploring major themes such as nationalism, national identity, the influence of the frontier, the structure of society, questions of race and gender, and the evolution of political cultures. T 1:30–3:20

HIST 703a/AMST 803a, Research in Early National America Joanne Freeman
A research seminar focused on the early national period of American history, broadly defined. Early weeks familiarize students with sources from the period and discuss research and writing strategies. Students produce a publishable article grounded in primary materials. W 9:25–11:15

HIST 706a/LAW 20641, Political Economy, Institutions, and Property in the Age of the American Revolution Steven Pincus, Claire Priest

A new generation of scholarship emphasizes the importance of political economy and institution building as central themes in the American founding era through the lens of institutions, property, and debates over political economy. The course covers institutions central to understanding the eighteenth-century political economy such as slavery, immigration, banking, imperial law, comparative constitutional development, courts, and credit markets. Readings and discussions focus on both British imperial and early American contexts. Course grade is based primarily on a research paper. W 1:10–3

HIST 708b/AFAM 705b/AMST 708b/ENGL 708b/HSHM 729b, The History of Race Greta LaFleur

This course offers a broad survey of the history of racial science and racialist thinking in the Atlantic world from the early modern period through the late nineteenth century. Rather than attempting to detail the histories of specific racial formations (such as blackness or whiteness), the course tracks the intellectual history of the emergence of "race" as a specific category of human differentiation and traces a swath of its most muscular—and pernicious—permutations through the eighteenth and nineteenth centuries. W 1:30–3:20

HIST 711a/AFAM 738a/AMST 706a/WGSS 716a, Readings in African American Women's History Crystal Feimster

The diversity of African American women's lives from the colonial era through the late twentieth century. Using primary and secondary sources we explore the social, political, cultural, and economic factors that produced change and transformation in the lives of African American women. Through history, fiction, autobiography, art, religion, film, music, and cultural criticism we discuss and explore the construction of African American women's activism and feminism; the racial politics of the body, beauty, and complexion; hetero- and same-sex sexualities; intraracial class relations; and the politics of identity, family, and work. M 1:30–3:20

HIST 715a/AFAM 764a/AMST 715a, Readings in Nineteenth-Century America David Blight

The course explores recent trends and historiography on several problems through the middle of the nineteenth century: sectionalism, expansion; slavery and the Old South; northern society and reform movements; Civil War causation; the meaning of the Confederacy; why the North won the Civil War; the political, constitutional, and social meanings of emancipation and Reconstruction; violence in Reconstruction society; the relationships between social/cultural and military/political history; problems in historical memory; the tension between narrative and analytical history writing; and the ways in which race and gender have reshaped research and interpretive agendas. W 1:30–3:20

HIST 730a/AMST 801a, U.S. Intellectual Formations in the Twentieth Century Jean-Christophe Agnew

This seminar introduces students to recent works on some of the more important intellectual movements in twentieth-century U.S. history and explores the widely different contextualist approaches that historians have taken toward them. Our first set of questions focuses on the intellectuals as a social type or formation: How did they mobilize

themselves and others differently over the course of the century as the institutional ground shifted beneath their feet, the culture industries multiplied, and the communication revolution unfolded? How should we understand the real and imagined spaces that intellectuals fashioned for themselves and the impact of those geographies upon their identities and ideas? What effects have the changing forms of intellectual collaboration had on the genesis, refinement, and articulation of ideas in this country? Our second set of questions focuses on some of the ideas, ideologies, paradigms, "imaginaries," and intellectual identities that took hold over the course of the century, with a view toward comparing the different visions in relation to one another and against the circumstances of their efflorescence. One short and one long paper. T 1:30–3:20

HIST 734b/AMST 780b, Class and Capitalism in Twentieth-Century United States Jennifer Klein

Reading course on class formation, labor, and political economy in the twentieth-century United States; how regionalism, race, and class power shaped development of American capitalism. The course reconsiders the relationships between economic structure and American politics and political ideologies, and between global and domestic political economy. Readings include primary texts and secondary literature (social, intellectual, and political history; geography). W 3:30–5:20

HIST 744a/AMST 744a/F&ES 617a/HSHM 747a, Readings and Research in Energy History Paul Sabin

The history of energy in the United States and the world. Readings and discussion range widely across different forms of energy: animal power, biomass, and early hydropower; coal, oil, and atomic energy; and present-day hydraulic fracturing, wind, and solar. Themes include relations between energy producers and communities, including resistance to energy projects; cultural and social change associated with dominant energy regimes; labor struggles and environmental transformations; the global quest for oil; and changing national energy policies. We explore new approaches to writing and teaching the history of energy. Open to undergraduates with permission of the instructor. M 1:30–3:20

HIST 746a/AMST 903a[U], Introduction to Public Humanities Ryan Brasseaux

What is the relationship between knowledge produced in the university and the circulation of ideas among a broader public, between academic expertise on the one hand and nonprofessionalized ways of knowing and thinking on the other? What is possible? This seminar provides an introduction to various institutional relations and to the modes of inquiry, interpretation, and presentation by which practitioners in the humanities seek to invigorate the flow of information and ideas among a public more broadly conceived than the academy, its classrooms, and its exclusive readership of specialists. Topics include public history, museum studies, oral and community history, public art, documentary film and photography, public writing and educational outreach, the socially conscious performing arts, and fundraising. In addition to core readings and discussions, the seminar includes presentations by several practitioners who are currently engaged in different aspects of the Public Humanities. With the help of Yale faculty and affiliated institutions, participants collaborate in developing and executing a Public Humanities project of their own definition and design. Possibilities might include, but are not limited to, an

exhibit or installation, a documentary, a set of walking tours, a Web site, a documents collection for use in public schools. Required for the M.A. with a concentration in Public Humanities.

HIST 750a/AFAM 802a/AMST 804a, Readings in African American History since 1865 Glenda Gilmore
Students read major secondary works alongside key primary sources on African American history from 1865 to the present. The course covers Reconstruction; the Jim Crow era; the Long Civil Rights Movement, including its classical phase; African American transnationalism; and urban, political, and labor history from the African American perspective. The course emphasizes gender and racial formation. Students read thematically within the course, make class presentations, and write a historiographical paper. W 1:30–3:20

HIST 752a/AMST 741a, Indians and Empires Ned Blackhawk
This course explores recent scholarship on Indian-imperial relations throughout North American colonial spheres from roughly 1500 to 1900. It examines indigenous responses to Spanish, Dutch, French, English, and lastly American and Canadian colonialism and interrogates commonplace periodization and geographic and conceptual approaches to American historiography. It concludes with an examination of American Indian political history, contextualizing it within larger assessments of Indian-imperial and Indian-state relations. T 7–8:50

HIST 757a/LAW 20678, Problems in Legal Historiography John Witt
Intensive readings seminar designed for students doing advanced work in legal history. The seminar surveys current trends in the theory of legal history, with an emphasis on the American experience and international law. Paper required. Enrollment limited to ten. Permission of the instructor required. M 7:10–9

HIST 761b/LAW 21063, American Legal History Claire Priest
This course examines the foundations of the American legal, political, and economic order from the colonial period through the early twentieth century. We analyze the emergence of American property law, slavery, women's legal history, intellectual property, and corporate law as well as federalism, the Constitution, and judicial review. The course readings consist of contemporary sources, recently published works, and classics in the field. The course supports independent student research with a paper requirement. TTH 2:10–3:35

HIST 764a/AFAM 716a/AMST 910a, Working Group on Latina/o Studies I
Stephen Pitti, Alicia Schmidt Camacho
A continuous workshop for graduate students in American Studies, History, African American Studies, and related fields. This group devotes the fall term to intensive reading and discussion of important interdisciplinary texts in Latina/o studies. Students interested in participating should contact stephen.pitti@yale.edu. F 9:25–11:15

HIST 765b/AFAM 718b/AMST 911b, Working Group on Latina/o Studies II
Stephen Pitti, Alicia Schmidt Camacho
A continuous workshop for graduate students in American Studies, History, African American Studies, and related fields. The spring term focuses on the development of individual research projects and on public history work with the Smithsonian Museums

and organizations in New Haven. Students interested in participating should contact stephen.pitti@yale.edu. F 9:25–11:15

HIST 768a/AMST 768a, Asian American History and Historiography Mary Lui
This reading and discussion seminar examines Asian American history through a selection of recently published texts and established works that have significantly shaped the field. Major topics include the racial formation of Asian Americans in U.S. culture, politics, and law; U.S. imperialism; U.S. capitalist development and Asian labor migration; and transnational and local ethnic community formations. The class considers both the political and academic roots of the field as well as its evolving relationship to "mainstream" American history. TH 9:25–11:15

HIST 775a/AMST 866a/WGSS 712a, Readings in the History of Sexuality Joanne Meyerowitz
Selected topics in the history of sexuality. Emphasis on key theoretical works and recent historical literature. W 3:30-5:20

HIST 783a/AMST 717a, Readings in Transnational History Jenifer Van Vleck
Readings in historiography after the "transnational turn"—the project of writing and teaching history across national boundaries. Emphasis on methods, especially research strategies and interpretive frameworks. Topics of readings and discussions include empire, colonialism, and postcolonialism; nations and nationalisms; borders and borderlands; globalization; cultural transfer and hybridity; and transnational approaches to histories of race, gender, and sexuality. M 1:30–3:20

HIST 797a/AFAM 797a/AMST 797a, Atlantic Abolitions Marcela Echeverri, Edward Rugemer
This readings course explores the historiography on the century of abolition, when the new states of the Americas abolished racial slavery. Beginning with the first abolitions in the U.S. North during the 1780s, we consider the emergence and process of abolition throughout the Atlantic world, including the Caribbean, Spanish America, and Brazil, through the 1880s. TH 9:25–11:15

HIST 800b/HSAR 746b/MDVL 565b, Circa 1000 Valerie Hansen, Mary Miller, Anders Winroth
The world in the year 1000, when the different regions of the world participated in complex networks. Archaeological excavations reveal that the Vikings reached L'Anse aux Meadows, Canada, at roughly the same time that the Kitan people defeated China's Song dynasty and established a powerful empire stretching across the grasslands of Eurasia. Viking chieftains donned Chinese silks while Chinese princesses treasured Baltic amber among their jewelry. In what is now the American Southwest, the people of Chaco Canyon feasted on tropical chocolate, while the lords of Chichen Itza wore New Mexican turquoise—yet never knew the Huari lords of the central Andes. In this seminar, students read interpretative texts based on archaeology and primary sources, prepare projects in teams, work with material culture, and develop skills of cross-cultural analysis. Mandatory field trip to the Metropolitan Museum of Art in New York on Saturday, January 21. M 3:30–5:20

HIST 807a/AMST 650a, Resistance, Rebellion, and Survival Strategies in Modern Latin America Gilbert Joseph
An interdisciplinary examination of new conceptual and methodological approaches to such phenomena as peasants in revolution, millenarianism, "banditry," refugee movements, and transnational migration. F 1:30–3:20

HIST 810a, Introduction to Brazilian History Stuart Schwartz
An introduction to the historical problems and historiography of Brazil. Readings of basic books in the field and discussion of the historiographical traditions. Basic readings are in English but students are encouraged to use Portuguese.

HIST 821b, A Greater Caribbean: New Approaches to Caribbean History Anne Eller
This course is taught in conjunction with a course of the same title and scope at Cornell University with Professor Ernesto Bassi. We engage with new work emerging about the Greater Caribbean in the context of Latin America, the African diaspora, Atlantic history, global history, comparative emancipation from chattel slavery, and the study of global revolutions. Students make in-class presentations that locate these titles in a deeper historiography with classic texts. This course crosses imperial boundaries of archives and historiography in order to consider the intersecting allegiances, identities, itineraries, and diaspora of peoples, in local, hemispheric, and global context. Some central questions include: What is the lived geography of the Caribbean at different moments, and how does using different geographic and temporary frameworks help approach the region's history? What role did people living in this amorphously demarcated region play in major historical transformations of the eighteenth and nineteenth centuries? How did the varied but interconnected processes of Caribbean emancipation impact economic and political systems throughout the Atlantic and beyond? The course concludes with a mini-conference in which students of both universities come together to discuss the state of the field and future directions in Caribbean history. W 9:25–11:15

HIST 830b/AFST 830b, Cities, Media, and Culture in Twentieth-Century Africa Daniel Magaziner
This seminar considers the scholarship on African urban life during the twentieth century. We read recent works about intellectual and cultural history, infrastructure and technology, political economy, urban planning, and media. In consultation with the instructor, students spend the last weeks of the course developing a study of a specific African city based on a mix of secondary literature and a dedicated primary source. W 1:30–3:20

HIST 837b/AFST 837b, Decolonization and Independence in Africa Robert Harms
This seminar looks at the process of decolonization in twentieth-century Africa and explores some of the major political, economic, and cultural forces that influenced the trajectories of independent African countries. W 9:25–11:15

HIST 839a/AFST 839a, Environmental History of Africa Robert Harms
An examination of the interaction between people and their environment in Africa and the ways in which this interaction has affected or shaped the course of African history. W 9:25–11:15

HIST 847a, Orientalism and Its Critics Abbas Amanat
The Orient and knowledge of the Other; from travel literature to Oriental studies to Middle East history; beyond academic: art, literature, and cinema; politics of Orientalism and Occidentalism. No language prerequisite. W 3:30–5:20

HIST 854a, Readings in Ottoman History Alan Mikhail
An introduction to the historiography of the Ottoman Empire. Readings include classics in the field as well as examples of recent trends and innovative new works. Emphasis is placed on methodology, source usage, questions or periodization, and other interpretive problems. All students should read Caroline Finkel's *Osman's Dream* for our first meeting. T 1:30–3:20

HIST 858a, Readings in Qing Documents Peter Perdue
This course is an introduction to the use of documents from the Qing dynasty. We examine selected archival and published materials, and discuss how to develop research projects from primary source materials. TH 1:30–3:20

HIST 860a/NELC 830a, From Medina to Constantinople: The Middle East from 600 to 1517 Adel Allouche
The seminar discusses the religious and political events that shaped the Middle East from the rise of Islam to the Ottoman conquest of Egypt. It encompasses Arab lands, Iran, and Turkey. TH 1:30–3:20

HIST 861b, Research in Ottoman History Alan Mikhail
Research seminar focused on methods, sources, and problems in the field of Ottoman history. The overall goal is for students to produce a publishable article based on primary materials. Topics may come from any period of Ottoman history. T 1:30–3:20

HIST 863b, Narratives of Modern Iran Abbas Amanat
Close reading of texts in historical context; studies and discussion on genres of historical writing (1785–1989) to include chronicles, travel literature, diaries and memoirs, literature of dissent. Prerequisite: knowledge of Persian.

HIST 887a, Research in Japanese History Fabian Drixler
This seminar on Japan's early modern and modern history has three parts. We first read a number of outstanding books and articles to inform and inspire our own research agenda. We then familiarize ourselves with the different types of sources and reference materials. The final six weeks of the course are devoted to individual research projects, which we hone through several cycles of presentations, drafts, and peer review. While the course is designed for graduate students with a reading knowledge of Japanese, it welcomes participants who want to pursue a Japan-centered project with sources in other languages. W 3:30–5:20

HIST 893b/EALL 871b/EAST 593b, History of China's Republican Period Denise Ho
This reading seminar examines recent English-language scholarship on China's Republican period (1912–1949) covering themes from state and economy to society and culture. Weekly topics include state institutions and law, nationalism, politics and political

movements, the development of cities, media and publication, public health, education, labor, and rural reconstruction. W 3:30–5:20

HIST 910a/HSHM 745a/WGSS 733a, History of Health Activism Naomi Rogers
This research seminar introduces students to current historical debates around health activism. Topics include progressive and conservative ideologies and debates around them; debates around welfare and entitlements; gender and reproductive rights; medical professionalism; and health activism as a social movement. Research is focused on holdings in Yale libraries. M 1:30–3:20

HIST 913b/HSHM 713b, Geography and History William Rankin
A research seminar focused on methodological questions of geography and geographic analysis in historical scholarship. We consider approaches ranging from the Annales School of the early twentieth century to contemporary research in environmental history, history of science, urban history, and more. We also explore interdisciplinary work in social theory, historical geography, and anthropology and grapple with the promise (and drawbacks) of GIS. Students may write their research papers on any time period or geographic region, and no previous experience with geography or GIS is necessary. Open to undergraduates with permission of the instructor. M 1:30–3:20

HIST 919b/HSHM 746b, History and Material Culture Paola Bertucci, Chitra Ramalingam
Approaches to studying material culture historically. What—and how—can historians learn from objects? How can objects be used to do history? This seminar explores methods and literary genres for doing and writing material history from across a range of disciplines: history of science, history of art, anthropology, archaeology, conservation science, and museum studies. W 3:30–5:20

HIST 921b/HSHM 710b, Problems in Science Studies Joanna Radin
Exploration of the methods and debates in the social studies of science, technology, and medicine. This course covers the history of the field and its current intellectual, social, and political positioning. It provides critical tools—including feminist, postcolonial, and new materialist perspectives—to address the relationships among science, technology, medicine, and society. T 1:30–3:20

HIST 930a/AMST 878a/HSHM 701a, Problems in the History of Medicine and Public Health John Harley Warner
An examination of the variety of approaches to the cultural, social, and intellectual history of medicine, focusing on the United States. Reading and discussion of the recent scholarly literature on medical cultures, public health, and illness experiences from the early national period through the present. Topics include the role of gender, class, ethnicity, race, religion, and region in the experience of health care and sickness and in the construction of medical knowledge; the interplay between lay and professional understandings of the body; the role of the marketplace in shaping professional identities and patient expectations; citizenship, nationalism, and imperialism; and the visual cultures of medicine. W 1:30–3:20

HIST 931a/HSHM 702a, Problems in the History of Science Henry Cowles
Survey of classic and recent work in the history of science, broadly conceived. Topics include physical, life, and human sciences; role of technology and instruments; relationship between theory and practice; and interactions with society, politics, and capitalism. Focus on mastering debates in history of science, with connections to philosophy, anthropology, and literary studies. T 3:30–5:20

HIST 936a/HSHM 716a, Early Modern Science and Medicine Paola Bertucci
The course focuses on recent works in the history of science and medicine in the early modern world. We discuss how interdisciplinary approaches—including economic and urban history, sociology and anthropology of science, gender studies, art and colonial history—have challenged the classic historiographical category of "the Scientific Revolution." We also discuss the avenues for research that new approaches to early modern science and medicine have opened up, placing special emphasis on the circulation of knowledge, practices of collecting, and visual and material culture. T 1:30–3:20

HIST 965a/ANTH 541a/F&ES 836a/PLSC 779a, Agrarian Societies: Culture, Society, History, and Development Fabian Drixler, Peter Perdue, James Scott
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. W 1:30–5:20

HIST 967a, Intellectual History as Storytelling Marci Shore
This seminar explores the discipline of intellectual history from the perspective of the historian's role as author of that history. Topics include the challenges of working with highly personal and subjective sources; the moral dilemmas of relativism; and the relationship between voyeurism and empathy. How do historians relate to novelists grappling with similar material? How can we narrate the history of ideas? How can we write nonfiction about people whose worldviews involved elaborate fantasies about the past, present, and future? How can we situate abstract ideas in concrete times, places, and lives? How do we integrate narrative and analysis? When is it justified to write about the present? The relationship between lunacy and genius is often very intimate; we discuss how historians can approach morally ambiguous historical protagonists be they communist poets, surrealist novelists, fascist philosophers, or others. We focus on storytelling, on history as both art and *Wissenschaft*. Readings include novels, essays, narrative nonfiction, and the genres in between.

HIST 980a/GLBL 910a, Genocide in History and Theory Benedict Kiernan
Comparative research and analysis of genocidal occurrences around the world from ancient times to the present; theories and case studies; an interregional, interdisciplinary perspective. Readings and discussion, guest speakers, research paper. TH 1:30–3:20

HIST 985b[U]/MGT 984b, Studies in Grand Strategy, Part I Elizabeth Bradley, John Gaddis, Charles Hill

This two-term course begins in January with readings in classical works from Sun Tzu to Clausewitz to Kissinger. Students identify principles of strategy and examine the extent to which these were or were not applied in historical case studies from the Peloponnesian War to the post-Cold War period. During the summer students undertake research projects or internships designed to apply resulting insights to the detailed analysis of a particular strategic problem or aspect of strategy. Written reports are presented and critically examined early in the fall term. Students must take both terms, fulfill the summer research/internship, and attend additional lectures to be scheduled throughout the spring and fall terms. Admission is by competitive application only; deadline is early November. Please visit http://iss.yale.edu/programs/grand-strategy for application information. M 3:30–5:20

HIST 985a[U]/MGT 984a, Studies in Grand Strategy, Part II Elizabeth Bradley, Charles Hill

Part II of the two-term linked seminar offered during the calendar year 2016. Research seminar. M 3:30–5:20

HIST 994a/b, Oral Exam Tutorial

Graded Satisfactory/Unsatisfactory.

HIST 995a/b, Prospectus Tutorial

Graded Satisfactory/Unsatisfactory.

HIST 998a/b, Directed Readings

Offered by permission of the instructor and DGS to meet special requirements not covered by regular courses. Graded Satisfactory/Unsatisfactory.

HIST 999a/b, Directed Research

Offered by arrangement with the instructor and permission of DGS to meet special requirements.

HISTORY OF ART

Loria Center, Rm. 252, 203.432.2668
http://arthistory.yale.edu
M.A., M.Phil., Ph.D.

Chair
Tim Barringer (Loria 657, 203.432.8162, timothy.barringer@yale.edu)

Director of Graduate Studies
Jacqueline Jung (Loria 553, 203.432.2684, jacqueline.jung@yale.edu)

Professors Brian Allen (*Adjunct*), Carol Armstrong, Tim Barringer, Edward Cooke, Jr., Diana Kleiner, Kobena Mercer (*on leave* [Sp]), Amy Meyers (*Adjunct*), Mary Miller, Robert Nelson (*on leave* [F]), Jock Reynolds (*Adjunct*), Vincent Scully (*Emeritus*), Nicola Suthor, Robert Thompson (*Emeritus*), Mimi Hall Yiengpruksawan

Associate Professors Milette Gaifman, Jacqueline Jung, Kishwar Rizvi

Assistant Professors Marisa Bass, Craig Buckley, Erica James, Youn-mi Kim, Jennifer Raab, Sebastian Zeidler

Lecturers Martina Droth, Theresa Fairbanks-Harris, Karen Foster, Ian McClure, Ruth Phillips (*Visiting*)

Fields of Study

Fields include ancient Greek and Roman; Medieval and Byzantine; Renaissance; Early Modern; eighteenth-, nineteenth-, and twentieth-century European; Modern Architecture; African; African American and African diaspora; American; American Decorative Arts; British; Pre-Columbian; Islamic; Chinese, Japanese, and Korean.

Special Requirements for the Ph.D. Degree

Students in the history of Western art must pass examinations in German and one other language pertinent to their field of study. One examination must be passed during the first year of study, the other not later than the beginning of the third term. Students of non-Western art must qualify in two languages selected by agreement with the adviser and the director of graduate studies (DGS). They have an extra year in which to do so. During the first two years of study, students typically take twelve term courses. Normally in March 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. During the fall term of the third year, students are expected to take the qualifying examination. Candidates must demonstrate knowledge of their field and related areas, as well as a good grounding in method and bibliography. By the end of the second term of the third year, students are expected to have established a dissertation topic. A prospectus outlining the topic must be approved by a committee at a colloquium by the end of the third year. Students are admitted to candidacy for the Ph.D. upon completion of all predissertation requirements, including the prospectus and qualifying examination. Admission to candidacy must take place by the end of the third year.

The faculty considers teaching to be an important part of the professional preparation of graduate students. Students are required to complete four terms of teaching. This requirement is fulfilled in the second and third years. Students may also serve as a graduate research assistant at either the Yale University Art Gallery or the Yale Center for British Art. This can be accepted in lieu of one or two terms of teaching, but students may accept a graduate research assistant position at any time after the end of their first year. Application for these R.A. positions is competitive.

Combined Ph.D. Programs

HISTORY OF ART AND AFRICAN AMERICAN STUDIES

The Department of the History of Art offers, in conjunction with the Department of African American Studies, a combined Ph.D. in History of Art and African American Studies. Students in the combined-degree program must take five 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 FILM AND MEDIA STUDIES

The Department of the History of Art offers, in conjunction with the Film and Media Studies Program, a combined Ph.D. in the History of Art and Film and Media Studies. Students are required to meet all departmental requirements, but many courses may count toward completing both degrees at the discretion of the directors of graduate studies in History of Art and Film and Media Studies. For further details, see Film and Media Studies.

HISTORY OF ART AND RENAISSANCE STUDIES

The Department of the History of Art 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 Degree Requirements under Policies and Regulations. Additionally, students in the History of Art are eligible to pursue a supplemental M.Phil. degree in Medieval Studies. For further details, see Medieval Studies.

M.A. (en route to the Ph.D.) This degree is awarded after the satisfactory completion of eight term courses and after evidence of proficiency in one required foreign language.

Program materials are available upon request to the Director of Graduate Studies, Department of the History of Art, Yale University, PO Box 208272, New Haven CT 06520-8272.

Courses

HSAR 500a, Methods in Art History Kishwar Rizvi
This seminar is designed to introduce students to a range of art historical methods past and present: a variety of formalisms, connoisseurship, different kinds of iconography, the social history of art, psychoanalysis, and a number of other approaches that are sometimes referred to as visual culture. Readings include classic texts by Riegl, Wölfflin, Panofsky, and Warburg, and more recent approaches by Alpers, Clark, and Crary, among others. T 10:30–11:20

HSAR 512a or b, Directed Research
By arrangement with faculty.

HSAR 563b/CLSS 864b, Art and Ritual in Greek Antiquity Milette Gaifman
The relationship between art and ritual has received much scholarly attention in various fields, particularly classics, history of art, religious studies, and anthropology. Greek antiquity offers an ideal context for considering the intricate ties between visual culture and religious practices, for much of what is known today as ancient Greek art and architecture was originally related to rituals; artifacts and architectural monuments such as painted pottery, sculptural reliefs, and temples served as settings for worship and ceremonial events and featured representations of activities such as libations and sacrifices. The seminar explores how works of art and architecture shaped ancient practices and theologies. While examining closely ancient artifacts and monuments, students consider the most recent theoretical frames related to the subject from various schools of thought such as the Paris school, British anthropology, and *Bildwissenschaft*. W 2:30–4:20

HSAR 570a/ARCG 749a/CLSS 846a, Becoming Hadrian: Autobiography and Art in the Second-Century A.D. Diana Kleiner
Marguerite Yourcenar's famed fictional *Memoirs of Hadrian* serves as the starting point for an exploration of Hadrian and the art he commissioned in Rome and abroad. Hadrian's passion for life, quest after peace, romantic wanderlust, veneration of Greek culture, and craving for love, along with his acceptance of death's inexorableness, led him to commission some of Rome's greatest monuments. The emperor's flair for leadership and talent as an amateur architect inform student projects on the sculpture, mosaics, and buildings of the age, among them the portraiture of Hadrian's lover Antinous, the Pantheon, and Hadrian's Wall in Britain. Qualified undergraduates who have taken HSAR 250a and/or HSAR 252a may be admitted with permission of the instructor. T 1:30–3:20

HSAR 588a, Studies in Medieval Sculpture, 800–1500 Jacqueline Jung
For much of the Middle Ages, figural sculpture both large- and small-scale was the artistic medium of particular accessibility and power to people of all social stations and ranks. Although sculptural works could communicate theological precepts with the same clarity as images in two dimensions, the artistic and material properties peculiar to sculpture, above all its existence in real space and its ability to simulate the volumes and textures of real human bodies, imbued it with mimetic qualities impossible to achieve in other media, and thus allowed it to generate a range of meanings, responses, and behaviors peculiar to itself. Through a series of case studies of important examples, principally from France and Germany, this seminar explores the place of sculpture in the larger history of medieval art and culture. The human body takes center stage, both as a subject of representation and as a vehicle of perception. Throughout the course we consider the extent to which medieval sculpture, despite its frequent adherence to architectural frames, might be viewed as a *dynamic* art, one that places special demands on embodied, mobile viewers and that reveals its full significance only in the course of transient activities. Visits to museums in New York and Cambridge, Mass., enhance our understanding of sculpture's material properties and effects. F 1:30–3:20

HSAR 597b, Word and Image in the Middle Ages Robert Nelson
Word and image studies are a burgeoning field of art history and now have their own journal. This course looks generally at that literature and focuses on the Middle Ages and the Byzantine Empire. Topics of interest are *ekphrasis,* or the description of a work of art; inscriptions around works of art; and especially manuscript illumination, an area of sustained interest of Anglo-American scholars and historically the most popular subject of scholarship on Byzantine art. More attention has been paid lately to the image or icon, and this work needs to be integrated with a reconsideration of the nature of written and oral discourse. W 1:30–3:20

HSAR 632b, *The Life of Forms in Art* and *The Shape of Time* Eeva-Liisa Pelkonen, Nicola Suthor
This seminar focuses on the legacy of two famed twentieth-century Yale-based art historians, Henri Focillon and his student George Kubler, as well as their legacy and impact in both practice and historiography of art and architecture. The focus is on close reading of their most influential books, *The Life of Forms in Art* and *The Shape of Time,* which proposed a set of dynamic variables and indeterminacies that drive art from within, celebrating art as the endless process of becoming of form. Their work helped to radicalize the way artists and architects started to think about works of art—no longer in isolation, but rather as pieces in longer procedural chains involving similar forms and problems mediated through space and time. W 1:30–3:20

HSAR 642a, Bosch and Bruegel Marisa Bass
Humor, monstrosity, violence, and the extremes of human nature obsessed two figures who have long defined the art of the sixteenth-century Netherlands: Hieronymus Bosch and Pieter Bruegel the Elder. Yet despite their looming status in the scholarly and popular imagination, the interpretation of their oeuvres continues to be vexed by methodological problems and debate about the intended meaning of their enigmatic imagery. To

understand the impact of their art, moreover, demands looking beyond the local Netherlandish tradition to their transnational reception across early modern Europe, particularly as part of the power dynamics of the Habsburg empire. This year, the 500th anniversary of Bosch's death, has elicited a flurry of new scholarship and offers an apt moment to reconsider not only the legacy of Bosch but also of Bruegel, the most conscious and creative adaptor of Boschian tradition. Topics include proverbial and popular culture, the rise of the print medium, early modern collecting, genre painting, iconoclasm, the notion of style, workshop practice, technical art history, and the historiography of the northern Renaissance at large. Trips to study relevant works in the Yale Art Gallery and the Metropolitan Museum to be scheduled. TH 1:30–3:20

HSAR 652b, Documenting the World Kishwar Rizvi
This seminar explores the significance of the documentary survey in Europe and the Middle East. Writing the history of the world can only be undertaken from a particular ideological point of view; for example, although medieval illustrated manuscripts, such as the *Compendium of History* of Rashid al-Din (1304) and the *Travels of Sir John Mandeville* (ca. 1371), were concerned with situating the reader within the context of religious and political authority, during the eighteenth century the attempt was made to document the world through scientific explorations of race, religion, and geography, as exemplified by the magnum opus *Ceremonies and Customs of the World Religions,* by Bernard and Picart (1727–31). This seminar studies original and facsimile copies of manuscripts at Yale libraries. TH 10:30–12:20

HSAR 671b/RUSS 671b, The Arts in Russia from Reform to Revolution
Tim Barringer, Molly Brunson
During the second half of the long nineteenth century, Russia experienced an unprecedented flourishing of the arts, evolving rapidly from a country with a relatively young literary tradition and few cultural institutions to one that witnessed the likes of Tolstoy and Dostoevsky, the Mighty Five, the Peredvizhniki, and the Ballets Russes. Imperial Russian culture, and especially from the era of reform to the revolution (1855–1917), has served as the foundation for a national canon and a global artistic reputation, its legacy felt in the Russian avant-garde and official Soviet culture alike, and even in the recent recasting of a twenty-first-century national identity. This seminar considers Russian literature, visual arts, music, and drama in their social, historical, and political contexts, and also across a broad historical scope and alongside criticism with a range of disciplinary perspectives. Russia's conflicted position between East and West, as both part of and apart from Western culture, motivates a number of the course's driving questions. How does Russia's particular experience of modernity impact cultural forms and institutions, and what distinguishes Russia's national manifestations of realism, modernism, and symbolism? How do the arts balance a commitment to pan-European culture with the often self-conscious project of developing a robust national tradition? How is Russian culture introduced to the West, and to what end? How do the various arts experience the transition from the *fin de siècle* to the Soviet period, and how is this transition represented in Soviet and Western historiography? What constitutes the legacy of "the Russians" in the twentieth century and today? Special attention is also given to questions of aesthetics, form, and genre, as well as to the uneven development and different roles of literature,

long considered the dominant art in Russia, and the nonverbal arts. The course concludes with a study trip to Russia after the end of the term. Enrollment limited. Prerequisites: HSAR 221a/RUSS 220a and permission of the instructors. T 1:30–3:20

HSAR 672a, Landscape, Mobility, and Dislocation Tim Barringer, Jennifer Raab
During the long nineteenth century, in a period characterized by industrialization, imperial expansion, and global migration, landscape became an increasingly powerful and contested artistic medium, one that could express the ideologies of empire, philosophies of nature, relationship between geography and vision, and constructions of nationhood and alterity. This course considers such issues by looking at American landscape painting in both a transatlantic and transhemispheric context. We read a range of texts, including those by artists, critics, philosophers, and scientists from the period, in order to examine the cultural, historical, and aesthetic construction of landscape in the nineteenth century, paying particular attention to questions of artistic mobility and dislocation. The course includes a trip to the Hudson River Valley, the favored subject of so many American landscape painters, as well as to New York to view a special installation of works by artists who traveled to Latin America. W 1:30–3:20

HSAR 674a, The History of Color, 1400–2000 Carol Armstrong, Nicola Suthor
This seminar looks at the vexed history of color in all of its aspects, from the Renaissance to the present. Divided between *colore/couleur* and *colorito/coloris,* and frequently opposed to *disegno/dessin,* color has often been relegated to second place and to the status of supplement, derogatorily associated with the superficial, the ephemeral, the deceptive, the illusory, the artificial, and the feminine. At the same time, it has been understood as the "difference" of painting, it is the essence of "what painting is" from a material and practical point of view, it has been at the heart of the *paragone* debates, and it has been a lynchpin of modern and modernist art and theory. This course looks at the history of thought about color in a variety of areas: the alchemical and chemical; the practical and the theoretical; the science of optics; discourse, rhetoric, poetics, and philosophy. Writers addressed include Cennino Cennini and other authors of artist's manuals; Roger de Piles, Sir Isaac Newton, and Johann Wolfgang van Goethe; Charles Baudelaire, Michel Eugène Chevreul, and Josef Albers; Rainer Maria Rilke and Ludwig Wittgenstein. Artists considered include Titian, Peter Paul Rubens, and Jean-Antoine Watteau; Eugène Delacroix, J.M.W. Turner, Edouard Manet, and the Impressionists; Georges Seurat and Paul Cézanne; Henri Matisse, Helen Frankenthaler, and the color-field painters. T 1:30–3:20

HSAR 698b/AFAM 511b/WGSS 698b, Fault Lines: Race, Gender, and Sexuality in Contemporary Art Erica James
This seminar examines moments in which prevailing representational paradigms of race, gender, and sexuality were disrupted and transformed, affecting three-dimensional paradigm shifts in reading of race, gender, and sexuality in fine art and visual culture. Students deepen their engagement with and writing on this work beyond the ghetto of identity politics by considering multiple methods of theoretical analyses simultaneously. Sites of rupture include the art and visual culture that emerged around the figure of the boxer through Jack Johnson and Muhammad Ali; African diaspora visual poetics in the

youth culture of South Africa and Jamaica; and the work of contemporary artists Kalup Linzy, Mickalene Thomas, and Iona Rozeal Brown. TH 1:30–3:20

HSAR 704b, Native American Art History: Objects, Beings, Belongings
Ruth Phillips
This course explores Native North American artistic traditions through close study of individual objects in the collection of the Peabody Museum of Natural History. We undertake a series of investigations including physical description, provenance research, comparative analysis, and historical contextualization in order to explore the ways in which material objects evidence the processes of culture contact, exchange, cultural translation, and colonization that have unfolded since the arrival of Europeans. We investigate the different understandings of material and visual entities proposed by Western and Indigenous ontologies, and we consider the ethical questions of possession and belonging arising from colonial histories of collecting and display. F 10:30–12:20

HSAR 715b, Cubism Sebastian Zeidler
This seminar takes a close look at the work of Braque and Picasso circa 1907 to 1913, with sideways glances at Duchamp (painting) and Dada (collage). The idea is to use Cubist painting, an art that demands and rewards sustained attention, as a means of teaching graduate students a skill they ought to possess but frequently do not: visual analysis. Other, more theoretical issues (formalism, semiology, art and science) arise in due course and are dealt with accordingly. The seminar has a modernist focus, but all who want to practice looking at art are welcome. TH 2:30–4:20

HSAR 718a/GMAN 722a, Mimesis in Art and Nature Paul North
Influential theories postulate that visual art and literature imitate nature. Recent scientific theories postulate that nature also imitates. We investigate what it means for anything to "look like" anything else, in readings of literature, art, and criticism. Authors and topics include Edgar Allan Poe, Nikolai Gogol, Oscar Wilde, and Gerhard Richter on portraiture; Emanuel Swedenborg, Charles Baudelaire, Walter Benjamin, and René Magritte on correspondence; Aristotle, Erich Auerbach, and Philippe Lacoue-Labarthe on mimesis; Goethe, Darwin, Kafka, and Günter Wagner on natural similarities and homology; Peirce, Warburg, and Walker Evans on iconicity. TH 3:30–5:20

HSAR 720a/AMST 805a/REL 966a/RLST 699a/WGSS 779a, Sensational Materialities: Sensory Cultures in History, Theory, and Method Sally Promey
This interdisciplinary seminar explores the sensory and material histories of (often religious) images, objects, buildings, and performances as well as the potential for the senses to spark contention in material practice. With a focus on American things and religions, the course also considers broader geographical and categorical parameters so as to invite intellectual engagement with the most challenging and decisive developments in relevant fields, including recent literatures on material agencies. The goal is to investigate possibilities for scholarly examination of a robust human sensorium of sound, taste, touch, scent, and sight—and even "sixth senses"—the points where the senses meet material things (and vice versa) in life and practice. Topics include the cultural construction of the senses and sensory hierarchies; investigation of the sensory capacities of things; and specific episodes of sensory contention in and among various religious traditions.

In addition, the course invites thinking beyond the "Western" five senses to other locations and historical possibilities for identifying the dynamics of sensing human bodies in religious practices, experience, and ideas. The Sensory Cultures of Religion Research Group meets at 7 p.m. on Tuesdays; class participants are strongly encouraged, but not required, to attend. Prerequisite: permission of the instructor; qualified undergraduates are welcome. M 3:30–5:20

HSAR 725b/AMST 736b, An Introduction to American Material Culture
Edward Cooke, Jr.
The field of material culture has drawn from a number of different disciplines and scholarly traditions. Through readings and applications of methodologies ranging from structuralism and semiotics to Marxist criticism and cultural studies, this seminar provides a solid foundation for the interpretation of artifacts.

HSAR 730b/AMST 692b/JDST 799b/REL 967b/RLST 788b, Religion and the Performance of Space Sally Promey, Margaret Olin
This interdisciplinary seminar explores categories, interpretations, and strategic articulations of space in a range of religious traditions. In conversation with the work of major theorists of space, this seminar examines spatial practices of religion in the United States during the modern era, including the conception, construction, and enactment of religious spaces. It is structured around theoretical issues, including historical deployments of secularity as a framing mechanism, ideas about space and place, geography and gender, and relations between property and spirituality. Examples of case studies treated in class include the enactment of rituals within museums, the marking of religious boundaries such as the Jewish "eruv," and the assignment of "spiritual" ownership in Hawai'i Volcanoes National Park. The seminar coordinates with several campus events, including research group presentations and an exhibition of work by Thomas Wilfred at the Yale University Art Gallery. Prerequisite: permission of the instructors; qualified undergraduates are welcome. M 3:30–5:20

HSAR 733a/AMST 749a, Material Culture of the Colonial Americas (South and North) Edward Cooke, Jr.
This seminar explores the material culture created and used during the period of the European colonization of North and South America. The intent and priorities of Spanish, Portuguese, French, Dutch, English, and German settlers in the period 1500–1800 are explored and contrasted. In looking at the entire colonial period, the course explores the effects of colonial policies on importation and local production, the impact of imported objects and immigrant craftsmen upon local craft structures, the extent of trade and mobility within the colonies, and the movement of raw materials within a global economy. Close analysis of indigenous cultures, the uneven impact of various European powers, and the different market levels in the New World contribute to a more nuanced understanding of cultural transfer, adaptation, imposition, emulation, imitation, and hybridity. The result is a deeper sense of the meaning of objects within empire, and the agency of the colonial craftsmen. Ceramics, glass, textiles, and base metals reveal the vast trade networks that linked the various colonies. On the other hand, furniture, and some textiles often borrowed from European conventions but were translated into local materials wrought by local modes of workmanship. W 10:30–12:20

HSAR 739b, Histories and Theories of Modern Architecture: Theorizing Space
Craig Buckley

That space is a fundamental category for thinking about architecture may appear self-evident. Yet concepts of space emerge quite late in the historiography of modern architecture. This seminar retraces concepts of space as they emerge and shift from the second half of the nineteenth century to the late twentieth century. In the writings of historians, architects, artists, and critics, space marks an unstable epistemological filter through which to interpret and analyze buildings, works of art, ruins, and public squares. If philosophical aesthetics since Kant had maintained that theorizations of space were an *a priori* feature of the human mind, the nineteenth century witnessed the rise of a more intensive psychological and formal interest in describing and theorizing spatial *experience,* one that both troubled and reoriented the Kantian tradition. Nineteenth-century readings include Gottfried Semper's theorization of architecture as an art of enclosing space; theories of spatial empathy from German psychological aesthetics; and Alois Riegl's conception of history as the unfolding of space conceptions. In the twentieth century we examine the emergence of space-time theories, vitalist conceptions of living space, geographical conceptions of social space, notions of acoustic and electronic space developed within media theory, and the geographically informed critique of space developed by Henri Lefebvre. TH 1:30–3:20

HSAR 746b/HIST 800b/MDVL 565b, Circa 1000 Valerie Hansen, Mary Miller, Anders Winroth

The world in the year 1000, when the different regions of the world participated in complex networks. Archaeological excavations reveal that the Vikings reached L'Anse aux Meadows, Canada, at roughly the same time that the Kitan people defeated China's Song dynasty and established a powerful empire stretching across the grasslands of Eurasia. Viking chieftains donned Chinese silks while Chinese princesses treasured Baltic amber among their jewelry. In what is now the American Southwest, the people of Chaco Canyon feasted on tropical chocolate, while the lords of Chichen Itza wore New Mexican turquoise—yet never knew the Huari lords of the central Andes. In this seminar, students read interpretative texts based on archaeology and primary sources, prepare projects in teams, work with material culture, and develop skills of cross-cultural analysis. Mandatory field trip to the Metropolitan Museum of Art in New York on Saturday, January 21. M 3:30–5:20

HSAR 750a[U], Ancient American Art in the Yale University Art Gallery Mary Miller

This course introduces students to both the how and why of ancient American art in the context of a university museum, with a particular focus on the Yale Art Gallery. Pre-Columbian art at Yale and elsewhere was usually first collected in the context of an anthropology or natural history museum, part of larger collections that addressed the history of humanity and were understood to be of archaeological value; only later did works of American antiquity enter art museums and become the subject of art historical study. A reinstallation of the Yale Art Gallery collection has given it a prominent place on the main floor of the museum. Is it foundational in any respect to the museum as a whole? Fundamental to the contextualizing of ancient American materials is an understanding of cultural setting, archaeological sequence, and formal analysis, beginning with the earliest materials in which works of careful facture were imbued with meaning by their makers.

In this class, students study the sweep of culture and chronology, from the Chavín to the Inca in the Andes, and from the Olmec to the Aztec in Mesoamerica. T 1:30–3:20

HSAR 751b, The Body in Pain: Representing the Civil War Jennifer Raab
How can art persuasively represent pain and death? What are the limits and possibilities of visually expressing individual and collective suffering? This course considers the images that chronicled the deadliest war in American history, from photographs by Alexander Gardner, Timothy O'Sullivan, and William Bell of battlefields, burned cities, and bullet wounds, to sketches, oil paintings, and engravings by Winslow Homer made at the front lines for *Harper's Weekly*. Readings range from period texts by Frederick Douglass, Abraham Lincoln, and Oliver Wendell Holmes, to theoretical sources on violence, trauma, memory, and ethics. Selected meetings at the Yale University Art Gallery, the Cushing/Whitney Medical Library, and the Beinecke, whose recent acquisition of the Meserve-Kunhardt Collection provides a particularly rich and extensive new source for research papers. M 1:30–3:20

HSAR 753b, Theories of Imagination and Visual Perception Margaret Olin
This seminar traces the role of imagination and visual perception as conceived by philosophers, phenomenologists, perceptual psychologists, and other theorists in mainly Western thought since the seventeenth century. The ways in which perception and imagination are conceived together are informed by changing conceptions of each term. "Imagination" can be seen as a mental power of internal image making that must be considered separately from perception, or it may be considered as an indispensable component of perception, which itself can be conceived as a more or less faithful representation or a creative process. Readings are chosen from among the works of John Locke, Immanuel Kant, Hippolyte Taine, Hermann von Helmholtz, Henri Bergson, Jean Piaget, Maurice Merleau-Ponty, and others. The significance of the discourse for art and literature is stressed. Students make presentations and submit papers on topics of their choosing in consultation with the instructor. Qualified undergraduates are welcome.

HSAR 783a/AFAM 826a, Theorizing Diaspora Kobena Mercer
This seminar reviews different methods in the study of diasporas and demonstrates their application in research on visual culture and art history. Models addressed to African American, Caribbean, and black British contexts by Stuart Hall, Paul Gilroy, James Clifford, Brent Hayes Edwards, among others, are examined in relation to art, film, and photography that articulate cross-cultural aesthetics. Debates on hybridization that led to such cognate concepts as syncretism, creolization, and translation are tested in comparative case studies. Texts include Homi Bhabha, Sarat Maharaj, Jean Fisher, Edouard Glissant, and Jan Nederveen Pieterse; and book-length introductions by Robin Cohen, *Global Diasporas* (2d ed., 2008), and Sudesh Mishra, *Diaspora Criticism* (2006). TH 3:30–5:20

HSAR 804b/ANTH 787b[U]/ARCG 787b[U], East Asian Objects and Museums: Collection, Curation, and Display Anne Underhill, Youn-mi Kim
This course explores the East Asian art and anthropological collections at Yale's museums and at other major museums in North America and East Asia. Students study collections and their histories; gain experience in museum practices; and learn from specialists through class visits to other relevant museums in the United States and an associated

international conference, Material Culture and Everyday Life before the Korean War: Workshop on the Korean Art and Photograph Collections at the Yale Peabody Museum, sponsored by the Council on East Asian Studies. Opportunities for a student-curated exhibition at Yale are being developed. W 9:25–11:15

HSAR 815b, Momoyama Art in World Perspective Mimi Hall Yiengpruksawan
Exploration of art practices in the time of Nobunaga and Hideyoshi, with emphasis on cross-cultural entanglements in the sixteenth century and the optics of the bizarre at the threshold of the early modern world. Coverage includes castle architecture and decoration, the intersection of European and Japanese pictorial modes and painting practices, Christian art in Japan, the tea ceremony and *wabi* taste, genre painting such as map screens and city views, and the oceanic motif in visual cultures of the early modern period. W 1:30–3:20

HISTORY OF SCIENCE AND MEDICINE

The Graduate Program in the History of Science and Medicine is a semi-autonomous graduate track within the Department of History. The program's students are awarded degrees in History, with a concentration in the History of Science and Medicine.

207 Hall of Graduate Studies, 203.432.1365
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M.A., M.Phil., Ph.D.

Chair
Paul Freedman

Director of Graduate Studies
Naomi Rogers

Faculty Paola Bertucci (*History*), Henry Cowles (*History of Medicine*), Joanna Radin (*History of Medicine*), Chitra Ramalingam (*History*), William Rankin (*History*), Naomi Rogers (*History of Medicine; Women's, Gender & Sexuality Studies*), William Summers (*Therapeutic Radiology*), John Harley Warner (*History of Medicine; History*)

Affiliated Faculty Rene Almeling (*Sociology*), Toby Appel (*Librarian for Medical History*), Melissa Grafe (*Librarian for Medical History*), Dimitri Gutas (*Near Eastern Languages & Civilizations; on leave* [Sp]), Ann Hanson (*Classics*), Jessica Helfand (*Yale College*), Marcia Inhorn (*Anthropology; on leave* [Sp]), Kathryn James (*Curator, Early Modern Books & Manuscripts, Beinecke Library*), Amy Kapczynski (*Law*), Jennifer Klein (*History*), Joanne Meyerowitz (*History*), Amy Meyers (*Center for British Art*), Alan Mikhail (*History*), Ayesha Ramachandran (*Comparative Literature; on leave* [F]), Kevin Repp (*Curator, Modern European Books & Manuscripts, Beinecke Library*), Paul Sabin (*History*), Jason Schwartz (*Public Health*), Gordon Shepherd (*Neuroscience*), Frank Snowden (*History; History of Medicine*), Rebecca Tannenbaum (*History*), Jenifer Van Vleck (*History*), R. John Williams (*English; Film & Media Studies*)

Fields of Study

All subjects and periods in the history of science and history of medicine, especially the modern era. Special fields represented include American and European science and medicine; disease, therapeutics, psychiatry, drug abuse, and public health; physics; science and national security; science and law, science and religion, life sciences, human genetics, eugenics, molecular biology, biotechnology, microbiology, intellectual property, gender, race, and science/medicine; bioethics and medical research.

Special Admissions Requirements

Applicants should have a strong undergraduate background in history and in a science relevant to the direction of their graduate interests. These requirements will be applied with flexibility, and outstanding performance in any field pertinent to the program will be taken into consideration.

Special Requirements for the Ph.D. Degree

All students must show proficiency either in French and German, or in two foreign languages relevant to the student's research interests and approved by the director of graduate studies (DGS). Students may fulfill the requirement by passing an approved language course for credit, by passing a language test administered by the program faculty, by DGS approval of demonstrated command of a native language other than English, or by graduation from an approved foreign university where teaching was conducted in a language other than English.

Students will ordinarily take twelve term courses during the first two years. All students will normally take the two-term core seminar sequence HSHM 701a/702b or equivalents, HSHM 710a, four additional graduate seminars in history of science or medicine, and at least one graduate course in a field of history outside of science or medicine. The remaining courses can be taken in history of medicine or science, history, science, or any other field of demonstrated special relevance to the student's scholarly objectives. Two of the twelve courses must be graduate research seminars in the History of Science and Medicine.

During the first two years of study, students must achieve Honors in at least two courses in the first year and Honors in at least four courses by the end of the second year, with a High Pass average overall. At the end of each term, the DGS will ask faculty members whether they have serious concerns about the academic progress of any first- or second-year students in the Ph.D. program. Faculty members who have such concerns will provide written feedback to the DGS at his or her request. The DGS will use his or her discretion to ensure that feedback is provided to any students about whom there are concerns in a clear and effective manner.

At the end of the academic year, the HSHM faculty will hold a special meeting to review each first- and second-year student in the program. The purpose of the meeting is to assess students' academic progress. In order for second years to proceed to the third year, they must demonstrate through written work, classroom performance, and participation in departmental activities that they have the ability to: (a) speak and write clearly; (b) conduct independent research at a high level; and (c) develop coherent scholarly arguments. A faculty vote will be taken at the conclusion of the review meeting to decide whether each second-year student may continue in the program. If a majority of faculty present and voting determine that a student may not continue, the student will be informed in writing and withdrawn from the program. The review meeting must be a full faculty meeting, but faculty members with no knowledge of the students under review may abstain from the vote, and their abstentions will not count in the total. Those members of the faculty who have worked with or know the students being evaluated are required to attend. In the event that any necessary faculty members absolutely cannot be present, they may send their views in writing to the DGS, who will read them at the meeting.

Students who enter having previously completed graduate work may obtain up to three course credits toward the completion of the total course requirement, the amount being contingent on the extent and nature of the previous work and its fit with their intended course of study at Yale.

All students are expected, prior to entering on their dissertation work, to develop a broad general knowledge of the discipline. This knowledge may be acquired through a combination of course work taken at Yale or elsewhere, regular participation in the program colloquia and workshops, and preparation for the qualifying oral examination.

Students will normally spend the summer following their second year preparing for the oral qualifying examination, which will be taken in the third year, preferably during the first half.

The qualifying examination will cover four areas of chosen concentration:

1 & 2. two fields in the history of science and/or history of medicine;

3. a field in an area of history outside of medicine and/or science;

4. a field of special interest, the content and boundaries to be established with the adviser for the field. The student may elect to do a second field in history outside of history of science or medicine; or a field in one of the sciences; or a field in a subject such as bioethics, health policy, public health, medical anthropology, medical sociology, science and law, science and national security, science and religion, science and culture, biotechnology, gender, science and medicine; race, science and medicine, or cultural studies.

During their first term in the program, all students will be advised by the DGS. During the second term and thereafter, each student will be advised by a faculty member of his or her choosing. The adviser will provide guidance in selecting courses and preparing for the qualifying examination. The adviser may also offer help with the development of ideas for the dissertation, but students are free to choose someone else as the dissertation supervisor when the time comes to do so. Students are encouraged to discuss their interests and program of study with other members of the faculty.

Students are encouraged to begin thinking about their dissertation topics during the second year. They are required to prepare a dissertation prospectus as soon as possible following the qualifying examination and to defend the prospectus orally before being admitted to full candidacy for the doctoral degree. Ordinarily the prospectus defense is held in the second term of the third year, with advancement to candidacy before the start of the fourth year.

Teaching is an important part of the professional preparation of graduate students in History of Science and Medicine. Students will teach, usually in the third and fourth years of study. They may, however, teach in the second term of the second year, deferring the completion of their required course work to the first term of the third year. Students are also encouraged to participate in the programs to develop teaching skills offered by the Graduate School. All HSHM students are expected to teach for four terms; two terms of teaching are required in order to receive the Ph.D.

In the fourth or fifth year, and preferably no later than the fall term of the fifth year, students are required to submit a chapter of the dissertation (not necessarily the first chapter) to the dissertation committee. This chapter will then be discussed with the student by members of the committee, preferably in a colloquium, to give the student additional advice and counsel on the progress of the dissertation. This conference is designed to be an extension of the conversation begun in the prospectus defense and is not intended as another defense; its aim is to give students early feedback on the research, argument, and style of the first writing accomplished on the dissertation.

M.D./Ph.D. and J.D./Ph.D. Joint-Degree Programs

Students may pursue a doctorate in History of Science and Medicine jointly with a degree in Medicine or Law. Standard graduate financial support is provided for the doctoral phase of work toward such a joint degree. Candidates for the joint degree in Law must apply for admission to both the Law School and the Graduate School. Information about the joint-degree program with Medicine can be obtained from the Web site of the Yale School of Medicine (http://medicine.yale.edu/mdphd) and from the Web site of the Section of the History of Medicine (http://medicine.yale.edu/histmed).

Master's Degrees

M.Phil. and M.A. (en route to the Ph.D.) See Degree Requirements under Policies and Regulations.

Terminal Master's Degree Program For the terminal master's degree students must pass seven term courses, four of which must be in HSHM. Course work will normally include the three "Problems" graduate seminars and one additional graduate seminar in HSHM. The remaining courses are to be chosen in consultation with the DGS or a faculty adviser. Honors grades are required in two courses, with a High Pass average overall. Financial aid is not available for this M.A. program.

More information is available on the program's Web site, http://hshm.yale.edu.

Courses

HSHM 701a/AMST 878a/HIST 930a, Problems in the History of Medicine and Public Health John Harley Warner

An examination of the variety of approaches to the cultural, social, and intellectual history of medicine, focusing on the United States. Reading and discussion of the recent scholarly literature on medical cultures, public health, and illness experiences from the early national period through the present. Topics include the role of gender, class, ethnicity, race, religion, and region in the experience of health care and sickness and in the construction of medical knowledge; the interplay between lay and professional understandings of the body; the role of the marketplace in shaping professional identities and patient expectations; citizenship, nationalism, and imperialism; and the visual cultures of medicine. W 1:30–3:20

HSHM 702a/HIST 931a, Problems in the History of Science Henry Cowles

Survey of classic and recent work in the history of science, broadly conceived. Topics include physical, life, and human sciences; role of technology and instruments; relationship between theory and practice; and interactions with society, politics, and capitalism. Focus on mastering debates in history of science, with connections to philosophy, anthropology, and literary studies. T 3:30–5:20

HSHM 710b/HIST 921b, Problems in Science Studies Joanna Radin

Exploration of the methods and debates in the social studies of science, technology, and medicine. This course covers the history of the field and its current intellectual, social, and political positioning. It provides critical tools—including feminist, postcolonial, and

new materialist perspectives—to address the relationships among science, technology, medicine, and society. T 1:30–3:20

HSHM 713b/HIST 913b, Geography and History William Rankin
A research seminar focused on methodological questions of geography and geographic analysis in historical scholarship. We consider approaches ranging from the Annales School of the early twentieth century to contemporary research in environmental history, history of science, urban history, and more. We also explore interdisciplinary work in social theory, historical geography, and anthropology and grapple with the promise (and drawbacks) of GIS. Students may write their research papers on any time period or geographic region, and no previous experience with geography or GIS is necessary. Open to undergraduates with permission of the instructor. M 1:30–3:20

HSHM 716a/HIST 936a, Early Modern Science and Medicine Paola Bertucci
The course focuses on recent works in the history of science and medicine in the early modern world. We discuss how interdisciplinary approaches—including economic and urban history, sociology and anthropology of science, gender studies, art and colonial history—have challenged the classic historiographical category of "the Scientific Revolution." We also discuss the avenues for research that new approaches to early modern science and medicine have opened up, placing special emphasis on the circulation of knowledge, practices of collecting, and visual and material culture. T 1:30–3:20

HSHM 729b/AFAM 705b/AMST 708b/ENGL 708b/HIST 708b, The History of Race Greta LaFleur
This course offers a broad survey of the history of racial science and racialist thinking in the Atlantic world from the early modern period through the late nineteenth century. Rather than attempting to detail the histories of specific racial formations (such as blackness or whiteness), the course tracks the intellectual history of the emergence of "race" as a specific category of human differentiation and traces a swath of its most muscular—and pernicious—permutations through the eighteenth and nineteenth centuries. W 1:30–3:20

HSHM 745a/HIST 910a/WGSS 733a, History of Health Activism Naomi Rogers
This research seminar introduces students to current historical debates around health activism. Topics include progressive and conservative ideologies and debates around them; debates around welfare and entitlements; gender and reproductive rights; medical professionalism; and health activism as a social movement. Research is focused on holdings in Yale libraries. M 1:30–3:20

HSHM 746b/HIST 919b, History and Material Culture Paola Bertucci, Chitra Ramalingam
Approaches to studying material culture historically. What—and how—can historians learn from objects? How can objects be used to do history? This seminar explores methods and literary genres for doing and writing material history from across a range of disciplines: history of science, history of art, anthropology, archaeology, conservation science, and museum studies. W 3:30–5:20

HSHM 747a/AMST 744a/F&ES 617a/HIST 744a, Readings and Research in Energy History Paul Sabin

The history of energy in the United States and the world. Readings and discussion range widely across different forms of energy: animal power, biomass, and early hydropower; coal, oil, and atomic energy; and present-day hydraulic fracturing, wind, and solar. Themes include relations between energy producers and communities, including resistance to energy projects; cultural and social change associated with dominant energy regimes; labor struggles and environmental transformations; the global quest for oil; and changing national energy policies. We explore new approaches to writing and teaching the history of energy. Open to undergraduates with permission of the instructor. M 1:30–3:20

HSHM 914a or b, Research Tutorial I
By arrangement with faculty.

HSHM 915a or b, Research Tutorial II
By arrangement with faculty.

HSHM 920a or b, Independent Reading
By arrangement with faculty.

HSHM 930a or b, Independent Research
By arrangement with faculty.

IMMUNOBIOLOGY

Anlyan Center (TAC) S625, 203.785.3857
http:// immunobiology.yale.edu/
M.S., M.Phil., Ph.D.

Chair
David Schatz

Director of Graduate Studies
Susan Kaech (TAC 641B, 203.737.2423, susan.kaech@yale.edu)

Director of Graduate Admissions
João Pereira (TAC 541A, 203.737.2089, joao.pereira@yale.edu)

Student Services Officer
Barbara Cotton (TAC S625, 203.785.3857, barbara.cotton@yale.edu)

Professors Jeffrey Bender (*Internal Medicine*), Alfred Bothwell, Lieping Chen, Joseph Craft (*Internal Medicine*), Peter Cresswell, Madhav Dhodapkar (*Internal Medicine*), Vishwa Dixit (*Comparative Medicine*), Richard Flavell, David Hafler (*Neurology*), Kevan Herold, Akiko Iwasaki, Susan Kaech, Paula Kavathas (*Laboratory Medicine*), Ruslan Medzhitov, Jordan Pober, Craig Roy (*Microbiology*), David Schatz, Robert Tigelaar (*Dermatology*)

Associate Professors Tarek Fahmy (*Biomedical Engineering*), Eric Meffre, Carla Rothlin, Bing Su

Assistant Professors Stephanie Eisenbarth (*Laboratory Medicine*), Ann Haberman (*Laboratory Medicine*), Martin Kriegel, Carrie Lucas, Noah Palm, João Pereira, Aaron Ring

Fields of Study

The Immunobiology graduate program is designed to prepare students for independent careers in research and teaching in immunology or related disciplines. The educational 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. Graduate students are diverse in their interests and ethnic backgrounds, and more than 50 percent are women.

Research Areas

Research focuses on the molecular, cellular, and genetic underpinnings of immune system function and development, on host-pathogen interactions, and on human and translational immunology, with a particular interest in a variety of autoimmune disorders. These research interests break down into six major themes, spanning almost all aspects of the immune system and its role in disease prevention.

Lymphocyte development A central focus of research is to understand the molecular events underlying the development of B and T lymphocytes. Areas of major interest include the receptors and signals that control lymphocyte lineage commitment, cell maturation, cell proliferation, and cell death; the establishment of the proper environments for lymphocyte development; mechanisms that regulate the state of chromatin during lymphocyte development; and the mechanisms by which antibody and T cell receptor genes are assembled and diversified.

Mounting an immune response An effective immune response requires the coordinated action of numerous cell types. A critical first step is the activation of cells of the innate immune system, including monocytes, macrophages, dendritic cells, and neutrophils; and the receptors and signaling molecules that control this process are under intensive study. The mechanism by which cells take up, process, and present antigen is a major interest, as is the recognition of this antigen by T cell receptors on T lymphocytes. Cytoplasmic signal transduction molecules, nuclear transcription factors, and mechanisms controlling gene expression are all under study.

Regulating the immune response The immune response is tightly regulated through the interaction of cell surface receptors with secreted cytokines and with one another, and the mechanisms by which these interactions exert their regulatory influences are studied in several laboratories. Another major interest is in learning how specialized cells or anatomic locations, such as vascular endothelial cells or the epidermis, regulate and direct the immune response.

Consequences of an immune response Apart from the obvious consequence of the elimination of an invading organism, an appropriate immune response results in immunological memory and large numbers of activated lymphocytes, which must be eliminated. The mechanisms controlling immunological memory, tolerance, and apoptosis, as well as those leading to autoimmunity, are a major interest of many faculty. Diabetes, multiple sclerosis, lupus, and rheumatoid arthritis are just some of the autoimmune diseases under study. Much of this work takes place in the context of the Section of Human and Translational Immunology.

Infectious disease and the host-pathogen interaction A major interest is the study of infectious organisms—bacterial, viral, and parasitic—and the immune response to them. A great deal of effort is directed toward understanding the strategies used by infectious agents to avoid the immune system. HIV, HBV (hepatitis B virus), herpes simplex virus, parvoviruses, *Candida albicans, Borrelia burgdorferi* (the causative agent of Lyme disease), *Leishmania, Streptococcus pneumoniae,* and *Legionella pneumophilia* are all under study.

Structural analysis of immune system receptors and effectors There is a growing interest in using structural approaches to understand the function of key molecules of the immune response. For example, a major effort is devoted toward understanding how the Toll-like receptors, despite their similarity in extracellular-ligand recognition regions, are able to specifically recognize such a wide variety of pathogen-associated molecular patterns (PAMPS). Another effort is aimed at understanding the mechanism of APOBEC enzymes in controlling viruses such as HIV.

Facilities

More than thirty laboratories are actively involved in research in immunology. Many share immediately adjoining or nearby laboratory space on the top three floors of the Anlyan Center (TAC), 10 Amistad Street, and 300 George Street, and three faculty are funded by the Howard Hughes Medical Institute. The Department of Immunobiology provides one of the largest, highest-ranked training programs in immunology in the country, led by a faculty with a reputation for excellence in research. The Department of Immunobiology maintains a wide variety of major equipment, and Dr. Richard Flavell oversees a very active transgenic mouse/ES cell/knockout facility to which members of the department have access.

Program Entry

Most students enter the Immunobiology graduate program through the Immunology track of the interdepartmental graduate program in Biological and Biomedical Sciences (BBS), http://bbs.yale.edu. Other types of students enter from the M.D./Ph.D. program (see below), the MRSP (see below), or another BBS track, with approval of the Immunobiology director of graduate studies (DGS) and the faculty adviser.

The faculty and students of the BBS program are organized into interest-based tracks. Immunology, being one of seven tracks, encourages individualized attention to maximize scientific interactions. There is complete freedom to work with any of the 350 faculty members affiliated within any of the tracks and to take courses offered by any of the BBS departments or programs. 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, neuroscience, and bioinformatics. Research seminars and informal interactions with other graduate students, postdoctoral fellows, and faculty also form an important part of graduate education.

The Section of Human and Translational Immunology (HTI) is a component of the Immunobiology department and is located at 10 Amistad Street and 300 George Street. Its mission is to accelerate the application of new developments in the field of immunology to the treatment of human diseases. HTI faculty study the immunologic aspects of a very broad range of human diseases, encompassing investigations in the fields of cancer; transplantation of solid organs and stem cells; autoimmune diseases; and neurologic disease.

The Medical Research Scholars Program (MRSP) is open to students who have already been accepted into the BBS program. A separate application is also required, and is to be submitted to the BBS. A total of eight students each year (four first-years and four second-years) will be enrolled as Medical Research Scholars. They remain in their BBS tracks or departments but participate in the additional MRSP curriculum. The program bridges barriers between traditional predoctoral and medical training by providing Yale Ph.D. students with both medically oriented course work and a mentored clinical experience. This combination of medical knowledge and face-to-face interaction with patients and their doctors provides a new perspective to Ph.D. students and enhances the rigorous training in basic science already provided.

Admission requirements In addition to meeting general BBS requirements, applicants are expected to have a firm foundation in the biological and physical sciences. 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. There are no specific grade requirements for prior course work, but a strong performance in basic science courses is of great importance for admission. In special cases, the Medical College Admission Test (MCAT) scores may substitute for scores on the general GRE.

Special Requirements for the Ph.D. Degree

Students are required to take six courses for a grade in the Yale Graduate School.

Required graded courses for first- and second-year students are:
1. IBIO 530a, Biology of the Immune System (Students have the option of passing out of 530 by taking the final exam from the previous year.)
2. IBIO 531b, Advanced Immunology
3. Two Immunobiology seminar courses taken from this series: IBIO 536, 537, 538, 539 (The second seminar course can be audited if a student has grades in six other science courses and has already taken one seminar course for credit.)

Required credit-only, nongraded courses for first-year students are:
1. IBIO 600a, Introduction to Faculty Research
2. IBIO 611a, 612b, 613b, Research Rotations (short research projects are taken under the guidance of three Yale professors)
3. IBIO 601b, Fundamentals of Research: Responsible Conduct of Research

Fourth-year students are required to take IBIO 503b, a refresher training course in the responsible conduct of research.

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 the DGS and the thesis adviser.

Honors 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.

Teaching Students are required to serve as a science TA (teaching assistant) for two terms before the end of their sixth term. Teaching protocol and rules are as follows:
1. Teaching two term-long science courses is required as a fulfillment of the Ph.D.;
2. First-year students do not teach;
3. Teaching opportunities are first given to students who need teaching credit;
4. Teaching for additional income is available when openings exist after those selected for credit are hired; approval signatures from the adviser and DGS are required.
5. The maximum teaching allowed is one course per term.

A Yale McDougal Center one-day seminar entitled "Teaching at Yale" is offered each year. Attending this seminar is recommended prior to teaching.

Prospectus and qualifying exam Early in the fourth term (or in certain circumstances, in the third term), students make a thirty-minute presentation to the department 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 qualifying exam. During the next several weeks, students prepare a formal research proposal (in NIH grant format) concerning the proposed thesis research and study for the exam. The exam is held within three months. It is an oral exam covering all aspects of immunology generally, with a focus on the assigned areas mentioned above. The student is questioned on aspects of the thesis proposal.

Admission to candidacy Requirements for admission to candidacy, which usually takes place after six terms of residence, are: completion of course requirements, one of the two teaching requirements, the qualifying exam, and the third-year committee meeting—at the one-year anniversary of the qualifying exam—with a signed certification form from the adviser and committee members verifying that the student has made good progress.

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). See below.

M.D./Ph.D. Students Majoring in Immunobiology

Required Six courses for a grade. Out of the six courses the following are mandatory:

1. IBIO 530a, Biology of the Immune System (Students have the option of passing out of 530 by taking the final exam from the previous year.)
2. IBIO 531b, Advanced Immunology
3. Two Immunobiology seminar courses taken from this series: IBIO 536, 537, 538, 539 (The second seminar course can be audited if a student has grades in six other courses and has already taken one seminar course for credit.)

Also required *Two grades of Honors:* Yale University graduate courses taken for a grade at the School of Medicine may be counted toward the Honors fulfillment and the six total required courses. Verification must be provided to the DGS. *One term of teaching:* Previously taught courses in the School of Medicine may count toward this requirement. To request credit for previous teaching experience, a note from the course director describing the teaching experience (duration of the teaching experience, frequency of class meetings, number of students taught, materials covered, dates, and for whom) should be provided to the Immunobiology DGS. *Responsible Conduct of Research, Refresher Course:* Fourth-year students are required to take a refresher training course in the responsible conduct of research. M.D./Ph.D. students can fulfill this NIH requirement through Immunobiology (IBIO 603b) or through the M.D./Ph.D. program.

M.D./Ph.D. students are *not* required to take:

1. IBIO 600a, Introduction to Research
2. IBIO 611a, 612b, 613b, Research Rotations

3. IBIO 601b, Fundamentals of Research: Responsible Conduct of Research. A note from the DGS of the M.D./Ph.D. program must be forwarded to the Immunobiology DGS stating that the student has taken a course in Research Conduct and Ethics, or its equivalent in the School of Medicine. *Include dates, titles, and faculty*. If the student has not taken this course, then registration in this class is required.

Annual thesis committee meetings Each student is required to have a thesis committee meeting at least every twelve months, and more frequently if the student or committee feels that it would be appropriate or helpful. The thesis supervisor (the student's PI) then submits a thesis committee report form to the DGS summarizing the student's progress.

Master's Degrees

M.Phil. A student is entitled to the M.Phil. degree once all academic and prospectus requirements, and one of the two teaching requirements, have been met. Also required is a third-year committee meeting at which the members sign an approval form stating that the student is making good progress toward his or her research.

M.S. (en route to the Ph.D.) Students who complete at least one year of resident graduate study at Yale with the quality of work judged satisfactory by the Department of Immunobiology faculty and who have satisfied ten courses with an average grade point average of High Pass (graded) and Pass (ungraded) may petition for the award of the M.S. degree. Students must petition through the Registrar's Office of the Graduate School in early October for the December award of the M.S. and by the middle of March for the May award. Students who are eligible for or who have already received the M.Phil. will not be awarded the M.S.

For additional information on the Program in Biological and Biomedical Sciences see http://bbs.yale.edu.

Courses

For a complete listing of immunology-related courses, see http://bbs.yale.edu.

IBIO 503b, Responsible Conduct of Research, Refresher Course
The NIH requires that students receive training in the responsible conduct of research every four years. This course meets that requirement for fourth-year students. The course has two components: (1) one large-group session is held for all fourth-year students through the BBS; the main topics are scientific misconduct and authorship; (2) two Immunobiology faculty facilitate discussions based on RCR topics, gathered in advance from the students; anonymous or hypothetical stories are selected by the faculty and discussed in a workshop environment in which students are then asked to analyze each case and suggest courses of actions.

IBIO 530a/MBIO 530a/MCDB 530a[U], Biology of the Immune System Carla Rothlin, Peter Cresswell, Vishwa Dixit, Akiko Iwasaki, Susan Kaech, Martin Kriegel, Ruslan Medzhitov, Eric Meffre, Noah Palm, João Pereira, Craig Roy, David Schatz
The development of the immune system. Cellular and molecular mechanisms of immune recognition. Effector responses against pathogens. Immunologic memory and vaccines.

Human diseases including allergy, autoimmunity, cancer, immunodeficiency, HIV/AIDS. MWF 9:25–10:15

IBIO 531b, Advanced Immunology Alfred Bothwell and faculty
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. MW 4:30–6:30

IBIO 532b, Inflammation Ruslan Medzhitov
This course covers fundamentals of inflammation from a broad biological perspective, with a focus on both physiological and pathological aspects of inflammation. W 3:30–5:20

IBIO 536a, Advanced Immunology Seminar: Metabolic Regulation of Innate and Adaptive Immunity Susan Kaech, Vishwa Dixit, Gerald Shadel
F 1:30–3:30

IBIO 537b, Antigen Processing and DC Biology Peter Cresswell, Stephanie Eisenbarth
Prerequisites: IBIO 530a and 531b. MW 11:35–12:50

IBIO 600a, Introduction to Research: Faculty Research Presentations Susan Kaech and faculty
Introduction to the research interests of the faculty. Required of all first-year Immunology/BBS students. Pass/Fail.

IBIO 601b/CB&B 601b, Fundamentals of Research: Responsible Conduct of Research Susan Kaech and faculty
A weekly seminar presented by faculty trainers on topics relating to proper conduct of research. Required of first-year Immunobiology students, first-year CB&B students, and training grant-funded postdocs. Pass/Fail. T 5

IBIO 611a, Research Rotation 1 Susan Kaech and faculty
Intensive experience in the design and execution of experiments in immunology or other areas of biology. Students design a focused research project in consultation with a faculty mentor and execute the designed experiments in the mentor's laboratory. Students are expected to read relevant background papers from the literature, design and perform experiments, interpret the resulting data, and propose follow-up experiments. Students are also expected to attend the mentor's weekly lab meeting(s) as well as weekly Immunobiology departmental seminars and Research in Progress seminars. The course concludes with the student giving a brief presentation of the work performed at Rotation Talks, attended by other first-year immunology-track graduate students. Evaluation is by the mentor; students also evaluate the rotation experience. Students must turn in a prioritized list of four possible mentors to Barbara Cotton in the office of the director of graduate studies at least one week prior to the beginning of the course. Mentors are assigned by the DGS. Graded Pass/Fail. 1 course credit; minimum of 20 hours/week. Required of all first-year Immunology/BBS students.

IBIO 612b, Research Rotation 2 Susan Kaech and faculty
See description under IBIO 611a.

IBIO 613b, Research Rotation 3 Susan Kaech and faculty
See description under IBIO 611a.

INTERNATIONAL AND DEVELOPMENT ECONOMICS

Economic Growth Center
27 Hillhouse Avenue, 203.432.3610
http://ide.yale.edu
M.A.

Director
Dean Karlan

Director of Graduate Studies
Michael Boozer

The Department of Economics offers a one-year program of study in International and Development Economics, leading to the Master of Arts degree. IDE students are diverse in terms of their nationalities and their career paths. Many of our students now come directly from their undergraduate school or a few years of work experience, although we do not exclude any candidate on the basis of work experience or country of origin. After completion of the program, IDE students have gone into various paths, including working in research for academic and nonacademic agencies such as the World Bank, the United Nations, and the Poverty Action Lab. Other students have gone on to further academic work such as law school and to Ph.D. programs in economics, environmental sciences, public health, and similar programs. Many students have returned to their home countries to work for their government or for funding agencies there.

Some 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 Graduate Record Examination (GRE) and the Test of English as a Foreign Language (TOEFL) examinations are also required. The TOEFL requirement is waived only for applicants who will have received a degree, prior to matriculation at Yale, from a college or university where English is the primary language of instruction.

Yale fellowship funds are not available for the IDE program, and students are required to produce certification of the necessary funding prior to enrollment.

The course program requires the completion of eight graduate-level courses, six of which make up the core elements of the IDE program and are required; the remaining two are graduate electives. The required courses are Microeconomics; Macroeconomics; Econometrics; Economics of Poverty Alleviation: Evidence from Experimental Evaluations; Development Economics; Development Econometrics. These required courses are designed to provide a rigorous understanding of the economic theory necessary for economic policy analysis. In special circumstances, in consultation with the DGS, students may receive credit toward the degree for undergraduate language classes. An option of a second year of nondegree elective study is available via the special student registration status.

Joint-program options for study with the School of Forestry & Environmental Studies (F&ES) and the School of Public Health (YSPH) are also available. Application to F&ES or YSPH must be made simultaneously with the application to the IDE program.

Admission to these joint programs is determined by the participating professional school and must be obtained prior to beginning the program. Joint-degree students earn the Master of Arts degree in IDE and the Master of Environmental Studies (F&ES) or Master of Public Health (YSPH) degree.

Prospective applicants are encouraged to visit the IDE program Web site at http://ide.yale.edu. Program materials are available upon request to Louise Danishevsky, Senior Administrative Assistant, International and Development Economics Program, Yale University, PO Box 208269, New Haven CT 06520-8269; e-mail, ide@yale.edu.

INVESTIGATIVE MEDICINE

2 Church Street South, Suite 112, 203.785.6842
http://medicine.yale.edu/investigativemedicine
Ph.D.

Director of Graduate Studies
Joseph Craft (joseph.craft@yale.edu)

Deputy Director
Eugene Shapiro

Professors Karen Anderson (*Pharmacology*), Joseph Craft (*Internal Medicine; Immunobiology*), David Fiellin (*Internal Medicine; Epidemiology*), Thomas Gill (*Internal Medicine; Epidemiology*), Fred Gorelick (*Internal Medicine; Cell Biology*), Jeffrey Gruen (*Pediatrics; Genetics*), Harlan Krumholz (*Internal Medicine; Epidemiology*), Chirag Parikh (*Internal Medicine*), Eugene Shapiro (*Pediatrics; Epidemiology*), George Tellides (*Surgery*), Mary Tinetti (*Internal Medicine; Epidemiology*)

Fields of Study

The Investigative Medicine program offers a training pathway for highly select physicians in clinical departments who are interested in careers in clinical research. The program is designed to develop a broad knowledge base, analytical skills, creative thinking, and the hands-on experience demanded of clinical researchers devoted to disease-oriented and patient-oriented investigation. The program provides the student with individualized experience encompassing formal course work and practical experience, under the supervision and mentorship of a senior faculty member.

Students will enter the program with a broad range of experience and interests. Students can undertake thesis work in a variety of disciplines. These include but are not limited to:

1. Evaluating risk factors and interventions for disease using modern concepts in quantitative methods and clinical study design.
2. Investigating the biochemical, physiologic, and genetic basis of disease in the setting of a Clinical Research Center.
3. Exploring the molecular basis of a disease from the laboratory standpoint.

Special Admissions Requirements

The Investigative Medicine program is designed for students with an M.D. or D.O. degree. To be eligible for admission, applicants must have completed two or more years of postgraduate clinical training. Prospective students who are already in a residency or subspecialty clinical fellowship program at Yale may apply to the Investigative Medicine program anytime during the first two years of that training (approximate). Application to the program also may be made concurrently with application for residency or fellowship training in a clinical department at the Yale School of Medicine. Special arrangements will be made for a deferred acceptance by the Graduate School.

The most important criteria for selection into the program are commitment to rigorous training in clinical investigation and evidence of high academic achievement in undergraduate and medical school courses, and on scores from the USMLE. All applicants must be eligible to practice medicine in the United States.

Special Requirements for the Ph.D. Degree

The minimum overall course requirements for the doctorate program are completion of nine (9) courses. Intensive course work will extend for twelve months, starting in July. The majority of the course requirements are to be completed by the end of the first year of study. Prior to registering for a second year of study, students must successfully complete IMED 630a, Ethical Issues in Biomedical Research. In addition to IMED 655b, electives are often taken in the second year, with the expectation that they be completed by the end of the second year. To be eligible to take the comprehensive qualifying examination, students must achieve the grade of Honors in two courses (one course if a full-year course), have a minimum grade average of High Pass, and have completed a minimum of six courses. When requirements are met (typically by December 31 of the second year), students submit their thesis proposal and undertake the comprehensive qualifying examination. In order to be admitted to candidacy, students must pass both the written and oral comprehensive qualifying examinations and submit a thesis prospectus that has been approved by their qualifying committee. The remaining degree requirements include completion of the dissertation project, writing of the dissertation, and its oral defense. It is expected that most students will complete the program in three to five years. There is no foreign language requirement. The minimum required curriculum for each program of study is as follows:

COURSE REQUIREMENTS FOR LABORATORY-BASED PATIENT-ORIENTED RESEARCH

IMED 625a, Principles of Clinical Research
IMED 630a, Ethical Issues in Biomedical Research
IMED 635a or b, Directed Reading in Investigative Medicine
IMED 645a, Introduction to Biostatistics in Clinical Investigation
IMED 655b, Writing Your Career Development (K-type) Grant *or* IMED 670b, Writing Your First Independent Investigator-Initiated (R-type) Grant
IMED 680b, Topics in Human Investigation
CBIO 601, Molecular and Cellular Basis of Human Disease
CB&B 740a, Clinical and Translational Informatics
Elective (1)

COURSE REQUIREMENTS FOR CLINICALLY BASED PATIENT-ORIENTED RESEARCH

IMED 630a, Ethical Issues in Biomedical Research
IMED 635a or b, Directed Reading in Investigative Medicine
IMED 655b, Writing Your Career Development (K-type) Grant *or* IMED 670b, Writing Your First Independent Investigator-Initiated (R-type) Grant
IMED 660c, Methods in Clinical Research, Part I

IMED 661a, Methods in Clinical Research, Part II
IMED 662b, Methods in Clinical Research, Part III
IMED 680b, Topics in Human Investigation
Electives (2)

Courses

IMED 625a, Principles of Clinical Research Eugene Shapiro
The purpose of this intensive two-week course is to provide an overview of the objectives, research strategies, and methods of conducting patient-oriented clinical research. Topics include competing objectives of clinical research, principles of observational studies, principles of clinical trials, principles of meta-analysis, interpretation of diagnostic tests, prognostic studies, causal inference, qualitative research methods, and decision analysis. Sessions generally combine a lecture on the topic with discussion of articles that are distributed in advance of the sessions. Consent of instructor required. Two weeks, July 25–August 5, 2016. MTWTHF 2–4

IMED 630a, Ethical Issues in Biomedical Research Joseph Craft
This term-long course addresses topics that are central to the conduct of biomedical research, including the ethics of clinical investigation, conflicts of interest, misconduct in research, data acquisition, and protection of research subjects. Practical sessions cover topics such as collaborations with industry, publication and peer review, responsible authorship, and mentoring relationships. Satisfactory completion of this course fulfills the NIH requirement for training in Responsible Conduct of Research. Format consists of lecture presentation followed by discussion. Consent of instructor required. T 3:30–5

IMED 635a or b, Directed Reading in Investigative Medicine Joseph Craft
An independent study course for first-year students in the Investigative Medicine program. Topics are chosen by the student, and reading lists are provided by faculty for weekly meetings to discuss articles. Four sessions are required; dates/times by arrangement. Consent of instructor required.

IMED 645a, Introduction to Biostatistics in Clinical Investigation Eugene Shapiro
The course provides an introduction to statistical concepts and techniques commonly encountered in medical research. Previous course work in statistics or experience with statistical packages is not a requirement. Topics to be discussed include study design, probability, comparing sample means and proportions, survival analysis, and sample size/power calculations. The computer lab incorporates lecture content into practical application by introducing the statistical software package SPSS to describe and analyze data. Consent of instructor required. Two weeks, July 11–22, 2016. MTWTHF 8:30–11:15

IMED 655b, Writing Your Career Development (K-type) Grant Eugene Shapiro
In this term-long course, students gain intensive, practical experience in evaluating and preparing grant proposals, including introduction to NIH study section format. The course gives new clinical investigators the essential tools to design and initiate their own proposals for obtaining grants to do research and to develop their own careers. The course is limited to students who plan to submit grant proposals for a K-type mentored

career development award. Attendance and active participation are required. There may be spaces to audit the course. Consent of instructor required. W 1–3

IMED 660c, Methods in Clinical Research, Part I Eugene Shapiro

IMED 661a, Methods in Clinical Research, Part II Eugene Shapiro

IMED 662b, Methods in Clinical Research, Part III Eugene Shapiro
This yearlong course, presented by the Robert Wood Johnson Clinical Scholars Program, presents in depth the methodologies used in patient-oriented research, including methods in biostatistics, clinical epidemiology, health services research, community-based participatory research, and health policy. Consent of instructor required.

IMED 670b, Writing Your First Independent Investigator-Initiated (R-type) Grant Eugene Shapiro
In this term-long course, students gain intensive, practical experience in evaluating and preparing grant proposals, including discussion of NIH study section format. The course is particularly designed to help investigators in the "K to R" transition period. The course is limited to students who plan to submit an R-type (e.g., R01 or R21) grant, as well as VA and foundation grant proposals. Attendance and active participation are required. Consent of instructor required. W 3–5

IMED 680b, Topics in Human Investigation Joseph Craft, Karen Anderson
The course teaches students about the process through which novel therapeutics are designed, clinically tested, and approved for human use. It is divided into two main components, with the first devoted to moving a chemical agent from the bench to the clinic, and the second to outlining the objectives and methods of conducting clinical trials according to the FDA approval process. The first component describes aspects of structure-based drug design and offers insight into how the drug discovery process is conducted in the pharmaceutical industry. The format includes background lectures with discussions, labs, and computer tutorials. The background lectures include a historical perspective on drug discovery, the current paradigm, and important considerations for future success. The second component of the course provides students with knowledge of the basic tools of clinical investigation and how new drugs are tested in humans. A series of lectures and discussions provides an overview of the objectives, research strategies, and methods of conducting patient-oriented research, with a focus on design of trials to test therapeutics. Each student is required to participate (as an observer) in an HIC review, in addition to active participation in class. Consent of instructor required. TH 3–4:30

ITALIAN LANGUAGE AND LITERATURE

82-90 Wall Street, 203.432.0595
http://italian.yale.edu
M.A., M.Phil., Ph.D.

Chair
Millicent Marcus

Director of Graduate Studies
Christiana Purdy Moudarres (82-90 Wall St., Rm. 407, 203.432.0597)

Professors Luigi Ballerini [Sp], Millicent Marcus, Giuseppe Mazzotta (*on leave*), Walter Stephens [F]

Assistant Professor Christiana Purdy Moudarres

Affiliated Faculty Francesco Casetti (*Film & Media Studies; on leave* [Sp]), Roberto González Echevarría (*Spanish & Portuguese*), Gundula Kreuzer (*Music*), Alastair Minnis (*English; on leave* [Sp]), David Quint (*English*), Frank Snowden (*History*), Gary Tomlinson (*Music*), Francesca Trivellato (*History; on leave*)

Visiting faculty from other universities are regularly invited to teach courses in the department.

Fields of Study

The Italian department brings together several disciplines for the study of the Italian language and its literature. Although the primary emphasis is on a knowledge of the subject throughout the major historical periods, the department welcomes applicants who seek to integrate their interests in Italian with wider methodological concerns and discourses, such as history, rhetoric and critical theories, comparison with other literatures, the figurative arts, religious and philosophical studies, medieval, Renaissance, and modern studies, and the contemporary state of Italian writing. Interdepartmental work is therefore encouraged and students are accordingly given considerable freedom in planning their individual curriculum, 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 and second years, students' progress is analyzed in an evaluative colloquium. Applicants who have had little or no experience in Italy are generally urged to do some work abroad during the course of their graduate program. For all students of Italian, a reading 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 outside the Italian department. After consultation with the director of graduate studies (DGS), students who join the graduate program with an M.A. in hand may have up to four courses waived. The comprehensive qualifying examination must take place during the third year of residence. It is designed to demonstrate the student's mastery of the language and acquaintance with the literature. The examination, which is both written and oral, will be devised in consultation with members of the department. In the term following the qualifying examination, the student will discuss, in a session with the departmental faculty, a prospectus describing the subject and aims of the dissertation. Students are admitted to candidacy for the Ph.D. upon completion of all predissertation requirements, including the prospectus. Admission to candidacy normally occurs by the end of the sixth term.

Teaching is considered to be an important component of the doctoral program in Italian. Students will be appointed as teaching fellows in the third and fourth years of study. Guidance in teaching is provided by the faculty of the department and specifically by the director of language instruction.

Combined Ph.D. Programs

ITALIAN AND FILM AND MEDIA STUDIES

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

ITALIAN AND RENAISSANCE STUDIES

The Department of Italian also offers, in conjunction with the Renaissance Studies Program, a combined Ph.D. in Italian and Renaissance Studies.

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 Degree Requirements under Policies and Regulations). Additionally, students in Italian are eligible to pursue a supplemental M.Phil. degree in Medieval Studies. 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 530a[U], Dante in Translation Christiana Purdy Moudarres
A critical reading of Dante's *Divine Comedy* and selections from the minor works, with an attempt to place Dante's work in the intellectual and social context of the late Middle Ages by relating literature to philosophical, theological, and political concerns. TTH 1–2:15, 1 HTBA

ITAL 601a/CPLT 670a/ENGL 548a, Ariosto and Cervantes David Quint
The year 2016 marks the 500th anniversary of the *Orlando furioso* and the 400th anniversary of the death of Cervantes. This course reads the *Orlando furioso,* Ariosto's *Cinque canti,* and *Don Quijote* as depictions of the crisis of chivalry, and it charts, in the case of *Don Quijote,* the birth of the modern novel. It examines the use in these works of mirroring episodes—*entrelacement*—and interpolated tales. It also looks at similar techniques in Apuleius's *The Golden Ass,* in the *Thousand and One Nights,* and in Sir Philip Sidney's *New Arcadia*. T 10:30–12:20

ITAL 654b[U], Medieval Visions of the Future Christiana Purdy Moudarres
With recent innovations in science and technology, contemporary visions of the future seem to range from wildly optimistic to altogether catastrophic. This course examines the history of this ambivalence through a study of premodern interest in the future—both earthly and otherworldly—from classical antiquity through the late Middle Ages. Topics include visions of the afterlife; the apocalyptic tradition; body-soul relations; intersections of science and religion; approaches to longevity and immortality; physical, psychological, and intellectual enhancement; theologies of history; political utopias. T 3:30–5:20

ITAL 691a/b, Directed Reading Christiana Purdy Moudarres

ITAL 710a[U], Magic, Marvel, and Monstrosity in the Italian Renaissance Walter Stephens
Literary masterpieces of the Italian Renaissance provide vivid illustrations of the early modern sense of wonder. Early modern ideas about the nature of reality were bound up with questions and issues very different from those of our time. With the exact sciences still being invented, the nature of the world was much less hard and fast for Renaissance people than for the modern educated person. Discussions of fifteenth- and sixteenth-century dialogues, theater, and philosophy early in the term prepare the way for a reading of Ariosto's *Orlando furioso* (1532) and Tasso's *Gerusalemme liberata* (1581). M 2:30–4:20

ITAL 772b[U], Humanists, Hedonists, Cooks, and "Food" Painters of the Italian Renaissance Luigi Ballerini
The Council of Constance, Poggio Bracciolini's discovery of Lucretius's *De rerum natura,* and the new translation of Aristotle's *Nicomachean Ethics* by Leonardo Aretino inaugurate a whole series of philosophical essays dedicated to the notion of pleasure and happiness: see, for instance, Lorenzo Valla's *De vero falsoque bono* and Platina's *De honesta voluptate*. The philosophy of Epicurus is revisited by Humanism, and the old Dantean profiling of the Greek thinker is quickly obliterated. The sin of gluttony is viewed in an entirely new light, and cooking is quickly elevated to the rank of art. Works by Leonardo, Tintoretto,

Rubens, and other painters clearly show the transition from the religious culture of food as symbol (see Giotto, Duccio di Boninsegna, etc.) to the lay culture of food as an opportunity for material and artistic creativity. A few Renaissance gastronomical texts (by Johann of Bockenheim, Maestro Martino, Cristoforo Messisbugo, Bartolomeo Scappi, etc.) are analyzed. In Italian. M 2:30–4:20

ITAL 780a[U], Il romanzo del Novecento Millicent Marcus
No literary form is better suited to gauging the convulsive changes wrought by Italy's entrance into modernity than the novel. Infinitely permeable to the forces of historical circumstance, the novel counters these external forces with its own version of the evolving Italian subject in all its personal richness and complexity. We study the evolution of this literary genre throughout the course of the twentieth century and, in the process, adopt a variety of approaches, including, but not limited to, semiotics, psychoanalysis, narratology, gender, ideological criticism, and "la questione della lingua." In Italian. W 3:30–5:20

ITAL 785b[U]/CPLT 930b/FILM 624b/JDST 843b, The Holocaust in Italian Literature and Film Millicent Marcus
Though Italy was among the Nazi-occupied countries with the highest survival rate of its Jewish population, the Holocaust has continued to haunt the Italian literary and cinematic imagination in ways that warrant close critical scrutiny. The aesthetic and moral problem of how to represent this event in art gains special urgency in the Italian context, where a realist tradition dating back to Dante and Giotto joins forces with a postwar neorealist impulse to create a series of compelling literary treatments (Primo Levi's above all), as well as cinematic works. In keeping with the Holocaust's invitation to interdisciplinary study, the course examines the intersection of a number of discourses—historical, literary, cinematic—viewed from a variety of perspectives—feminist, generic, philosophical, theological, and historiographic. Since several of the authors are women, the question of the "voce femminile" and its creation of an alternative, or anti-history, is also raised. W 3:30–5:20, screenings M 7:30

LAW

Sterling Law Building, 203.432.1696
www.law.yale.edu/phd
Ph.D.

Dean
Robert Post

Director of Graduate Studies
To be announced

Fields of Study

The three-year Ph.D. in Law program prepares students who have earned a J.D. to enter law teaching or other careers that require a scholarly mastery of law. The program is designed to give students a broad foundation in the canonical texts and methods of legal scholarship and to support students in producing their own scholarship in the form of a dissertation. The program strongly encourages, but does not require, interdisciplinary approaches to the study of law.

Admissions Requirements

All applicants must have a J.D. from an accredited United States law school at the time they matriculate and begin the Ph.D. in Law program. Applicants must have taken the LSAT (Law School Admission Test). For other admissions requirements, please see the Ph.D. in Law program's Web site, www.law.yale.edu/phd.

Special Requirements for the Ph.D. Degree

Each student will have a faculty advisory committee, which will help select appropriate courses. In their first year, students will take a mandatory two-term proseminar on the foundations of legal scholarship, legal theory, and methods and as many as four additional courses. Students may take other courses in the Law School or in other departments or schools at Yale University. Each student's advisory committee may waive up to four courses. The proseminar may not be waived and must be taken for a grade, not audited.

Each Ph.D. student will take two qualifying examinations. The first, administered before the start of the second term in the program, will be a written examination built upon a foundation laid by the materials studied in the proseminar. It will test the student's breadth of knowledge across the legal canon, including knowledge of canonical texts, methods, and principles. The second will be an oral examination administered by the student's advisory committee at the beginning of the second year and no later than October 15 of that year. The oral examination will test whether the student has a sufficiently deep knowledge of the scholarship, theories, and methodologies relevant to the student's area of study. Both qualifying examinations will be graded on a pass/fail basis. If the student fails a qualifying examination, he or she may retake it the following term.

After completion of the second qualifying examination, the student will assemble a faculty dissertation committee and prepare a dissertation prospectus. Upon approval of

the prospectus, usually by the end of the fourth term, the student will devote the remaining time in the program to writing a dissertation, which may take the form of a traditional monograph or three publishable scholarly articles. The final dissertation must be approved by both the student's dissertation committee and the Ph.D. Policy Committee.

Students in the Ph.D. in Law program are also expected to meet additional academic requirements in each year of the program, specified below and outlined in greater detail in the Ph.D. in Law Program Manual available from the Graduate Programs Office at Yale Law School. Students who fail to meet program requirements will not be in good standing and may be withdrawn from the program.

All required written work must be judged satisfactory by the student's advisory committee, in consultation with the assistant dean for graduate programs and the director of graduate studies (DGS). A satisfactory article or chapter is one that the student's advisory committee, the assistant dean, and DGS agree is appropriate and ready for professional presentation at an academic workshop, and one that offers the promise of meeting the standards expected by leading law reviews or academic presses.

First-year requirements include satisfactory performance in course work, including the proseminar; passing the first qualifying examination; and submission of a complete first dissertation article or chapter. Students also must submit an approved reading list for the second qualifying examination to the assistant dean and DGS no later than the final day of the spring exam period.

Second-year requirements include submission of the first dissertation article or chapter for publication no later than the first day of classes for the fall term of the second year and successful completion of the second qualifying examination by October 15 of that year. Second-year students shall complete a second satisfactory dissertation article or chapter by December 1 and complete their first required teaching experience by the end of their second year in the program. They shall submit their dissertation prospectus to the assistant dean and DGS by June 1 of the second year.

In the third year, students are required to complete and submit a draft of their third dissertation article or chapter by August 1, and to workshop their article or chapter at the Law School no later than September 20 in preparation for the academic job market. For those who plan to graduate in May of their third year, a final and complete dissertation must be submitted to the assistant dean, DGS, dissertation committee members, and the Graduate School registrar no later than March 15. Students must also satisfactorily complete their second teaching experience during their third year in the program. Both teaching experiences will be reviewed in person or via recorded media with the assistant dean and/or committee chair and DGS. Students who do not successfully complete all program requirements before the conclusion of their third year in the program may petition the Ph.D. Policy Committee to enroll in a seventh or eighth term on "Dissertation Completion" status.

Graduate Research Assistant and Teaching Fellow Experience

As part of their training, Ph.D. students must complete two terms of teaching experience. There are a number of ways in which students can fulfill this requirement, which may vary by year. They include: (1) serving as a teaching assistant for a Law School course; (2) serving as a teaching fellow for a course in Yale College or another school at Yale;

(3) co-teaching a course with a faculty member; and (4) in unusual situations, teaching their own course. In all cases, students engaged in teaching will have faculty supervision and feedback from their advisers.

Master's Degree

No master's degree is awarded en route to the Ph.D. in Law.

Program materials are available upon request to the Graduate Programs Office, Yale Law School, 127 Wall Street, New Haven CT 06511.

Courses

For Law School courses and their descriptions, see the Law School bulletin, online in both html and pdf versions at www.yale.edu/bulletin. For courses in other schools at Yale University, please see their respective bulletins. Specific course selections will be approved by the student's advisory committee and by the DGS.

LINGUISTICS

370 Temple Street, Rm. 204, 203.432.2450
http://ling.yale.edu
M.A., M.Phil., Ph.D.

Chair
Robert Frank

Director of Graduate Studies
Claire Bowern

Professors Stephen Anderson (*on leave* [F]), Robert Frank, Roberta Frank,* Laurence Horn (*Emeritus*), Frank Keil,* Zoltán Szabó,* Petronella Van Deusen-Scholl (*Adjunct; Center for Language Study*), Raffaella Zanuttini (*on leave* [Sp])

Associate Professors Claire Bowern, Maria Piñango, Kenneth Pugh (*Adjunct; Haskins Laboratory*)

Assistant Professors Ryan Bennett, Jason Shaw, Jim Wood

Lecturers Matthew Barros, Hadas Kotek, Kevin Tang

Supporting faculty in other departments J. Joseph Errington (*Anthropology; on leave* [Sp])

*A joint appointment with primary affiliation in another department.

Fields of Study

Fields include phonetics, phonology, morphology, syntax, semantics, pragmatics, neuro- and psycholinguistics, computational linguistics, historical linguistics, and descriptive study of a variety of languages.

Special Requirements for the Ph.D. Degree

PROGRAM VISION

Linguistics at Yale has a long and storied history in traditional approaches to the study of language. Today the department takes a distinctively integrative and interdisciplinary approach in investigating the systems of knowledge that comprise our linguistic competence. We are convinced that an understanding of the human language faculty will arise only through the mutually informing relationship between formally explicit theories and insights from wide-ranging descriptive and experimental work. Thus at Yale, theoretical inquiry grounded in introspection proceeds in partnership with historical and comparative studies, fieldwork, experimental investigations of normal and impaired language processing, cognitive neuroscience, laboratory phonetic analysis, and computational and mathematical modeling. Students in the Ph.D. program are exposed to these methodological approaches, while receiving firm grounding in the traditional domains of linguistics. Ph.D. students participate in research in phonetics, phonology, morphology, syntax, semantics, pragmatics, and historical linguistics, and explore data from a wide

variety of languages, both well studied and less well documented, with particular faculty expertise in the Romance, Australian, and Mayan languages.

COURSE WORK

The conception of linguistics embraced by the Yale Ph.D. program requires that students receive training that is both deep in its coverage of areas of linguistic inquiry and broad in the range of methodological approaches. The course work requirements are designed to accomplish these complementary goals. This course work must include a set of core courses, designed to expose students to core theoretical ideas, together with courses exposing students to a range of methodologies in linguistic research.

During their first six terms, students must complete a minimum of fourteen term courses at the graduate level, of which seven must be completed during the first two terms, and twelve during the first four terms. During the initial two years of course work, students must receive at least three grades of H (= Honors). Two grades of F, or three of P or F, during the initial two-year period constitute grounds for dismissal from the Ph.D. program.

Core courses The core requirement ensures that students achieve expertise at the level of the following courses: LING 612, Linguistic Change; LING 620, General Phonetics; LING 635, Phonological Theory; LING 654, Syntax II; LING 663, Semantics; LING 680, Morphology.

The usual way to demonstrate this expertise will be to take all of these courses. Because several of these courses have prerequisites, students will typically need to take more basic courses in order to prepare themselves for the courses listed here. For example, LING 632, Introduction to Phonological Analysis, serves as a prerequisite for LING 635; and LING 653, Syntax I, is a prerequisite for LING 654; entering students usually take both of these prerequisite courses in the first term. However, students entering the Ph.D. program with sufficient background will be able to place out of antecedent courses. To facilitate placement, reading lists covering the material in the following basic courses will be provided, and students may request to take placement exams in areas in which their previous preparation is such that they could proceed directly to more advanced course work: LING 512, Historical Linguistics; LING 620, General Phonetics; LING 632, Introduction to Phonological Analysis; LING 653, Syntax I; LING 663, Semantics.

By August 1, entering students may send a request to the DGS for a placement exam in any of these five areas. The exams will be given during the week prior to the fall term. Passing an exam allows the student to place out of the corresponding course. Students placing out of courses are nonetheless expected to complete the same requirement of a minimum of fourteen term courses in the first three years.

Methodology courses For the methodology requirement, students must take three relevant courses. The following courses, which are offered regularly by the department, qualify, but other courses may as well, to be determined in consultation with the adviser and DGS: LING 600, Experimentation in Linguistics; LING 624, Formal Foundations of Linguistic Theories; LING 627, Language and Computation; LING 630, Techniques in Neurolinguistics; LING 631, Neurolinguistics; LING 641, Field Methods.

One of the methodology courses must be taken during the first year of the program, and two must be completed by the end of the second year.

Seminar courses Starting in year three and continuing until the prospectus is approved, students are expected to enroll in one seminar course for credit each term. Students should use such seminars as opportunities both for exploring new research areas and, especially, for pushing current research interests in novel directions.

RESEARCH

The primary focus of a Ph.D. program is independent research. In the course of our Ph.D. program, students will learn to carry out cutting-edge linguistic research, culminating in the completion of a dissertation. To help students in the transition from "consuming" to also "producing" linguistic research, there are a number of structures and requirements in place.

1. *Research adviser and first-year directed readings*. By the end of the first term of the program, students will need to find a department faculty member who is willing to serve as their research adviser. This choice should be made on the basis of compatibility of research interests and discussions between the student and faculty member. Starting from the spring term of the first year, the student will, with the help of his or her adviser, define a topic of research interest, meeting regularly (minimally once every three weeks) and carrying out a series of readings on this topic. Students are required to keep a research journal, describing their readings and how they fit in with work in the area, and chronicling the development of their thinking about the research topic. It is the faculty's expectation that this exploration will form the foundation for the research reported in the student's first qualifying paper (on which see below). Note however that the initial choice of research adviser is not set in stone: students who want to change their choice of topic or adviser for whatever reason may do so, so long as they are able to find a faculty member who is willing to serve as their adviser on a new topic. It is the student's responsibility to find a suitable adviser, and students are expected to have a faculty adviser at all times during their enrollment in the program.
2. *Portfolio*. At the conclusion of the first year of the program, students must submit to the faculty a portfolio of two research papers, in two distinct subfields. These papers should demonstrate a student's mastery of the material in these fields to the level covered in the core courses in the area, as well as the ability to identify a significant research question and argue for a possible solution. In short, such papers should be at the level of an excellent term paper, representative of a student's best work during the first year of course work. The faculty do not expect students to write papers expressly for the portfolio. Rather, the portfolio will typically consist of versions of term papers from classes taken during the first year in the program, which are then lightly revised on the basis of comments received from the course instructors. The deadline for the submission of these papers is June 15.
3. *Annotated bibliography/research plan*. On the basis of the research journal begun during the first year in the program, students will prepare an annotated bibliography and research plan (ABRP) for their first qualifying paper. The ABRP, which should be approximately twenty pages in length, should lay out the question that the student

wants to explore, motivating its importance through a presentation and synthesis of relevant past literature on the topic. The deadline for submission of the ABRP is the beginning of the third week of the fall term.

4. *Qualifying papers*. Once the ABRP has been completed, the student will proceed to work on his or her qualifying papers (QPs). The goal of the QPs is to develop a student's ability to conduct independent research in linguistics at the level of current scholarship in two different areas of linguistics. The faculty expect a QP to report on the results of a substantial project, which are written up in a manner consistent with the standards of the field. Because the transition from student to scholar can be a difficult one, we have broken the process of writing the first QP into a number of smaller steps with specific deadlines for each (all during the second year of the program): (a) Students are required to make a presentation of their preliminary results in an appropriate venue (lab meeting, reading group, seminar, etc.) by no later than the end of the fall term. (b) Also by the end of the fall term, the student will send a request for a QP reader to the DGS. This request must include a title and abstract of the project, and may also request specific faculty members to be involved. On the basis of research area and faculty availability, the DGS will identify a faculty member other than the adviser to serve as a QP reader. This reader will be involved in the ultimate evaluation of the QP once it is completed. Because it is useful to get a range of feedback on one's work, we encourage students to make the best use of their QP reader by meeting with them and keeping them up to date on the progress of the project. (c) Students must submit a first draft of their QP to their adviser and reader no later than February 1. (d) The student must make an oral presentation of his or her work. This oral presentation may take place in the department (typically at a Friday Lunch Talk). Alternatively, the oral presentation requirement may be satisfied via a presentation at a professional conference, provided at least one member of the department faculty is in attendance. (e) Once the QP has been orally presented, students must submit the final version of the paper to their adviser and reader no later than three weeks from the date of presentation.

   Toward the end of the spring term of the second year, the student should begin to explore possible areas and advisers for the second QP, and must have identified an area and adviser by the beginning of the fall term of the third year. Students must follow the same steps and deadlines listed above for the second QP, this time during the third year.

5. *Prospectus*. No later than the beginning of the seventh term, students must choose a dissertation topic and find a faculty member who is willing to serve as dissertation adviser. By the end of the seventh term, students will present a dissertation prospectus to the entire faculty. The prospectus should lay out clearly the student's proposed dissertation topic. It should motivate the importance of the topic, present the core idea of the proposed work together with its promise and viability, and demonstrate how this work fits into past research in the area. The prospectus should also identify a dissertation committee. The committee must include at least three faculty members (including the adviser), two of whom must be members of the Linguistics department. The prospectus document should be fifteen to twenty pages in length. After the document is submitted, the prospectus must be defended orally in front of

the faculty. Upon successful completion of the prospectus defense, students advance to Ph.D. candidacy.

6. *Dissertation*. By the end of the eighth term, students must complete a chapter of the dissertation, together with a detailed outline of the dissertation and comprehensive bibliography. At this point (and at one-term intervals thereafter until the completion of the dissertation), the student will meet with the entire dissertation committee, to evaluate progress toward the dissertation. When this committee approves the chapter and dissertation outline, students are eligible for a University Dissertation Fellowship, which will support them in their fifth year of graduate study.

   Students are expected to complete their dissertations by the end of the fifth year. At least one month prior to the dissertation filing date, the completed dissertation must be orally defended. This defense will typically involve a public presentation of the main results of the dissertation and oral examination by the members of the dissertation committee. Committee members must be given the completed dissertation no less than two weeks prior to the date of the defense.

FEEDBACK AND EVALUATION

At the conclusion of each academic year, all Ph.D. students will receive a written evaluation of their performance in the program, highlighting their strengths and accomplishments, as well as mentioning areas for improvement. Because of the fundamental role played by research in the Ph.D. program, we expect the completion of the research requirements to take highest priority. It is particularly important that students make satisfactory progress toward the first QP and complete all work by the deadlines given above. Failure to do so may result in being asked to leave the program.

LANGUAGE REQUIREMENT

Students are expected to exhibit some breadth in their knowledge of the languages of the world beyond those most commonly studied (including but not confined to Romance, Germanic, and Slavic languages) and those most similar in structure to the student's first language. LING 641, Field Methods, fulfills this requirement; alternatively, with the permission of the DGS, the student may instead take an appropriate language structure class, or one or more classes characterized as L3 or higher at Yale or the equivalent elsewhere. This requirement must be completed before the prospectus defense, when the student advances to Ph.D. candidacy.

TEACHING FELLOW/RESEARCH ASSISTANT REQUIREMENTS

The faculty regard teaching experience as an integral part of the graduate training program in Linguistics. All students are required to serve as Teaching Fellows for a minimum of two terms, usually beginning in the first term of the third year. In addition, students must complete two additional terms of assistantship. These may be either as a Teaching Fellow, or through participation in externally supported, supervised research as a Research Fellow. Research assistantships may be provided by the Linguistics faculty and by various Yale and Yale-affiliated units. Before accepting a research assistantship in fulfillment of this requirement, students must receive approval from the DGS. To be approved, a research assistantship must meet the following criteria:

1. It must be supervised by a Linguistics department faculty member or a faculty member from an affiliated unit, such as Haskins Laboratories or the Yale School of Medicine.
2. It must provide research experience that complements the student's academic plan of study.
3. It must provide at least ten hours of experience per week.

If an approved research assistantship is accepted that does not provide a stipend equal to the standard departmental stipend, a University Fellowship will be provided to augment the stipend so as to bring it up to the departmental standard.

Master's Degrees

M.Phil. Students in the doctoral program who complete all requirements for the Ph.D. apart from the submission of a completed dissertation (but including the presentation and successful defense of a dissertation prospectus) may petition for the M.Phil. degree.

M.A. (en route to the Ph.D.) Students in the doctoral program who successfully complete the course work, examinations, and work samples required by the end of the second year of graduate study (see above) may petition for the M.A. degree.

Program materials are available online at http://ling.yale.edu.

Courses

LING 500a/ENGL 500a, Introduction to Old English Language and Literature
Roberta Frank
The essentials of the language, some prose readings, and close study of several celebrated Old English poems. TTH 9–10:15

LING 501b/ENGL 501b, *Beowulf* and the Northern Heroic Tradition Roberta Frank
A close reading of the poem *Beowulf,* with some attention to shorter heroic poems. W 9:25–11:15

[LING 502a, Advanced Old English]

LING 510a[U], Introduction to Linguistics Jim Wood
The goals and methods of linguistics. Basic concepts in phonology, morphology, syntax, and semantics. Techniques of linguistic analysis and construction of linguistic models. Trends in modern linguistics. The relations of linguistics to psychology, logic, and other disciplines.

LING 512a[U], Historical Linguistics Claire Bowern
Introduction to language change and language history. Types of change that a language undergoes over time: sound change, analogy, syntactic and semantic change, borrowing. Techniques for recovering earlier linguistic stages: philology, internal reconstruction, the comparative method. The role of language contact in language change. Evidence from language in prehistory.

LING 515a[U]/SKRT 510a[U], Introductory Sanskrit I David Brick
An introduction to Sanskrit language and grammar. Focus on learning to read and translate basic Sanskrit sentences in the Indian Devanagari script. No prior background in Sanskrit assumed. Credit only on completion of LING 525b/SKRT 520b. MTWTHF 9:25–10:15

[LING 517a[U], Language and Mind]

LING 525b[U]/SKRT 520b[U], Introductory Sanskrit II David Brick
Continuation of LING 515a/SKRT 510a. Focus on the basics of Sanskrit grammar; readings from classical Sanskrit texts written in the Indian Devanagari script. Prerequisite: LING 515a/SKRT 510a. MTWTHF 9:25–10:15

LING 538a[U]/SKRT 530a[U], Intermediate Sanskrit I David Brick
The first half of a two-term sequence aimed at helping students develop the skills necessary to read texts written in Sanskrit. Readings include selections from the *Hitopadesa, Kathasaritsagara, Mahabharata,* and *Bhagavadgita*. Prerequisite: LING 525b or equivalent. MTWTHF 10:30–11:20

[LING 540b[U]/PSYC 506b, Computational Models in Cognitive Science]

LING 548b[U]/SKRT 540b[U], Intermediate Sanskrit II David Brick
Continuation of LING 538a, focusing on Sanskrit literature from the *kavya* genre. Readings include selections from the *Jatakamala* of Aryasura and the opening verses of Kalidasa's *Kumarasambhava*. Prerequisite: LING 538a or equivalent. MTWTHF 10:30–11:20

LING 564a, Principles of Language Teaching and Learning
Petronella Van Deusen-Scholl
Introduction to the basic principles of second-language acquisition theory, focusing on current perspectives from applied linguistics, sociolinguistics, and psycholinguistics. Topics include language teaching methodology, communicative and task-based approaches, learner variables, intercultural competence, and models of assessment. W 3:30–5:20

[LING 600b[U], Experimentation in Linguistics]

[LING 611b, Grammatical Diversity in U.S. English]

LING 612b, Linguistic Change Claire Bowern
Principles governing linguistic change in phonology and morphology. Status and independence of proposed mechanisms of change. Relations between the principles of historical change and universals of language. Systematic change as the basis of linguistic comparison; assessment of other attempts at establishing linguistic relatedness. Prerequisites: LING 512, 632, and 653.

LING 619a[U], The Evolution of Language and Culture Claire Bowern
Introduction to cultural and linguistic evolution. How diversity evolves; how innovations proceed through a community; who within a community drives change; how changes can be "undone" to reconstruct the past. Methods originally developed for studying evolutionary biology are applied to language and culture.

LING 620b[U], General Phonetics Jason Shaw
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 624a[U], Formal Foundations of Linguistic Theories Robert Frank
Study of formal systems that play an important role in the scientific study of language. Exploration of a range of mathematical structures and techniques; demonstrations of their application in theories of grammatical competence and performance including set theory, graphs and discrete structures, algebras, formal language, and automata theory. Evaluation of strengths and weaknesses of existing formal theories of linguistic knowledge.

LING 625a[U], Computing Meanings Robert Frank
Introduction to mathematical and computational tools for assigning meanings to natural language sentences. Foundational skills for the development of formal models of human language syntax and semantics, and for practical applications of language technology such as text understanding and question-answering. Topics include syntactic structure and displacement, quantification and inference, and the dynamics of discourse. Prerequisite: LING 653 or permission of the instructor.

LING 627b[U], Language and Computation I Jason Shaw
Design and analysis of computational models of language. Topics include finite state tools, computational morphology and phonology, grammar and parsing, lexical semantics, and the use of linguistic models in applied problems. Prerequisite: prior programming experience or permission of the instructor.

[**LING 629a[U], Language and Computation II**]

[**LING 630b[U], Techniques in Neurolinguistics**]

LING 631b[U], Neurolinguistics Maria Piñango
The study of language as a cognitive neuroscience. The interaction between linguistic theory and neurological evidence from brain damage, degenerative diseases (e.g., Alzheimer's disease), mental illness (e.g., schizophrenia), neuroimaging, and neurophysiology. The connection of language as a neurocognitive system to other systems such as memory and music.

LING 632a[U], Introduction to Phonological Analysis Ryan Bennett
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. Prerequisite: LING 510 or 620.

LING 633b[U], The Literate Brain and Mind Kenneth Pugh
The neurobiological and cognitive foundations of reading and writing. Emerging research on gene-brain-behavior analyses of typically and atypically developing readers. The relationship between speech perception/production and individual differences in literacy learning; distributed brain circuits that support word reading, text comprehension, and second-language learning; the neurobiology of acquired and developmental reading and writing disorders.

LING 634a[U], Quantitative Linguistics using Corpora Kevin Tang
Introduction to the basics of corpus linguistics. Students learn to compile and process corpora and conduct statistical tests to better understand linguistic patterns and are provided with the background and tools necessary to pursue further research in this area. Digital humanities students from other departments are welcome. Prerequisite: one entry-level linguistics course (e.g., phonetics, phonology, syntax, and psycholinguistics) or permission of the instructor.

LING 635b[U], Phonological Theory Ryan Bennett
Topics in the architecture of a theory of sound structure. Motivations for replacing a system of ordered rules with a system of ranked constraints. Optimality theory: universals, violability, constraint types, and their interactions. Interaction of phonology and morphology, as well as relationship of phonological theory to language acquisition and learnability. Opacity, lexical phonology, and serial versions of optimality theory. Prerequisite: LING 632 or permission of the instructor.

[**LING 636b[U], Articulatory Phonology**]

LING 641a[U], Field Methods Ryan Bennett
Principles of phonetics, phonology, morphology, syntax, and semantics applied to the collection and interpretation of novel linguistic data. Data are collected and analyzed by the class as a group, working directly with a speaker of a relatively undocumented language.

[**LING 642b[U], Topics in Phonology: Probability**]

[**LING 647b[U], The Indigenous Languages of Australia**]

[**LING 648b[U], Indo-Aryan Languages**]

LING 653a[U], Syntax I Raffaella Zanuttini
An introduction to the syntax (sentence structure) of natural language. Introduction to generative syntactic theory and key theoretical concepts. Syntactic description and argumentation. Topics include phrase structure, transformations, and the role of the lexicon. MW 11:35–12:50

LING 654b[U], Syntax II Jim Wood
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. Prerequisite: LING 653. MW 11:35–12:50

[**LING 655b[U], Subjects**]

[**LING 656a[U], Grammatical Relations**]

[**LING 657a[U], Classic Readings in Syntax**]

[**LING 660a[U], Topics in Syntax: The Mental Lexicon**]

[**LING 661a[U], Current Trends in Syntax**]

LING 663a[U], Semantics I Hadas Kotek
Introduction to truth-conditional compositional semantics. Set theory, first- and higher-order logic, and the lambda calculus as they relate to the study of natural language meaning. Some attention to analyzing the meanings of tense/aspect markers, adverbs, and modals.

LING 664b[U], Semantics II Hadas Kotek
The model-theoretic approach to semantics and its treatment of core linguistic phenomena. Topics include quantification, tense/aspect/modality, context and interpretation, and the semantics-pragmatics interface. Prerequisite: LING 663 or permission of the instructor.

[**LING 666a[U], Cognitive Foundations of Meaning Change**]

LING 671b/PHIL 742b, Philosophy of Language Zoltán Szabó, Timothy Williamson
The course focuses on the relationship between philosophy and linguistics. It is aimed at graduate students in both departments who are interested in exploring the different ways questions are approached in the two fields and in developing the skills for cooperative research. We start with three foundational debates of the twentieth century: Quine vs. Carnap on ontological commitment, Russell vs. Strawson on reference, and Ayer vs. Geach on expressivism. The remainder of the class is divided into two parts: the philosophy of semantics and the philosophy of pragmatics. The first part covers the topics of reference and quantification, tense and modality, intentionality, and compositionality. The second deals with context and content, force and mood, implicature, and common ground. The core of the course is a manuscript written jointly with Rich Thomason, which will be supplemented with classic papers in the philosophy of language. W 1:30–3:20

[**LING 675b[U], Pragmatics**]

LING 680b[U], Morphology Jim Wood
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). Prerequisites: LING 632 and 653, or permission of the instructor.

[**LING 710b, Predication**]

[**LING 720b, Origins of Sound Structure**]

[**LING 721a[U], Topics in Phonetics: Prosody**]

LING 722b[U], Topics in Phonology: Prosody in Phonetics and Phonology
Ryan Bennett
Exploration of the phonetics and phonology of prosodic phenomena, in particular word-level prosody and phrase-level prosody. Phonetics topics include segmental and suprasegmental cues to prosodic structure, as well the phonetics of tone, phonation, and stress. Phonology topics include case studies of prosodic patterning in individual languages. Particular emphasis on typologically unusual prosodic systems, such as "hybrid" tone-stress systems and rich tonal systems. Prerequisites: LING 620 and LING 635, or

permission of the instructor. The LING 635 prerequisite may be satisfied by enrolling in LING 635 concurrently with this course.

LING 734a[U], Experimental Semantics Maria Piñango
The structure of meaning as part of the human cognitive system. How language use, which is serial and local in nature, is able to package meaning, which is multidimensional and atemporal. Psycholinguistic and cognitive modeling of core phenomena in lexical and compositional semantics. Readings from the fields of neurocognition and cognitive psychology, model-theoretic and lexico-conceptual semantics, and pragmatics. Prerequisite: 510, 517, 660, 663, or permission of the instructor.

[**LING 741b, Topics in Phonology: Prosody at the Interfaces**]

[**LING 749b[U], Topics in Phonology: The Phonetics-Phonology Interface**]

[**LING 755b[U], Doubling in Syntax**]

[**LING 756b[U], The Syntax of Space**]

[**LING 760a, Compositional Syntax**]

[**LING 761a[U], Topics in Syntax: The Mental Lexicon**]

[**LING 762a[U], Imperatives and Politeness**]

[**LING 763a[U], Computational Models of Syntax**]

[**LING 765b[U], Semantic Change**]

LING 768b[U], Information Structure and the Syntax-Phonology Interface
Matthew Barros
This course introduces students to the literature on the syntax-phonology interface, that is, the mapping between sentence structure and phonetic/phonological/gestural properties of the speech signal in which such structures are encoded in natural language. Students become familiar with different theoretical analyses of the interface and are provided with the background and tools necessary to pursue research in this area. Prerequisite: LING 653.

[**LING 772b, Meaning, Concepts, and Words**]

LING 776b[U]/PHIL 690b[U], Implicature and Pragmatic Theory Laurence Horn
Theoretical and experimental approaches to conversational and conventional implicature. Pragmatic intrusion into what is said; constraints on truth-conditional content in neo-Gricean pragmatics and relevance theory. Arguments for and against the grammatical view of scalar implicature. Evidence from studies on the acquisition and processing of implicature and presupposition. Prerequisite: one course in semantics or pragmatics, or permission of the instructor.

[**LING 777b, Case and Voice**]

[**LING 790a[U], Research Methods**]

LING 810a or b, Directed Research in Linguistics
By arrangement with faculty.

LING 812a or b, Directed Research in Historical Linguistics
By arrangement with faculty.

LING 820a or b, Directed Research in Computational Linguistics
By arrangement with faculty.

LING 830a or b, Directed Research in Neurolinguistics
By arrangement with faculty.

LING 840a or b, Directed Research in Phonetics
By arrangement with faculty.

LING 841a or b, Directed Research in Phonology
By arrangement with faculty.

LING 850a or b, Directed Research in Language Description
By arrangement with faculty.

LING 860a or b, Directed Research in Syntax
By arrangement with faculty.

LING 861a or b, Directed Research in Grammar
By arrangement with faculty.

LING 880a or b, Directed Research in Morphology
By arrangement with faculty.

LING 890a or b, Directed Research in Semantics
By arrangement with faculty.

MANAGEMENT

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Professors Rick Antle, Nicholas Barberis, James Baron, Paul Bracken, Zhiwu Chen, Judith Chevalier, James Choi, Ravi Dhar, Jonathan Feinstein, Shane Frederick, William Goetzmann, Gary Gorton, Jonathan Ingersoll, Edward Kaplan, James Levinsohn, Andrew Metrick, A. Mushfiq Mobarak, Barry Nalebuff, Nathan Novemsky, Sharon Oster, Edieal Pinker, Benjamin Polak, Douglas Rae, K. Geert Rouwenhorst, Peter Schott, Fiona Scott-Morton, Subrata Sen, Robert Shiller, Jiwoong Shin, Edward Snyder, Olav Sorenson, Matthew Spiegel, K. Sudhir, Shyam Sunder, Arthur Swersey, Jacob Thomas, Heather Tookes, Amy Wrzesniewski, Gal Zauberman, X. Frank Zhang

Associate Professors Victoria Brescoll, Daylian Cain, Arthur Campbell, Rodrigo Canales, Lisa Kahn, Sang-Hyun Kim, Marissa King, Donald Lee, Justin Murfin

Participating Faculty from the School of Management Jason Abaluck, Saed Alizamir, Lorenzo Caliendo, Zoë Chance, Jason Dana, Joyee Deb, Florian Ederer, Constanca Esteves-Sorenson, Stanley Garstka, Jeffrey Garten, Roger Ibbotson, Ivana Katic, Ahmed Khwaja, Thomas Kolditz, Kalin Kolev, Balázs Kovács, Michael Kraus, Vineet Kumar, Alina Lerman, Vahideh Manshadi, Alan Moreira, Tyler Muir, George Newman, Marina Niessner, Amandine Ody-Brasier, Taly Reich, Jeffrey Sonnenfeld, Thomas Steffen, Kosuke Uetake, Victor Vroom, Kevin Williams

Fields of Study

Current fields include accounting, financial economics, marketing (behavioral), marketing (quantitative), operations, and organizations and management.

Special Admissions Requirements

The GRE General Test or the GMAT 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).

Core Requirements for the Ph.D. Degree

All students are required to take the Ph.D. Student Research Workshop (MGMT 780) and each individual program's seminar and workshop series in every term throughout their years in residence. These are not counted as part of the required number of courses specified below for each of the individual programs. All of the programs are full-time, requiring that all students be in residence at Yale during the academic year as well as the

summer months. Teaching is considered to be an important part of the doctoral program in Management. Students are expected to serve as teaching fellows in one term of their residence. Additional requirements in each program of study are listed below.

Special Requirements in Accounting

The specialization in Accounting prepares students to become accounting scholars engaged in research and teaching at the highest levels in the general areas of financial information and contracting within and across organizations. It is designed to develop strong theoretical and empirical skills. There is heavy emphasis on students' original research, which is supported through courses, presentations, feedback, joint work, and informal interactions with the faculty and fellow students in accounting and other disciplines.

The general structure of the program is as follows. During the first four terms of study, students take a minimum of twelve courses in addition to attending conference and seminar presentations and other academic activities. Courses are selected in consultation with the faculty advisers and the director of graduate studies (DGS). The summer months at the end of years one and two are devoted to completing original research papers (due by September 1 and October 1, respectively). After four terms in the program (typically by mid-June), students take a faculty-written three-day qualifying exam aimed at assessing their intellectual readiness to start dissertation research. They remain in residence for five years while they receive a stipend. During this period each student is assigned to a member of the faculty as a research assistant. Students also have the option of accepting teaching assistantships. To register for their seventh term of study, students submit an approved dissertation prospectus. Students are expected to complete their dissertations by the end of the sixth year but may petition for a seventh year of study if academically necessary.

Special Requirements in Financial Economics

The specialization in Financial Economics prepares students to launch a career in academic finance. Students should seek out faculty with whom they may wish to work early in the process to ensure a smooth transition from one stage of the program to the next.

Students are required to take twelve courses. In the first year of study, students are expected to take Financial Economics I (MGMT 740), Financial Economics II (MGMT 741), General Economic Theory: Microeconomics (ECON 500), General Economic Theory: Microeconomics II (ECON 501), Econometrics I (ECON 550), and Econometrics II (ECON 551). Some students with limited math or economics backgrounds may be advised to postpone taking some of these courses until their second year of study. In addition, students are expected to take the Ph.D.-level courses offered by the Finance faculty. Availability and topics vary by year. Students must receive a grade of Honors in at least one full-year or two term-long graduate courses. Furthermore, students must have no more than one grade of Pass in these courses. To be admitted to candidacy, a student must pass both Financial Economics I and II as well as the topic courses offered in the year the student takes the qualifying exam.

Research papers Students are expected to write original research papers during the summers between their first and second years of study. Both papers must be solo authored. The topic of the first-year paper requires written approval from the student's faculty adviser; the deadline to submit that approval to the DGS is May 15. The paper itself is due to the director of the program by the second Monday in August. The second-year paper proposal must be approved by May 15 by a member of the Finance faculty who has agreed to supervise the project. The paper itself is due to the student's adviser by the second Monday in August.

Students whose papers receive a failing grade may be dismissed from the program.

Qualifying exam The two-part qualifying exam covers the Ph.D.-level Finance courses taken in the first two years of study. Unless given a waiver by the director of the Finance Ph.D. program, students must take the relevant section of the qualifying exam before the last business day before June 15 of their first and second years of study. A student who fails either section of the exam may retake it once, by the final business day before August 1. A student who fails either section of the exam a second time will be dismissed from the program.

Dissertation Students must write a dissertation prospectus and assemble a dissertation committee in order to register for a sixth term of study. The committee must have at least three members, at least two of whom must be from the Finance faculty unless a waiver is given by the program director. If a student cannot form a committee prior to the start of his or her sixth term of study, the student will be withdrawn from the program.

Prior to submission of the dissertation, students must pass a public defense. Before a public defense can be scheduled all three members of the committee must agree that the student and the dissertation itself are ready. All members of the faculty are invited to a dissertation defense. After the defense, the faculty in attendance will meet to discuss the dissertation. The faculty may pass or fail the student. In addition, they may grant a conditional pass when they believe there are only minor problems with the dissertation and delegate the final decision regarding corrections of those problems to the committee.

Special Requirements in Marketing (Behavioral)

Students are required to take fourteen Ph.D.-level courses in their first two years of study: one microeconomics course (ECON 545); two empirical methods courses (e.g., PSYC 518, STAT 660); five depth courses (MGMT 750, 753, 754, 758; PSYC 543 or 601, or NBIO 597/INP 597); and six electives (from MGMT 703; PSYC 509, 607, 610, 621, 749; STAT 530). Students may take other courses as electives if the faculty adviser permits. Students are expected to obtain at least two Honors grades and a High Pass average in the remaining twelve courses.

Research papers Students are expected to write original research papers during the summers between their first and second years of study. Either paper may be coauthored with others students or faculty. Students select a faculty adviser for each paper and work with him or her during the summer to develop the paper. The first paper must be presented in the Ph.D. Student Research Workshop during the fall term of the student's second year of study. The second paper must be presented in the Ph.D. Student Research Workshop in the student's third year of study.

Qualifying exam Students must successfully complete the qualifying exam in Marketing at the end of their second year of study. The exam is administered no later than June 15. A student who fails to successfully complete the exam may retake it once; retakes are generally scheduled during August of the year in which the student first took the exam. A second failure results in dismissal from the program.

Dissertation The dissertation typically consists of three essays which are completed in the student's third through fifth years of study. Prior to starting work on the dissertation, the student must write a dissertation prospectus and finalize his or her dissertation committee, consisting of the principal adviser and three other faculty members. The prospectus must be completed and accepted by the dissertation committee by the end of the student's third year of study.

Prior to submission of the dissertation to the Graduate School, the student must defend it before his or her committee, other faculty members, and interested doctoral students. The faculty could accept the dissertation as is, require minor changes, or reject the dissertation and ask the student to redo one or more essays.

Special Requirements in Marketing (Quantitative)

Students are required to take fourteen Ph.D.-level courses in their first two years of study: two microeconomics courses (ECON 500 and 501); two empirical methods courses (ECON 550 and 551); four depth courses (MGMT 750, 755; MGMT 753, 754, or 758); and six electives (from ECON 520, 521, 527, 530, 531, 552, 553, 554, 555, 557, 600, 601; MGT 611; MGMT 703; STAT 551, 665). Students may take some other courses as electives if the faculty adviser permits. Students are expected to obtain at least two Honors grades and a High Pass average in the remaining twelve courses.

If a student has requested and received a waiver for any of the above courses, the total number of required courses drops by the number of waivers received.

Research papers Students are expected to write original research papers during the summers between their first and second years of study. Either paper may be coauthored with other students or faculty. Students select a faculty adviser for each paper and work with him or her during the summer to develop the paper. The first paper must be presented in the Ph.D. Student Research Workshop during the fall term of the student's second year of study. The second paper must be presented in the Ph.D. Student Research Workshop in the student's third year of study.

Qualifying exam Students must successfully complete the qualifying exam in Marketing at the end of their second year of study. The exam is administered no later than June 15. A student who fails to successfully complete the exam may retake it once; retakes are generally scheduled during August of the year in which the student first took the exam. A second failure results in dismissal from the program.

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Prior to submission of the dissertation to the Graduate School, the student must defend it before his or her committee, other faculty members, and interested doctoral students. The faculty could accept the dissertation as is, require minor changes, or reject the dissertation and ask the student to redo one or more essays.

Special Requirements in Operations

Students are required to take at least twelve courses: two core courses (ECON 500 and ENAS 649), typically completed in the first year of study; five methods courses (ECON 501; ENAS 530; STAT 541, 542, 551); two operations modeling courses (MGMT 720, 721), completed in the second year of study; and at least three elective courses scheduled in consultation with the student's course adviser. Under unusual circumstances and with the approval of both the adviser and the DGS, students may fulfill some of the methods course requirements with alternative offerings.

Research paper During the summer after the first year of study, each student works with an Operations faculty member on an ongoing research project. By September 30 the student must write a paper and prepare a presentation on the project for the Operations group internal seminar. Continuation in the program is contingent upon faculty approval of the paper.

General exam The general exam has two components, an exam based upon the course work of the first two years, and a research paper. The course-work exam is scheduled by faculty sometime after the last day of spring-term, second-year exams and prior to June 1. Students then spend the summer writing an original research paper on a topic chosen from a list provided by the Operations faculty (or, with the approval of the faculty, on a topic of the student's own choosing); the paper must be submitted by September 30. Faculty will evaluate the student's continued enrollment in the program based upon the course-work exam and the research paper. Students who do not pass the exam will be offered a chance for remediation prior to the end of the fall term of their third year of study.

Dissertation Prior to the start of the seventh term of study, the student must submit a proposal for his or her dissertation as an application to doctoral candidacy. Based upon this proposal and the student's previous performance, the faculty will decide whether to admit the student to candidacy.

Special Requirements in Organizations and Management

Upon admission, each student is assigned a faculty adviser who helps the student design an individualized program that prepares the student to do research in his or her area of interest. All students must complete twelve courses: two methods courses (PLSC 503 and 504; or ECON 550 and 551; or, students who believe they will primarily do experimental research may take PLSC 503 and a methods course in psychology such as PSYC 518); five depth courses (MGMT 731, 733, 734, 736; PSYC 629); two social science courses in psychology or sociology (e.g., PSYC 505, 509, 557, 621; SOCY 511, 625); one breadth course outside the student's area of study, chosen in consultation with the student's adviser; and at least two additional electives chosen in consultation with the adviser.

Beginning in their third year, students are also expected to present in the Organizations and Management Workshop once per year.

Research papers and qualifying exam During the summer after the first year of study, each student collaborates on a research paper with a faculty member. An initial draft of the paper should be completed by September 30, and the completed paper should be approved by two faculty members and submitted by 5 p.m. of the last day of classes of the fall term. Students will present these coauthored papers in the Ph.D. Student Research Workshop in the fall of the second year.

During the summer after the second year of study, each student works on a research paper under the guidance of a faculty member. An initial draft of the paper should be submitted by 5 p.m. of the last business day in October of the student's third year of study. Students will present these papers in the Ph.D. Student Research Workshop in their third year of study. The second summer paper is considered the qualifying exam and will be vetted by both the Organizations and Management faculty and the DGS.

Dissertation Once students have completed their course work, first-year paper, and qualifying exam, they may apply for admission to candidacy. As part of this application, students must submit a proposal for their planned dissertation and form a four-person dissertation committee to advise this research. Admission to candidacy depends on approval of the proposed plan of study and a comprehensive review of the student's performance by the faculty; completion of the requirements listed above does not guarantee admission. Students must be admitted to candidacy prior to their 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 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 627a/PLSC 717a, Business and Government after Communism Ian Shapiro, Michael Graetz

Reassessment of business's place in society—and its relations with government—in an era when alternatives to capitalism are moribund. Topics include the role of business in regime change, corruption and attempts to combat it, business and the provision of low-income housing and social services, and privatization of such core functions of government as prisons, the military, and local public services.

MGMT 700a/MGT 910a, Seminar in Accounting Research I Rick Antle, Shyam Sunder
Study of analytical modeling techniques in accounting research that covers topics such as performance measurement for incentives, the consequences of asymmetric information in economic relationships and the role of accounting therein, information sharing within and across firms, and the pricing of related-party transactions.

MGMT 702b, Seminar in Accounting Research III Alina Lerman
Study of empirical accounting research that covers topics such as valuation, pricing of accounting information, earnings management, reporting issues, accounting regulation, analyst forecasts, and auditing.

MGMT 703a, Experimental Economics Shyam Sunder
This term-long seminar introduces participants to experimental methods in economics research and conducts a survey of experimental results. Depending on the interests of the participants, we cover topics from auctions, asset markets, game theory, monetary theory, public goods, corporate finance, market microstructure, institutional economics, and so on. Participants are expected to design and conduct their own experiment, make class presentations, and write a term paper. Enrollment limited. Prerequisite: permission of the instructor.

MGMT 720a, Models of Operations Research and Management Vahideh Manshadi

MGMT 721b, Modeling Operational Processes Edward Kaplan, Edieal Pinker

[**MGMT 731, Organizations and Management II: Organizations and the Environment**]

MGMT 733, Theory Construction Rodrigo Canales
Researchers in organizational behavior generally build their models in words (rather than with math). This course focuses on how to build an internally consistent argument, and how to critique the logic of others' arguments.

MGMT 734, Designing Social Research
This course, taught every other year, reviews a number of topics critical to empirical research in the social sciences: data sources, the reliability and validity of measures, experimental and quasi-experimental design, etc.

MGMT 735b, Research Methods Balázs Kovács
This course is an introduction to the methods of the social sciences, focusing on issues raised by management research. The term "research methods" embraces all stages of the research process from how to identify and formulate interesting research problems to the design of appropriate research methods to investigate the chosen problem. This course is not intended to make students experts in research design or in any particular research method. Rather, it is a "sample platter" designed to acquaint them with the various approaches available. The course presumes that students will move on to more specialized and advanced methods courses as they develop clarity on the research questions that interest them and the methodologies appropriate to those questions and their field of study.

MGMT 736b, Organizations and Management I: Inside Organizations
James Baron, Amy Wrzesniewski
This course, taught every other year, reviews economic, psychological, and sociological perspectives on the internal behavior of organizations. Sessions are generally organized around phenomena and jointly taught by two instructors from different perspectives.

MGMT 740a/ECON 670a, Financial Economics I Jonathan Ingersoll
Current issues in theoretical financial economics are addressed through the study of current papers. Focuses on the development of the problem-solving skills essential for research in this area.

MGMT 741b/ECON 671b, Financial Economics II Alan Moreira
Continuation of MGMT 740a/ECON 670a.

MGMT 742a, Corporate Finance and Market Microstructure Matthew Spiegel
The course covers recent journal articles in the area of corporate finance, market microstructure, and asset pricing. Topics from corporate finance include optimal debt levels, bankruptcy, security design, initial public offerings, and mergers and acquisitions. The half of the course on market microstructure and asset pricing 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, and issues relating to delegated portfolio management.

MGMT 745b/ECON 672b, Behavioral Finance Nicholas Barberis
Much of modern financial economics works with models in which agents are rational, in that they maximize expected utility and use Bayes's law to update their beliefs. Behavioral finance is a large and active field that studies models in which some agents are less than fully rational. Such models have two building blocks: limits to arbitrage, which make it difficult for rational traders to undo the dislocations caused by less rational traders; and psychology, which catalogues the kinds of deviations from full rationality we might expect to see. We discuss these two topics and then consider a number of applications: asset pricing (the aggregate stock market and the cross-section of average returns); individual trading behavior; and corporate finance (security issuance, corporate investment, and mergers).

MGMT 746b/ECON 674b, Financial Crises Gary Gorton, Andrew Metrick
An elective doctoral course covering theoretical and empirical research on financial crises. The first half of the course focuses on general models of financial crises and historical episodes from the nineteenth and twentieth centuries. The second half of the course focuses on the recent financial crisis. Prerequisites: MGMT 740a and 741b and permission of the instructor.

MGMT 747b, Empirical Asset Pricing Tyler Muir
The class introduces the student to frontier research and methods in empirical asset pricing. It focuses on understanding the literature, surveying the current facts, and getting used to working with financial market data. Students go through empirical techniques, with an emphasis on how to use them in practice. This is not a theoretical econometrics course, though students should be familiar with running regressions and with basic

time-series econometrics. The goal at the end of the class is for students to understand the frontier research in the field and what the main facts are. Topics include cross-sectional patterns in returns such as value and momentum, stock and bond return predictability, testing asset pricing models, the link between asset prices and the real economy, and the effect of the financial sector, market frictions, and financial crises on asset prices.

MGMT 748a, Empirical Corporate Finance Marina Niessner

MGMT 750b, Seminar in Marketing II Jiwoong Shin
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 751b, Seminar in Marketing I Jiwoong Shin

MGMT 752a and b, Marketing Workshop Kosuke Uetake
A series of presentations of their latest research by top marketing scholars from the United States and abroad.

MGMT 753a/PSYC 553a, Behavioral Decision Making I: Choice Nathan Novemsky, Ravi Dhar
The seminar examines research on the psychology of decision making, focusing on judgment. Although the normative issue of how decisions should be made is relevant, the descriptive issue of how decisions are made is the main focus of the course. Topics of discussion include judgment heuristics and biases, confidence and calibration, issues of well-being including predictions and experiences, regret and counterfactuals. 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. Students generally enroll from a variety of disciplines including cognitive and social psychology, behavioral economics, finance, marketing, political science, medicine, and public health.

[**MGMT 754a/PSYC 554a, Behavioral Decision Making II: Judgment**]

MGMT 755b, Analytical Methods in Marketing Jiwoong Shin
This course provides exposure to the major streams of research regarding analytical methods in marketing strategy. The primary goal is to prepare students to read, appreciate, and critique the literature on analytical marketing models. The course is designed to provide a broad introduction to topics and industries that current researchers are studying as well as to expose students to a wide variety of techniques. Prerequisite: familiarity with microeconomic theory, basic game theory, and some econometrics.

MGMT 757b, Designing and Conducting Experimental Research Gal Zauberman

MGMT 758b, Foundations of Behavioral Economics Shane Frederick
The course explores foundational topics in behavioral economics and discusses the dominant prescriptive models (which propose what decision makers should do) and descriptive models (which aim to describe what decision makers actually do). The course

incorporates perspectives from economics, psychology, philosophy, decision theory, and finance, and engages long-standing debates about rational choice.

MGMT 780a and b, Ph.D. Student Research Workshop Subrata Sen

MGMT 781-01a and b, Accounting/Finance Workshop

MGMT 781-03a and b, Marketing Workshop

MGMT 781-04a and b, Organizations and Management Workshop

MGMT 781-05a and b, Operations Workshop

MGMT 782-01a and b, Accounting Doctoral Student Pre-Workshop Seminar

MGMT 782-02a and b, Financial Economics Doctoral Student Pre-Workshop Seminar

MGMT 782-03a and b, Marketing Doctoral Student Pre-Workshop Seminar Kosuke Uetake

MGMT 782-04a and b, Organizations and Management Doctoral Student Pre-Workshop Seminar

MGMT 782-05a and b, Operations Doctoral Student Pre-Workshop Seminar

MGMT 791a or b, Independent Reading and Research
By arrangement with individual faculty.

MGMT 792a or b, Predissertation Research
By arrangement with individual faculty.

MATHEMATICS

10 Hillhouse Avenue, 203.432.4172
http://math.yale.edu
M.S., M.Phil., Ph.D.

Chair
Igor Frenkel

Director of Graduate Studies
Hee Oh

Professors Andrew Casson, Ronald Coifman, Igor Frenkel, Alexander Goncharov, Peter Jones, Gil Kalai (*Adjunct*), Alexander Lubotzky (*Adjunct*), Gregory Margulis, Yair Minsky, Vincent Moncrief (*Physics*), Hee Oh, David Pollard (*Statistics*), Nicholas Read (*Physics; Applied Physics*), Vladimir Rokhlin (*Computer Science*), Daniel Spielman (*Computer Science*), Van Vu, Gregg Zuckerman

Associate Professor Sam Payne

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; geometric analysis; kleinian groups, low dimensional topology and geometry; differential geometry; finite and infinite groups; geometric group theory; finite and infinite dimensional Lie algebras, Lie groups, and discrete subgroups; higher Teichmüller theory and cluster varieties; representation theory; automorphic forms, L-functions; algebraic number theory and algebraic geometry; derived algebraic geometry, and periods and motives; tropical algebraic geometry; tomography and integral geometry; mathematical physics, quantum field theory, relativity, 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) pass qualifying examinations on their general 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 five years. Requirement (1) should be completed by the end of the second 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)–(5) and obtaining an adviser.

In addition to all other requirements, students must successfully complete MATH 991a, Ethical Conduct of Research, prior to the end of their first year of study. This requirement must be met prior to registering for a second year of study.

Honors Requirement

Students must meet the Graduate School's Honors requirement by the end of the fourth term of full-time study.

Teaching

Teaching experience is integral to graduate education at Yale. Therefore, most Mathematics students are required to assist in teaching during five terms, although those with external fellowships may petition for a one-term waiver of teaching. Students in years one and two serve as tutors and graders in undergraduate mathematics courses during one term per year. In years three through five, students normally teach a section of calculus or its equivalent during one term per year. The department offers a required teaching practicum in year two.

Master's Degrees

M.Phil. In addition to the Graduate School's Degree Requirements (see under Policies and Regulations), 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, perform adequately on the general qualifying examination, and be in residence at least one year. The M.S. degree is conferred only en route to the Ph.D.; there is no separate master's program in Mathematics.

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 I

MATH 501b[U], Modern Algebra II Gregg Zuckerman

MATH 515b[U], Intermediate Complex Analysis Alexander Goncharov

MATH 520a[U], Measure Theory and Integration Ilya Gekhtman

MATH 525b[U], Introduction to Functional Analysis Yair Minsky

MATH 533a[U], Introduction to Representation Theory Shamgar Gurevich

MATH 544a, Introduction to Algebraic Topology I Steven Frankel

MATH 545b, Algebraic Topology II Steven Frankel

[**MATH 573a^{U}, Algebraic Number Theory**]

MATH 702a/AMTH 702a, Numerical Solution of Ordinary and Partial Differential Equations Vladimir Rokhlin

This course includes (1) review of the classical qualitative theory of ODEs; (2) Cauchy problem: elementary numerical methods, stiff systems of ODEs, Richardson extrapolation and deferred corrections; (3) boundary value problems: elementary theory; (4) introduction to PDES: counterexamples, Cauchy-Kowalevski theorem, classification of second-order PDEs, separation of variables; (5) numerical methods for elliptic PDEs; (6) numerical methods for parabolic PDEs; and (7) numerical methods for hyperbolic PDEs. Prerequisites: advanced calculus; knowledge of FORTRAN or C.

MATH 845a^{U}, Introduction to Algebraic Geometry Alexander Goncharov

MATH 991a/CPSC 991a, Ethical Conduct of Research Vladimir Rokhlin

MECHANICAL ENGINEERING & MATERIALS SCIENCE

Dunham Laboratory, 203.432.4252
M.S., M.Phil., Ph.D.

Chair
Udo Schwarz

Director of Graduate Studies
Jan Schroers (jan.schroers@yale.edu)

Professors Charles Ahn, Ira Bernstein (*Emeritus*), Juan Fernández de la Mora, Alessandro Gomez, Sohrab Ismail-Beigi, Shun-Ichiro Karato, Marshall Long, Brian Scassellati, Jan Schroers, Udo Schwarz, Mitchell Smooke

Associate Professors Aaron Dollar, Corey O'Hern

Assistant Professors Eric Brown, Judy Cha, Madhusudhan Venkadesan

Lecturers Beth Anne Bennett, Kailasnath Purushothaman, Joseph Zinter

Fields of Study

Fluids and thermal sciences Dynamics and stability of drops and bubbles; dynamics of thin liquid films; macroscopic and particle-scale dynamics of emulsions, foams, and colloidal suspensions; electrospray theory and characterization; electrical propulsion applications; combustion and flames; computational methods for fluid dynamics and reacting flows; turbulence; particle tracking in fluid mechanics; laser diagnostics of reacting and nonreacting flows; and magnetohydrodynamics.

Soft matter/complex fluids Jamming and slow dynamics in gels, glasses, and granular materials; mechanical properties of soft and biological materials; and structure and dynamics of macromolecules. Several faculty in Mechanical Engineering are also affiliated with the Integrated Graduate Program in Physical and Engineering Biology (http://peb.yale.edu).

Materials science Studies of thin films; nanoscale effects on electronic properties of two-dimensional layered materials; amorphous metals and nanomaterials including nanocomposites, characterization of crystallization and other phase transformations; nanoimprinting; atomic-scale investigations of surface interactions and properties; classical and quantum nanomechanics; nanotribology; nanostructured energy applications; combinatorial materials science; and in situ transmission electron and scanning probe microscopy.

Robotics/mechatronics Machine and mechanism design; dynamics and control; robotic grasping and manipulation; human-machine interface; rehabilitation robotics; haptics; electromechanical energy conversion; biomechanics of human movement; and human-powered vehicles.

For admissions and degree requirements, and for course listings, see Engineering & Applied Science.

MEDIEVAL STUDIES

53 Wall Street, Rm. 310, 203.432.0672
http://medieval.yale.edu
M.A., M.Phil., Ph.D.

Chair and Director of Graduate Studies
R. Howard Bloch

Executive Committee R. Howard Bloch, Jessica Brantley, Ardis Butterfield, Stephen Davis, Roberta Frank, Paul Freedman, Dimitri Gutas (*on leave* [Sp]), Ivan Marcus, Giuseppe Mazzotta (*on leave*), Alastair Minnis (*on leave* [Sp]), Robert Nelson (*on leave* [F]), Anders Winroth

Faculty associated with the program R. Howard Bloch, Gerhard Böwering, Jessica Brantley, Ardis Butterfield, Walter Cahn (*Emeritus*), Marcia Colish (*Emerita*), Stephen Davis, Roberta Frank, Paul Freedman, Creighton Gilbert (*Emeritus*), Walter Goffart (*Emeritus*), Harvey Goldblatt, Frank Griffel, Dimitri Gutas (*on leave* [Sp]), Valerie Hansen (*on leave* [F]), Peter Hawkins, Jacqueline Jung, Traugott Lawler (*Emeritus*), Ivan Marcus, Vasileios Marinis, Giuseppe Mazzotta (*on leave*), Mary Miller, Alastair Minnis (*on leave* [Sp]), Robert Nelson (*on leave* [F]), Henry Parkes, Fred Robinson (*Emeritus*), Barbara Shailor, Denys Turner (*Emeritus*), Anders Winroth, Mimi Hall Yiengpruksawan, Anna Zayaruznaya (*on leave*)

Lecturers Adel Allouche, Raymond Clemens

Fields of Study

Fields in this interdisciplinary program include history, history of art, history of music, religious studies, languages and literatures, linguistics, and philosophy.

Special Admissions Requirements

The General Test of the GRE is required. A writing sample of ten to twenty pages should be included with the application.

Special Requirements for the Ph.D. Degree

Languages required are Latin, French, and German. Latin may be replaced with Arabic, Greek, or Hebrew when appropriate. Proficiency in Latin, Arabic, Greek, and Hebrew is tested with an examination administered and evaluated by the program during the first term. Proficiency in French and German is demonstrated by passing the departmental examinations and should be achieved by the third term. Students will design their programs in close contact with the director of graduate studies (DGS). 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 DGS. Then, having nurtured a topic of particular interest, the student submits a dissertation prospectus that must be approved by the end of the third year. Upon completion of all predissertation

requirements, including the prospectus, students are admitted to candidacy for the Ph.D. degree. What remains, then, is the writing, submission, and approval of the dissertation during the final two years.

Students in Medieval Studies participate in the Teaching Fellows Program in the third and fourth years.

Master's Degrees

M.Phil. See Degree Requirements under Policies and Regulations. In addition to its own Ph.D. degree, 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) eight courses in the medieval area, six of which must be from departments other than that in which the student is enrolled (two of these will normally be the Medieval Studies interdisciplinary seminar and a course in either research methodology or paleography); (2) proficiency in Latin, Arabic, Greek, or Hebrew as tested by an examination administered and evaluated by the department; and (3) an oral examination. The M.Phil. in Medieval Studies requires an additional year of course work in addition to the requirements of 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 three terms of course work. Minimum requirements include a High Pass average in courses and passing the examination in Latin, Arabic, Greek, or Hebrew.

Terminal Master's Degree Program For the terminal master's degree, students must take at least eight term courses with a general average of High Pass and with at least one term course of Honors. Two languages are required: Latin, Arabic, Greek, or Hebrew, and either French or German. No thesis is required.

Courses

MDVL 550a or b, Directed Reading
By arrangement with faculty.

MDVL 563b/CLSS 602b[U], Advanced Latin Paleography Barbara Shailor
The challenges of using hand-produced Latin manuscripts in research, with an emphasis on texts from the late Middle Ages. Gothic cursive scripts and book hands ca. 1200–ca. 1500; fragments of unidentified codices; complex or composite codices with heavy interlinear and marginal annotations. Manuscripts and fragments selected largely from collections in the Beinecke Library. Prerequisite: CLSS 601a or permission of the instructor. M 3:30–5:20

MDVL 565b/HIST 800b/HSAR 746b, Circa 1000 Valerie Hansen, Mary Miller, Anders Winroth
The world in the year 1000, when the different regions of the world participated in complex networks. Archaeological excavations reveal that the Vikings reached L'Anse aux Meadows, Canada, at roughly the same time that the Kitan people defeated China's Song

dynasty and established a powerful empire stretching across the grasslands of Eurasia. Viking chieftains donned Chinese silks while Chinese princesses treasured Baltic amber among their jewelry. In what is now the American Southwest, the people of Chaco Canyon feasted on tropical chocolate, while the lords of Chichen Itza wore New Mexican turquoise—yet never knew the Huari lords of the central Andes. In this seminar, students read interpretative texts based on archaeology and primary sources, prepare projects in teams, work with material culture, and develop skills of cross-cultural analysis. Mandatory field trip to the Metropolitan Museum of Art in New York on Saturday, January 21. M 3:30–5:20

MDVL 571a/CLSS 601a[U], Introduction to Latin Paleography Raymond Clemens
Latin paleography from the fourth century C.E. to ca. 1500. Topics include the history and development of national hands; the introduction and evolution of Caroline minuscule, pre-gothic, gothic, and humanist scripts (both cursive and book hands); the production, circulation, and transmission of texts (primarily Latin, with reference to Greek and Middle English); advances in the technical analysis and digital manipulation of manuscripts. Seminars are based on the examination of codices and fragments in the Beinecke Library; students select a manuscript for class presentation and final paper. M 3:30–5:20

MDVL 599a/HIST 533a, The Twelfth Century Paul Freedman
The growth of European institutions and intellectual life in the twelfth century. Particular emphasis on Anglo-American historiography of the period beginning with Charles Homer Haskins's 1927 study, *The Renaissance of the Twelfth Century.* TH 1:30–3:20

MICROBIOLOGY

Boyer Center for Molecular Medicine 354F, 203.737.1087
http://medicine.yale.edu/micropath
M.S., M.Phil., Ph.D.

Director of Graduate Studies
Walther Mothes

Student Services Officer/Registrar
Corey Brushett

Professors Serap Aksoy (*Epidemiology*), Susan Baserga (*Molecular Biophysics & Biochemistry; Genetics; Therapeutic Radiology*), Ronald Breaker (*Molecular, Cellular & Developmental Biology; Molecular Biophysics & Biochemistry*), Richard Bucala (*Internal Medicine; Epidemiology; Pathology*), Michael Cappello (*Pediatrics; Epidemiology; Microbial Pathogenesis*), Yung-Chi Cheng (*Pharmacology*), Peter Cresswell (*Immunobiology; Cell Biology*), Daniel DiMaio (*Genetics; Molecular Biophysics & Biochemistry; Therapeutic Radiology*), Erol Fikrig (*Internal Medicine*), Durland Fish (*Emeritus, Microbial Diseases; Forestry & Environmental Studies*), Richard Flavell (*Immunobiology*), Jorge Galán (*Microbial Pathogenesis; Cell Biology*), Eduardo Groisman (*Microbial Pathogenesis*), Jo Handelsman (*Molecular, Cellular & Developmental Biology*), Akiko Iwasaki (*Immunobiology; Molecular, Cellular & Developmental Biology*), Christine Jacobs-Wagner (*Molecular, Cellular & Developmental Biology*), Susan Kaech (*Immunobiology*), Albert Ko (*Epidemiology; Internal Medicine*), K. Brooks Low (*Therapeutic Radiology*), Diane McMahon-Pratt (*Microbial Diseases*), Ruslan Medzhitov (*Immunobiology*), I. George Miller (*Pediatrics; Epidemiology; Molecular Biophysics & Biochemistry*), Walther Mothes (*Microbial Pathogenesis*), John Rose (*Pathology*), Craig Roy (*Microbial Pathogenesis; Immunobiology*), Nancy Ruddle (*Emerita, Epidemiology*), Clifford Slayman (*Cellular & Molecular Physiology*), Dieter Söll (*Molecular Biophysics & Biochemistry; Chemistry*), William Summers (*Therapeutic Radiology; History of Science & Medicine; Molecular Biophysics & Biochemistry*), Joann Sweasy (*Therapeutic Radiology; Genetics*), Peter Tattersall (*Laboratory Medicine; Genetics*), Christian Tschudi (*Epidemiology*), Paul Turner (*Ecology & Evolutionary Biology*), Sandra Wolin (*Cell Biology; Molecular Biophysics & Biochemistry*)

Associate Professors Choukri Ben Mamoun (*Internal Medicine; Microbial Pathogenesis*), Andrew Goodman (*Microbial Pathogenesis*), Barbara Kazmierczak (*Internal Medicine; Microbial Pathogenesis*), Priti Kumar (*Internal Medicine/Infectious Diseases*), Brett Lindenbach (*Microbial Pathogenesis*), John MacMicking (*Microbial Pathogenesis*), Melinda Pettigrew (*Epidemiology*), Carla Rothlin (*Immunobiology*), Christian Schlieker (*Molecular Biophysics & Biochemistry; Cell Biology*), Richard Sutton (*Internal Medicine*), Jeffrey Townsend (*Public Health; Ecology & Evolutionary Biology*), Yong Xiong (*Molecular Biophysics & Biochemistry*)

Assistant Professors Murat Acar (*Molecular, Cellular & Developmental Biology; Physics*), Jason Crawford (*Chemistry; Microbial Pathogenesis*), Farren Isaacs (*Molecular, Cellular & Developmental Biology*), Martin Kriegel (*Immunobiology; Internal Medicine*), Noah Palm (*Immunobiology*)

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 (BBS), http://bbs.yale.edu. An undergraduate major in biology, biophysics, biochemistry, microbiology, or molecular biology is recommended; the GRE General Test or MCAT is required.

Special Requirements for the Ph.D. Degree

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, and genetics. Students must take a minimum of four courses, three of which have to be in microbiology. Students must receive a grade of Honors in two full-term courses. All students participate in three laboratory rotations (MBIO 670, 671, and 672), with different faculty members, in their area of interest. Laboratory rotations ensure 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 levels. 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.

In addition to all other requirements, students must successfully complete IBIO 601b, Fundamentals of Research: Responsible Conduct of Research, prior to the end of their first year of study. This requirement must be met prior to registering for a second year of study. In their fourth year of study, all students must successfully complete B&BS 503b, RCR Refresher for Senior BBS Students.

Master's Degree

M.Phil. The M.Phil. degree can be awarded to Ph.D. students who have been admitted to candidacy. See Degree Requirements under Policies and Regulations.

M.S. This degree may only be granted to students who are withdrawing from the Ph.D. program prior to advancing to candidacy. To be eligible for this degree, a student must have completed at least four graduate-level term courses at Yale, chosen from a number of main courses including, but not limited to: MBIO 685a, MBIO 685b, MBIO 530a, MBIO 734a, MBIO 680a, and CBIO 602a. Two of these four courses must be related to microbiology. Students must have received at least one Honors or two High Pass grades. In addition, students must have received a Satisfactory grade in the following eight courses: IBIO 601b, MBIO 701a,b, MBIO 702a,b, MBIO 670, MBIO 671, and MBIO 672.

Courses

MBIO 530a/IBIO 530a/MCDB 530a[U], Biology of the Immune System Carla Rothlin, Peter Cresswell, Vishwa Dixit, Akiko Iwasaki, Susan Kaech, Martin Kriegel, Ruslan Medzhitov, Eric Meffre, Noah Palm, Joao Pereira, Craig Roy, David Schatz
The development of the immune system. Cellular and molecular mechanisms of immune recognition. Effector responses against pathogens. Immunologic memory and vaccines. Human diseases including allergy, autoimmunity, cancer, immunodeficiency, HIV/AIDS. MWF 9:25–10:15

MBIO 670, 671, 672, Laboratory Rotations Walther Mothes
Rotation in three laboratories. Required of all first-year graduate students.

MBIO 680a/EMD 680a, Advanced Topics in Tropical Parasitic Diseases Diane McMahon-Pratt, Christian Tschudi
An introductory topic-based course in modern parasitology. For each topic there is an introductory lecture followed by a journal club-like discussion session of relevant papers selected from the literature. The course provides an introduction to basic biological concepts of parasitic eukaryotes causing diseases in humans. Topics include strategies used by parasitic eukaryotes to establish infections in the host and approaches to disease control, through either chemotherapy, vaccines, or genomics. In addition, emphasis is placed on evaluating the quality and limitation of scientific publications and developing skills in scientific communication. Prerequisite: permission of the instructor. MW 10:45–12

MBIO 685a,b, Molecular Mechanisms of Microbial Pathogenesis Andrew Goodman
This interdisciplinary course focuses on current topics related to host-pathogen interactions. Each week a lecture is given on the topic, followed by student presentations of seminal papers in the field. All participants are required to present a paper. TTH 10–11:30

MBIO 686a, Bacterial Determinants of Pathogenesis Eduardo Groisman
The course provides an introduction to basic principles in bacterial pathogenesis. Topics focus on the bacterial determinants mediating infection and pathogenesis, as well as strategies to prevent and treat diseases. 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. TTH 10–11:30

MBIO 701, Research in Progress Walther Mothes
All students, beginning in their third year, are required to present their research once a year at the Graduate Student Research in Progress. These presentations are intended to give each student practice in presenting his or her own work before a sympathetic but critical audience and to familiarize the faculty with the research. M 2

MBIO 702, Microbiology Seminar Series Walther Mothes
All students are required to attend all Microbiology seminars scheduled throughout the academic year. Microbiologists from around the world are invited to describe their research. TH 4

MBIO 734a/GENE 734a/MB&B 734a, Molecular Biology of Animal Viruses
Brett Lindenbach
Lecture course with emphasis on mechanisms of viral replication, oncogenic transformation, and virus-host cell interactions. MW 10–11:30

MOLECULAR BIOPHYSICS AND BIOCHEMISTRY

336 Bass Center, 203.432.5662
http://medicine.yale.edu/mbb
M.S., M.Phil., Ph.D.

Chair
Mark Hochstrasser

Director of Graduate Studies
Yong Xiong (336 Bass, 203.432.5662, nessie.stewart@yale.edu)

Professors Karen Anderson (*Pharmacology*), Susan Baserga, Ronald Breaker (*Molecular, Cellular & Developmental Biology; on leave* [Sp]), Gary Brudvig (*Chemistry*), Sandy Chang (*Laboratory Medicine*), Enrique De La Cruz, Daniel DiMaio (*Genetics; Therapeutic Radiology*), Donald Engelman, Alan Garen, Mark Gerstein, Nigel Grindley (*Emeritus*), Mark Hochstrasser, Jonathon Howard, Anthony Koleske, William Konigsberg, Peter Lengyel (*Emeritus*), J. Patrick Loria (*Chemistry*), I. George Miller (*Pediatric Infectious Diseases; Public Health*), Andrew Miranker, Peter Moore (*Emeritus, Chemistry*), Karla Neugebauer, Thomas Pollard (*Molecular, Cellular & Developmental Biology; on leave* [F]), Lynne Regan, Karin Reinisch (*Cell Biology*), David Schatz (*Immunobiology*), Robert Shulman (*Emeritus*), Fred Sigworth (*Cellular & Molecular Physiology; Biomedical Engineering*), Dieter Söll, Mark Solomon, Joan Steitz, Thomas Steitz, Scott Strobel, William Summers (*Therapeutic Radiology*), Patrick Sung, Kenneth Williams (*Adjunct; Research*), Sandra Wolin (*Cell Biology*)

Associate Professors Titus Boggon (*Pharmacology*), Michael Koelle, Christian Schlieker, Corey Wilson (*Chemical & Environmental Engineering*), Yong Xiong

Assistant Professors Richard Baxter (*Chemistry*), Julien Berro, Erdem Karatekin (*Cellular & Molecular Physiology*), Nikhil Malvankar, Matthew Simon, Charles Sindelar, Sarah Slavoff (*Chemistry*), Seyedtaghi Takyar (*Internal Medicine/Pulmonary*)

Fields of Study

The principal objective of members of the department is to understand living systems at the molecular level. Laboratories in MB&B focus on a diverse collection of problems in biology. Some specialize in the study of DNA dynamics, including replication, recombination, transposition, and/or functional genomics. Others focus on transcriptional regulation, from individual transcription factors to the control of lymphocyte activation, the interferon response, and organismal development. Other groups study RNA catalysis, RNA-protein interactions, and ribonucleoproteins including spliceosomes and the ribosome. Additionally there are those that emphasize protein folding and design, transmembrane signaling, and control of the cell cycle. Structural and computational biology is a strong component of many of these research efforts.

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 strongly 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 Biological and Biomedical Sciences (BBS), http://bbs.yale.edu.

Integrated Graduate Program in Physical and Engineering Biology (PEB)

Students applying to one of four tracks of the Biological and Biomedical Sciences program may simultaneously apply to be part of the PEB program. See the description under Non-Degree-Granting Programs, Councils, and Research Institutes for course requirements, and http://peb.yale.edu for more information about the benefits of this program and application instructions.

Special Requirements for the Ph.D. Degree

All first-year students (except M.D./Ph.D.) perform three laboratory rotations (MB&B 650, 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 required to take two courses in molecular biophysics (one of which must be MB&B 720a), one course in critical thinking (MB&B 730a), and one course in molecular biology (MB&B 743 is recommended but not required). The second credit in molecular biophysics and the molecular biology credit may be satisfied by taking appropriate courses from an approved list available each fall. 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 also attend MB&B 676b, Responsible Conduct of Research. In their fourth year of study, all students must successfully complete B&BS 503b, RCR Refresher for Senior BBS Students. 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 assist in teaching two terms at the TF-10 level during their graduate careers, usually during the second and third years. The student selects a research adviser by the end of the second term of residence. At that time two additional faculty members are chosen to form a research committee, with the total committee including at least two members of MB&B. Students are required to meet with this committee in the spring of years two and three, and in both the fall and spring of subsequent years. The qualifying examination, usually taken in the fall of the second year, is an oral defense of a research proposal consisting of (1) thesis aims and (2) extended goals on the same topic. The extended goals should include approaches beyond those in the thesis aims, typically beyond those generally employed by the host lab. Thus, a predominantly molecular

biological set of thesis aims should be accompanied by biophysical approaches in the extended goals section, and vice versa. The three-member oral examination committee usually includes at least one of the two members of the research committee excluding the thesis adviser. Requirements for admission to candidacy, which usually takes place after four terms of residence, include (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. Completion of the teaching requirement is not required for admission to candidacy. Once final drafts of the thesis chapters have been approved by the research committee, the student presents a dissertation seminar to the entire department, and only afterward 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 Degree Requirements under Policies and Regulations. Students must also maintain an overall High Pass average. Student progress toward these goals is reviewed at the ends of the first and second terms.

M.D./Ph.D. Students

M.D./Ph.D. students must satisfy the requirements listed above for the Ph.D. with the following modifications: Laboratory rotations are not required but are available. Assisting in teaching of one lecture course is required. Students are required to take MB&B 800a as part of their medical curriculum in addition to the two courses in molecular biophysics described above. Students with weak backgrounds in molecular biology will need to take MB&B 743b.

Master's Degree

M.Phil. See Degree Requirements under Policies and Regulations. Awarded only to students admitted to candidacy who are continuing for the Ph.D. Students need not have completed their teaching requirement to receive the M.Phil. Students are not admitted for this degree.

M.S. Students are not admitted for this degree. It may only be awarded to a student in the Ph.D. program who is in good standing upon completion of at least two terms of graduate study and who will not continue in the Ph.D. program. A student must receive grades of Pass or higher in at least five courses approved by the DGS as counting toward a graduate degree, exclusive of seminars or research. Students must have taken at least ten courses. A typical schedule would consist of six traditional courses, two terms of MB&B 650, and one term each of MB&B 675a and 676b. A student must also meet the Graduate School's Honors requirement for the Ph.D. program and maintain a High Pass average. Students who are eligible for or who have already received the M.Phil. will not be awarded the M.S.

More detailed program materials are available upon request to the Director of Graduate Admissions, Department of Molecular Biophysics and Biochemistry, Yale University, PO Box 208114, New Haven CT 06520-8114.

Courses

MB&B 500a[U]/MCDB 500a[U], Biochemistry Nicole Clay, Donald Engelman
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.

MB&B 517b3/ENAS 517b/MCDB 517b3/PHYS 517b3, Methods and Logic in Interdisciplinary Research Lynne Regan, Julien Berro, Enrique De La Cruz, Thierry Emonet, Paul Forscher, Jonathon Howard, Megan King, Simon Mochrie, Corey O'Hern, Thomas Pollard, Yongli Zhang, and staff
This half-term PEB class is intended to introduce students to integrated approaches to research. Each week, the first of two sessions is student-led, while the second session is led by faculty with complementary expertise and discusses papers that use different approaches to the same topic (for example, physical and biological or experiment and theory). Counts as 0.5 credit toward MB&B graduate course requirements. MW 5–7

MB&B 520a1, Boot Camp Biology Lynne Regan and staff
An intensive introduction to biological nomenclature, systems, processes, and techniques for graduate students with previous backgrounds in non-biological fields including physics, engineering, and computer science who wish to perform graduate research in the biological sciences. Counts as 0.5 credit toward MB&B graduate course requirements.

MB&B 523a/CB&B 523a/ENAS 541a/PHYS 523a, Biological Physics Corey O'Hern
An introduction to the physics of several important biological phenomena including transport in the cell cytoplasm, protein folding, DNA packaging, and thermodynamics of protein binding and aggregation. The material and approach are positioned at the interface of the physical and biological sciences, and involve significant computation. This course teaches the basics of computer programming necessary for quantitative studies of biological systems. We start with the foundations of programming in MATLAB. During the course, students perform sophisticated data analyses, view and analyze protein structures, and perform Monte Carlo and molecular dynamics simulations. No prior programming experience is needed. TTH 1–2:15

MB&B 545b[U], Methods and Logic in Molecular Biology Mark Hochstrasser, Jonathon Howard, Dieter Söll
An examination of fundamental concepts in molecular biology through analysis of landmark papers. Development of skills in reading the primary scientific literature and in critical thinking. Open only to MB&B students pursuing the B.S./M.S. degree. TH 7–8:50

MB&B 561a/MCDB 561a[U]/PHYS 561a, Introduction to Dynamical Systems in Biology Thierry Emonet, Jonathon Howard
Biological systems make sophisticated decisions at many levels. This course explores the molecular and computational underpinnings of how these decisions are made, with a focus on modeling static and dynamic processes in example biological systems. We

emphasize analytical and numerical models to explore the relationship between molecular mechanisms and behavior. Topics include molecular switches, regulatory networks, feedback, and signal transduction. The course contains significant instruction in MATLAB, while students also read papers from the primary literature. The course aims to turn ball-and-arrow diagrams into quantitative models with testable predictions. Prerequisite: PHYS 170 or equivalent, or permission of the instructor. TTH 2:30–3:45

MB&B 562b[U]/AMTH 765b/CB&B 562b/ENAS 561b/INP 562b/MCDB 562b[U]/PHYS 562b, Dynamical Systems in Biology Damon Clark, Jonathon Howard
This course covers advanced topics in computational biology. How do cells compute, how do they count and tell time, how do they oscillate and generate spatial patterns? Topics include time-dependent dynamics in regulatory, signal-transduction, and neuronal networks; fluctuations, growth, and form; mechanics of cell shape and motion; spatially heterogeneous processes; diffusion. This year, the course spends roughly half its time on mechanical systems at the cellular and tissue level, and half on models of neurons and neural systems in computational neuroscience. Prerequisite: MCDB 561a or equivalent, or a 200-level biology course, or permission of the instructor. TTH 2:30–3:45

MB&B 570a or 571b, Intensive Research for B.S./M.S. Candidates Michael Koelle, Yong Xiong
Required of students in the joint B.S./M.S. program with Yale College.

MB&B 600a[U], Principles of Biochemistry I Michael Koelle, Matthew Simon
Discussion of the physical, structural, and functional properties of proteins, lipids, and carbohydrates, three major classes of molecules in living organisms. Energy metabolism, hormone signaling, and muscle contraction as examples of complex biological processes whose underlying mechanisms can be understood by identifying and analyzing the molecules responsible for these phenomena. TTH 11:35–12:50

MB&B 601b[U], Principles of Biochemistry II Christian Schlieker, Karla Neugebauer
A continuation of MB&B 600a that considers the chemistry and metabolism of nucleic acids, the mechanism and regulation of protein and nucleic acid synthesis, and selected topics in macromolecular biochemistry. TTH 11:35–12:50

MB&B 602a/CBIO 602a/MCDB 602a, Molecular Cell Biology Sandra Wolin, Michael Caplan, Topher Carroll, Craig Crews, Pietro De Camilli, Megan King, Thomas Melia, In-Hyun Park, James Rothman, Martin Schwartz
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. MW 1:45–3

MB&B 625a[U]/GENE 625a/MCDB 625a[U], Basic Concepts of Genetic Analysis Tian Xu and staff
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. MW 11:35–12:50

MB&B 630b/MCDB 630b, Biochemical and Biophysical Approaches in Molecular and Cellular Biology Thomas Pollard and staff
This graduate course introduces the theory and application of biochemical and biophysical methods to study the structure and function of biological macromolecules. The course considers the basic physical chemistry required in cellular and molecular biology but does not require a previous course in physical chemistry. One class per week is a lecture introducing a topic. The second class is a discussion of one or two research papers utilizing those methods. Does not count for graduate course credit for BBSB graduate students. TTH 2:30–3:45

MB&B 635a[U]/ENAS 518a, Quantitative Approaches in Biophysics and Biochemistry Yong Xiong, Julien Berro, Nikhil Malvankar
The course offers an introduction to quantitative methods relevant to analysis and interpretation of biophysical and biochemical data. Topics covered include statistical testing, data presentation, and error analysis; introduction to dynamical systems; analysis of large datasets; and Fourier analysis in signal/image processing and macromolecular structural studies. The course also includes an introduction to basic programming skills and data analysis using MATLAB. Real data from research groups in MB&B are used for practice. Prerequisites: MATH 120 and MB&B 600a or equivalents, or permission of the instructors. TTH 9–10:15

MB&B 650, Lab Rotation for First-Year Students
Required of all first-year BBSB graduate students. Credit for full year only.

MB&B 675a, Seminar for First-Year Students Karla Neugebauer, Yong Xiong
Required of all first-year BBSB graduate students.

MB&B 676b, Responsible Conduct of Research Susan Baserga and staff
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, run in a seminar/discussion format. Required of all first-year BBSB graduate students. F 3

MB&B 710b4/C&MP 710b, Electron Cryo-Microscopy for Protein Structure Determination Fred Sigworth, Charles Sindelar
Understanding cellular function requires structural and biochemical studies at an ever-increasing level of complexity. The course is an introduction to the concepts and applications of high-resolution electron cryo-microscopy. This rapidly emerging new technique is the only method that allows biological macromolecules to be studied at all levels of resolution from cellular organization to near atomic detail. Counts as 0.5 credit toward MB&B graduate course requirements. TTH 9–10:15

[**MB&B 715b/ENAS 705b/PHYS 705b, Numerical Simulations of Liquids**]

MB&B 720a[U], Macromolecular Structure and Biophysical Analysis Andrew Miranker, Jonathon Howard, Yong Xiong
An in-depth analysis of macromolecular structure and its elucidation using modern methods of structural biology and biochemistry. Topics include architectural arrangements of

proteins, RNA, and DNA; practical methods in structural analysis; and an introduction to diffraction and NMR. Prerequisites: physical chemistry (may be taken concurrently) and biochemistry. TTH 11:35–12:50

[**MB&B 722b3, Optical Spectroscopy of Biomolecules**]

MB&B 723b4, Macromolecular Interactions: Atoms to Networks Lynne Regan
The course examines the nature of the intricate networks of macromolecular interactions that underlie the functioning of every cell and the modern biophysical methods available for their study across multiple length, time, and energy scales. Counts as 0.5 credit toward MB&B graduate course requirements. MW 11:35–12:50

MB&B 730a, Methods and Logic in Molecular Biology Matthew Simon, Anthony Koleske, Christian Schlieker
The course examines fundamental concepts in molecular biology through intense critical analysis of the primary literature. The objective is to develop primary literature reading and critical thinking skills. Required of and open only to first-year graduate students in BBSB. TTH 5–8

MB&B 734a/GENE 734a/MBIO 734a, Molecular Biology of Animal Viruses Brett Lindenbach
Lecture course with emphasis on mechanisms of viral replication, oncogenic transformation, and virus-host cell interactions. MW 10–11:30

MB&B 743b[U]/GENE 743b/MCDB 743b, Advanced Eukaryotic Molecular Biology Mark Hochstrasser, Karla Neugebauer, Matthew Simon, Patrick Sung
Selected topics in transcriptional control, regulation of chromatin structure, mRNA processing, mRNA stability, RNA interference, translation, protein degradation, DNA replication, DNA repair, site-specific DNA recombination, somatic hypermutation. Prerequisite: biochemistry or permission of the instructor. TTH 11:35–12:50

MB&B 749a[U]/GENE 749a, Medical Impact of Basic Science Joan Steitz, I. George Miller, Andrew Miranker, Karla Neugebauer, David Schatz, Thomas Steitz, and staff
Consideration of examples of recent discoveries in basic science that have elucidated the molecular origins of disease or that have suggested new therapies for disease. Emphasis is placed on the fundamental principles on which these advances rely. Reading is from the primary scientific and medical literature, with emphasis on developing the ability to read this literature critically. Aimed primarily at undergraduates. Prerequisite: biochemistry or permission of the instructor. May not be taken by MB&B B.S./MS. students for graduate course credit. MW 1–2:15

MB&B 750b3, Biological Membranes Donald Engelman
Biological membranes and their resident proteins are essential for cellular function; yet comparatively little is known about their structure and dynamics. This class provides an introduction to the biochemistry and biophysics of lipids, lipid bilayers, and lipid-derived second messengers. In addition, structural as well as functional aspects of the different classes of membrane proteins are discussed along with an outline of experimental approaches used to achieve an understanding of membrane protein structure

and function at a molecular level. Counts as 0.5 credit toward MB&B graduate course requirements. Prerequisite: biochemistry. MW 9–10:15

MB&B 752b[U]/CB&B 752b/CPSC 752b[U]/MCDB 752b[U], Biomedical Data Science: Mining and Modeling Mark Gerstein

Bioinformatics encompasses the analysis of gene sequences, macromolecular structures, and functional genomics data on a large scale. It represents a major practical application for modern techniques in data mining and simulation. Specific topics to be covered include sequence alignment, large-scale processing, next-generation sequencing data, comparative genomics, phylogenetics, biological database design, geometric analysis of protein structure, molecular-dynamics simulation, biological networks, normalization of microarray data, mining of functional genomics data sets, and machine-learning approaches to data integration. Prerequisites: biochemistry and calculus, or permission of the instructor. MW 1–2:15

MB&B 753b3, Biomedical Data Science: Mining Mark Gerstein

Biomedical data science encompasses the analysis of gene sequences, macromolecular structures, and functional genomics data on a large scale. It represents a major practical application for modern techniques in data mining and simulation. This module focuses on the first of these techniques, data mining. Specific topics to be covered include sequence alignment, comparative genomics and phylogenetics, biological databases, microarray normalization, and machine-learning approaches to data integration. Counts as 0.5 credit toward MB&B graduate course requirements. Prerequisites: biochemistry and calculus, or permission of the instructor. MW 1–2:15

MB&B 754b4, Biomedical Data Science: Modeling Mark Gerstein

Biomedical data science encompasses the analysis of gene sequences, macromolecular structures, and functional genomics data on a large scale. It represents a major practical application for modern techniques in data mining and simulation. This module focuses on the second of these techniques, simulation. Specific topics to be covered include geometric analysis of protein structure, molecular-dynamics simulation, and biological networks. Counts as 0.5 credit toward MB&B graduate course requirements. Prerequisites: biochemistry and calculus, or permission of the instructor. MW 1–2:15

MB&B 760b3, Principles of Macromolecular Crystallography Thomas Steitz, Yong Xiong

Rigorous introduction to the principles of macromolecular crystallography, aimed at students who are planning to carry out structural studies involving X-ray crystallography or who want to obtain in-depth knowledge for critical analysis of published crystal structures. Counts as 0.5 credit toward MB&B graduate course requirements. Prerequisites: physical chemistry and biochemistry. TTH 9–10:15

MB&B 761b4, X-ray Crystallography Workshop Yong Xiong and staff

This laboratory course provides hands-on training in the practical aspects of macromolecular structure determination by X-ray crystallography. Topics include data collection, data reduction, phasing by multi-wavelength anomalous diffraction and molecular replacement, solvent flattening, noncrystallographic symmetry averaging, electron density interpretation, model building, structure refinement, and structure validation. The

course includes training in the use of computer programs used to perform these calculations. Counts as 0.5 credit toward MB&B graduate course requirements. Prerequisites: MB&B 760b3 and a working exposure to the Unix operating system.

MB&B 800a, Advanced Topics in Molecular Medicine Susan Baserga, William Konigsberg, and staff
The seminar, which covers topics in the molecular mechanisms of disease, illustrates timely issues in areas such as protein chemistry and enzymology, intermediary metabolism, nucleic acid biochemistry, gene expression, and virology. M.D. and M.D./Ph.D. students only. Prerequisite: biochemistry (may be taken concurrently).

MB&B 900a or 901b, Reading Course in Biophysics
Directed reading course in biophysics. Term paper required. By arrangement with faculty. Open only to graduate students in MB&B. Please see syllabus for additional requirements.

MB&B 902a or 903b, Reading Course in Molecular Genetics
Directed reading course in molecular genetics. Term paper required. By arrangement with faculty. Open only to graduate students in MB&B. Please see syllabus for additional requirements.

MB&B 904a or 905b, Reading Course in Biochemistry
Directed reading course in biochemistry. Term paper required. By arrangement with faculty. Open only to graduate students in MB&B. Please see syllabus for additional requirements.

MOLECULAR, CELLULAR, AND DEVELOPMENTAL BIOLOGY

Kline Biology Tower, 203.432.3538
http://mcdb.yale.edu
M.S., Ph.D.

Chair
Vivian Irish

Director of Graduate Studies
Thierry Emonet

Professors Ronald Breaker (*on leave* [Sp]), John Carlson (*on leave* [Sp]), Lynn Cooley (*Genetics*), Craig Crews (*on leave* [F]), Stephen Dellaporta (*on leave* [Sp]), Paul Forscher, Jo Handelsman, Mark Hochstrasser (*Molecular Biophysics & Biochemistry*), Vivian Irish, Akiko Iwasaki (*Immunobiology*), Christine Jacobs-Wagner, Douglas Kankel, Paula Kavathas (*Immunobiology*), Haig Keshishian, Mark Mooseker, Jon Morrow (*Pathology*), Thomas Pollard (*on leave* [F]), Anna Pyle, Joel Rosenbaum, Alanna Schepartz (*Chemistry*), Hugh Taylor (*Obstetrics, Gynecology & Reproductive Sciences*), Robert Wyman (*on leave* [Sp])

Associate Professors Thierry Emonet, Scott Holley, Valerie Horsley, Weimin Zhong

Assistant Professors Murat Acar, Shirin Bahmanyar, Sreeganga Chandra (*Neurology*), Damon Clark (*on leave* [F]), Nicole Clay, Nadya Dimitrova, Joshua Gendron (*on leave*), Farren Isaacs, Yannick Jacob, Kathryn Miller-Jensen (*Biomedical Engineering*), Matthew Rodeheffer (*Comparative Medicine*), Josien van Wolfswinkel

Fields of Study

Research in genetics and molecular biology encompasses studies of non-coding RNAs, genome engineering, genome organization and regulation, gene dosage, aging, bacterial chemotaxis, and oncogenes. Research topics in cellular and developmental biology include structure and dynamics of the cell cytoskeleton, molecular motors, chemical biology, the nuclear envelope, lncRNAs, regeneration, developmental biomechanics, vertebral column development, neural and epidermal stem cells, and systems developmental biology. Research in neurobiology focuses on growth cone motility, neural differentiation, synaptogenesis, visual perception, olfaction, and the formation of topographic maps. A Special Program in Plant Sciences provides research and training in the molecular genetics of flowering, epigenetics, the physiology of hormone action, pathogen defense systems, sex determination, and the circadian clock. Because of the breadth of the department, students are provided with unique opportunities for interdisciplinary studies.

To enter the Ph.D. program, students apply to the Molecular Cell Biology, Genetics, and Development (MCGD) track or the Plant Molecular Biology (PMB) track within the interdepartmental graduate program in Biological and Biomedical Sciences (BBS), http://bbs.yale.edu.

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 recommended, preferably in Biology, or in Biochemistry, Cell and Molecular Biology.

Integrated Graduate Program in Physical and Engineering Biology (PEB)

Students applying to the MCGD track of the Biological and Biomedical Sciences program may simultaneously apply to be part of the PEB program. See the description under Non-Degree-Granting Programs, Councils, and Research Institutes for course requirements, and http://peb.yale.edu for more information about the benefits of this program and application instructions.

Special Requirements for the Ph.D. Degree

Each student is expected to take at least three courses, in addition to MCDB 900/901, First-Year Introduction to Research. With the help of a faculty committee, each student will plan 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 fall term of the second year, each student prepares a dissertation prospectus outlining the research proposed for the Ph.D. The student is admitted to candidacy for the Ph.D. when (1) the prospectus is accepted by a dissertation committee of faculty members, (2) the committee is satisfied that the student has demonstrated competence in the areas necessary to conduct the proposed work, and (3) the other requirements indicated above are fulfilled. The student should complete the requirements for admission to candidacy no later than the end of the second year of study. Following admission to candidacy, each student is required to meet with his/her thesis advisory committee at least once a year. 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 (TF level 10) courses during their Ph.D. study, but not during the first year of graduate study. Requirements for M.D./Ph.D. students are the same as for Ph.D. students, except that a single term of teaching is required. During their first year of study, students must successfully complete MCDB 901b, First-Year Introduction to Research—Ethics: Scientific Integrity in Biomedical Research, to fulfill the responsible conduct and ethics in research requirement. This requirement must be met prior to registering for a second year of study. Further, in the fourth year of study, all students must successfully complete B&BS 503b, RCR Refresher for Senior BBS Students.

Honors Requirement

Students must meet the Graduate School's Honors requirement by the end of the fourth term of full-time study (see Course and Honors Requirements under Policies and Regulations).

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 and at least one Honors grade, in addition to satisfactory performance in MCDB 900/901, or (b) by (i) successfully completing at least three courses with an average grade of High Pass and at least one Honors grade, (ii) satisfactory performance in MCDB 900/901, and (iii) 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.

Prospective applicants are encouraged to visit the BBS Web site (http://bbs.yale.edu), MCGD and PMB tracks.

Courses

MCDB 500a[U]/MB&B 500a[U], Biochemistry Nicole Clay, Donald Engelman
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 517b3/ENAS 517b/MB&B 517b3/PHYS 517b3, Methods and Logic in Interdisciplinary Research Lynne Regan, Julien Berro, Enrique De La Cruz, Thierry Emonet, Paul Forscher, Jonathon Howard, Megan King, Simon Mochrie, Corey O'Hern, Thomas Pollard, Yongli Zhang, and staff
This half-term PEB class is intended to introduce students to integrated approaches to research. Each week, the first of two sessions is student-led, while the second session is led by faculty with complementary expertise and discusses papers that use different approaches to the same topic (for example, physical and biological or experiment and theory). Counts as 0.5 credit toward graduate course requirements. MW 5–7

MCDB 530a[U]/IBIO 530a/MBIO 530a, Biology of the Immune System Carla Rothlin, Peter Cresswell, Vishwa Dixit, Akiko Iwasaki, Susan Kaech, Martin Kriegel, Ruslan Medzhitov, Eric Meffre, Noah Palm, João Pereira, Craig Roy, David Schatz
The development of the immune system. Cellular and molecular mechanisms of immune recognition. Effector responses against pathogens. Immunologic memory and vaccines. Human diseases including allergy, autoimmunity, cancer, immunodeficiency, HIV/AIDS. MWF 9:25–10:15

MCDB 550a^{U}/C&MP 550a^{U}/ENAS 550a^{U}/PHAR 550a, Physiological Systems
Emile Boulpaep, Stuart Campbell

The course develops a foundation in human physiology by examining the homeostasis of vital parameters within the body, and the biophysical properties of cells, tissues, and organs. Basic concepts in cell and membrane physiology are synthesized through exploring the function of skeletal, smooth, and cardiac muscle. The physical basis of blood flow, mechanisms of vascular exchange, cardiac performance, and regulation of overall circulatory function are discussed. Respiratory physiology explores the mechanics of ventilation, gas diffusion, and acid-base balance. Renal physiology examines the formation and composition of urine and the regulation of electrolyte, fluid, and acid-base balance. Organs of the digestive system are discussed from the perspective of substrate metabolism and energy balance. Hormonal regulation is applied to metabolic control and to calcium, water, and electrolyte balance. The biology of nerve cells is addressed with emphasis on synaptic transmission and simple neuronal circuits within the central nervous system. The special senses are considered in the framework of sensory transduction. Weekly discussion sections provide a forum for in-depth exploration of topics. Graduate students evaluate research findings through literature review and weekly meetings with the instructor. MWF 9:25–10:15

[**MCDB 551a^{U}, Experimental Strategies in Molecular Cell Biology**]

[**MCDB 555a^{U}, Molecular Basis of Development**]

MCDB 560b^{U}/C&MP 560b^{U}/ENAS 570b^{U}/PHAR 560b, Cellular and Molecular Physiology: Molecular Machines in Human Disease Emile Boulpaep, Fred Sigworth

The course focuses on understanding the processes that transfer molecules across membranes at the cellular, molecular, biophysical, and physiological levels. Students learn about the different classes of molecular machines that mediate membrane transport, generate electrical currents, or perform mechanical displacement. Emphasis is placed on the relationship between the molecular structures of membrane proteins and their individual functions. The interactions among transport proteins in determining the physiological 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. MWF 9:25–10:15

MCDB 561a^{U}/MB&B 561a/PHYS 561a, Introduction to Dynamical Systems in Biology Thierry Emonet, Jonathon Howard

Biological systems make sophisticated decisions at many levels. This course explores the molecular and computational underpinnings of how these decisions are made, with a focus on modeling static and dynamic processes in example biological systems. We emphasize analytical and numerical models to explore the relationship between molecular mechanisms and behavior. Topics include molecular switches, regulatory networks, feedback, and signal transduction. The course contains significant instruction in MATLAB, while students also read papers from the primary literature. The course aims to turn

ball-and-arrow diagrams into quantitative models with testable predictions. Prerequisite: PHYS 170 or equivalent, or permission of the instructor. TTH 2:30–3:45

MCDB 562b[U]/AMTH 765b/CB&B 562b/ENAS 561b/INP 562b/MB&B 562b[U]/ PHYS 562b, Dynamical Systems in Biology Damon Clark, Jonathon Howard
This course covers advanced topics in computational biology. How do cells compute, how do they count and tell time, how do they oscillate and generate spatial patterns? Topics include time-dependent dynamics in regulatory, signal-transduction, and neuronal networks; fluctuations, growth, and form; mechanics of cell shape and motion; spatially heterogeneous processes; diffusion. This year, the course spends roughly half its time on mechanical systems at the cellular and tissue level, and half on models of neurons and neural systems in computational neuroscience. Prerequisite: MCDB 561a or equivalent, or a 200-level biology course, or permission of the instructor. TTH 2:30–3:45

MCDB 570b[U], Biotechnology Craig Crews, Kenneth Nelson, Joseph Wolenski
The principles and applications of cellular, molecular, and chemical techniques that advance biotechnology. Topics include the most recent tools and strategies used by government agencies, industrial labs, and academic research to adapt biological and chemical compounds as medical treatments, as industrial agents, or for the further study of biological systems. MW 11:35–12:50

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 start of this course, each student forms a committee composed of his or her adviser and two faculty members that meets to discuss the research project. At the end of this course, students complete a detailed prospectus describing their thesis project and the work completed thus far. The committee evaluates an oral and written presentation of this prospectus; the evaluation determines whether the student may continue in the combined program. Required of students in the joint B.S./M.S. program with Yale College.

MCDB 595, Intensive Research in MCDB for B.S./M.S. Candidates
A four-credit, yearlong course (two credits each term) that is similar to MCDB 495 and is taken during the senior year. During this course, students give an oral presentation describing their work. At the end of the course, a student is expected to present his or her work to the department in the form of a poster presentation. In addition, the student is expected to give an oral thesis defense, followed by a comprehensive examination of the thesis conducted by the thesis committee. Upon successful completion of this examination, as well as other requirements, the student is awarded the combined B.S./M.S. degree. Required of students in the joint B.S./M.S. program with Yale College.

MCDB 599b, Concepts and Applications in Systems Biology Murat Acar
Analysis of the primary scientific literature on the topics of gene network design, stochasticity in gene expression, and evolution of genes and networks, in the context of both prokaryotic and eukaryotic systems. Critique of the approaches, data analysis, controls, results, and conclusions of selected current and classic papers in systems biology. Prerequisite: permission of the instructor. F 3:30–5:30

MCDB 602a/CBIO 602a/MB&B 602a, Molecular Cell Biology Sandra Wolin, Michael Caplan, Topher Carroll, Craig Crews, Pietro De Camilli, Megan King, Thomas Melia, In-Hyun Park, James Rothman, Martin Schwartz
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. MW 1:45–3

MCDB 603a/CBIO 603a, Seminar in Molecular Cell Biology Megan King, Michael Caplan, Topher Carroll, Craig Crews, Pietro De Camilli, Thomas Melia, James Rothman, Martin Schwartz, Sandra Wolin
A graduate-level seminar course in modern cell biology. The class is devoted to the reading and critical evaluation of classical and current papers. The topics are coordinated with the MCDB 602a lecture schedule. Thus, concurrent enrollment in MCDB 602a is required. TH 9–11

MCDB 625a^{U}/GENE 625a/MB&B 625a^{U}, Basic Concepts of Genetic Analysis Tian Xu and staff
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. MW 11:35–12:50

MCDB 630b/MB&B 630b, Biochemical and Biophysical Approaches in Molecular and Cellular Biology Thomas Pollard and staff
This graduate course introduces the theory and application of biochemical and biophysical methods to study the structure and function of biological macromolecules. The course considers the basic physical chemistry required in cellular and molecular biology but does not require a previous course in physical chemistry. One class per week is a lecture introducing a topic. The second class is a discussion of one or two research papers utilizing those methods. TTH 2:30–3:45

MCDB 650a, Epigenetics Nadya Dimitrova, Yannick Jacob, Josien van Wolfswinkel
Study of epigenetic states and the various mechanisms of epigenetic regulation, including histone modification, DNA methylation, nuclear organization, and regulation by noncoding RNAs. Detailed critique of papers from primary literature and discussion of novel technologies, with specific attention to the role of epigenetics in development and its impact on human health. Prerequisite: permission of the instructor. WF 11:35–12:50

MCDB 660a/F&ES 654a, Anatomy, Physiology, and Development of Trees and Other Vascular Plants Graeme Berlyn
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. MW 4–5:20

MCDB 670a, Advanced Seminar in Biochemistry and Genetics Ronald Breaker, Stephen Dellaporta
New aspects of the molecular biology of RNA, ribonucleoproteins, and prions. Topics include the localization and function of RNA and ribonucleoproteins; siRNAs and microRNAs; the role of RNA in dosage compensation, chromosome silencing, and gene regulation; novel ribozymes and RNA technology; prions. Discussion; involvement and attendance are required. W 1:30–3:30

MCDB 677b/GENE 777b, Mechanisms of Development Valerie Reinke and staff
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 participation in critical analysis of primary literature and a research proposal term paper. W 1:30–3:20

MCDB 720a[U]/INP 720a/NBIO 720a, Neurobiology Haig Keshishian, Paul Forscher
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. MWF 11:35–12:25

MCDB 721La[U], Laboratory for Neurobiology Haig Keshishian, Robert Wyman
Optional laboratory. Introduction to the neurosciences. Projects include the study of neuronal excitability, sensory transduction, CNS function, synaptic physiology, and neuroanatomy. T *or* W 1:30–5:30

[**MCDB 730b[U]/INP 502b, Cell Biology of the Neuron**]

[**MCDB 735b[U]/INP 504b/NBIO 504b, Seminar in Brain Development and Plasticity**]

MCDB 743b/GENE 743b/MB&B 743b[U], Advanced Eukaryotic Molecular Biology Mark Hochstrasser, Karla Neugebauer, Matthew Simon, Patrick Sung
Selected topics in transcriptional control, regulation of chromatin structure, mRNA processing, mRNA stability, RNA interference, translation, protein degradation, DNA replication, DNA repair, site-specific DNA recombination, somatic hypermutation. Prerequisite: biochemistry or permission of the instructor. TTH 11:35–12:50

MCDB 752b[U]/CB&B 752b/CPSC 752b[U]/MB&B 752b[U], Biomedical Data Science: Mining and Modeling Mark Gerstein
Bioinformatics encompasses the analysis of gene sequences, macromolecular structures, and functional genomics data on a large scale. It represents a major practical application for modern techniques in data mining and simulation. Specific topics to be covered include sequence alignment, large-scale processing, next-generation sequencing data, comparative genomics, phylogenetics, biological database design, geometric analysis of protein structure, molecular-dynamics simulation, biological networks, normalization of microarray data, mining of functional genomics data sets, and machine-learning approaches to data integration. Prerequisites: biochemistry and calculus, or permission of the instructor. MW 1–2:15

[MCDB 861b[U], The Human Population Explosion]

MCDB 900a/CBIO 900a/GENE 900a, First-Year Introduction to Research—Grant Writing and Scientific Communication Scott Holley and faculty
Grant writing, scientific communication, and laboratory rotation talks for Molecular Cell Biology, Genetics, and Development track students. M 4–5:30

MCDB 901b/CBIO 901b/GENE 901b, First-Year Introduction to Research—Ethics: Scientific Integrity in Biomedical Research Joerg Bewersdorf
Ethics and laboratory rotation talks for Molecular Cell Biology, Genetics, and Development track students. TH 4:15–5:45

MCDB 902a and 903b, Advanced Graduate Seminar Matthew Rodeheffer, Damon Clark [Sp], Josien van Wolfswinkel [F]
The course allows students to hone their presentation skills through yearly presentation of their dissertation work. Two students each give thirty-minute presentations in each class session. Students are required to present every year beginning in their third year in the MCDB program. Each MCDB graduate student is expected to attend at least 80 percent of the class sessions. Two faculty members co-direct the course, attend the seminars, and provide feedback to the students.

MCDB 911a/CBIO 911a/GENE 911a, First Laboratory Rotation
First laboratory rotation for Molecular Cell Biology, Genetics, and Development track students.

MCDB 912b/CBIO 912b/GENE 912b, Second Laboratory Rotation Craig Crews
Second laboratory rotation for Molecular Cell Biology, Genetics, and Development track students.

MCDB 913b/CBIO 913b/GENE 913b, Third Laboratory Rotation Craig Crews
Third laboratory rotation for Molecular Cell Biology, Genetics, and Development track students.

MCDB 950a and 951b, Second-Year Research
By arrangement with faculty.

MUSIC

Stoeckel Hall, 203.432.2986
http://yalemusic.yale.edu
M.A., M.Phil., Ph.D.

Chair
James Hepokoski (*on leave* [F])

Acting Chair [F]
Patrick McCreless

Director of Graduate Studies
Gundula Kreuzer (Stoeckel, 203.432.2986, dgs.music@yale.edu)

Professors Kathryn Alexander (*Adjunct*), Ardis Butterfield, Richard Cohn (*on leave* [Sp]), Michael Friedmann (*Adjunct*), Daniel Harrison, Paul Hawkshaw (*Adjunct*), James Hepokoski (*on leave* [F]), Richard Lalli (*Adjunct*), Patrick McCreless (*on leave* [Sp]), Ian Quinn (*on leave* [Sp]), Gary Tomlinson, Michael Veal, Craig Wright

Associate Professors Robert Holzer (*Adjunct*), Brian Kane, Gundula Kreuzer, Markus Rathey (*Adjunct*)

Assistant Professors Rebekah Ahrendt, Henry Parkes, Anna Zayaruznaya (*on leave*)

Fields of Study

Fields include music history, music theory, and ethnomusicology. (Students interested in degrees in performance, conducting, 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 such as extended papers, advanced exercises, and analyses must be submitted. The GRE General Test is required by the Graduate School. Applicants whose native language is not English must take the Test of English as a Foreign Language (TOEFL).

Special Requirements for the Ph.D. Degree

Two years of course work, comprising a minimum of fourteen courses. All students must take the proseminars in ethnomusicology, music history, and music theory. In addition, students in the theory program must take both of the history of theory seminars; students in the music history program must take one history of theory seminar; and students in the ethnomusicology program must take at least two but no more than five graduate seminars or non-introductory undergraduate courses in other departments or schools within the University. In consultation with the DGS, history and theory students may elect to take up to two graduate seminars or non-introductory undergraduate courses outside the department. Consult the Music Graduate Student Handbook for further details specific to each program.

A student must receive at least four Honors grades in departmental seminars in order to proceed to the qualifying examination, administered in August following the second year. Reading proficiency in two languages—for historians and theorists, German and usually either French or Italian; for ethnomusicologists, two languages relevant to their research, one of which must be a European language—is demonstrated by examinations (with dictionary access) offered once per term. A style and repertory examination must be taken upon entering in August, and retaken every term until passed before the end of the third year. Third-year students attend a weekly prospectus/dissertation colloquium. Approval of the dissertation prospectus admits a student to candidacy, provided that all other requirements are met. Only students admitted to candidacy can continue into the fourth year of study. Fourth- and fifth-year students attend the dissertation colloquium in the spring terms.

The faculty considers teaching to be essential to the professional preparation of graduate students in Music. Students in Music participate in the Teaching Fellows Program in their third and fourth years.

Combined Ph.D. Program: Music and Renaissance Studies

The Department of Music 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 Degree Requirements under Policies and Regulations.

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 seven courses, at least six of which are seminars given in the department, along with the passing of the style and repertory examination and an examination in one foreign language. Of the six departmental seminars, at least two grades must be Honors; the remaining five grades must average High Pass.

Terminal Master's Degree Program The department offers admission to a small number of students in a terminal M.A. program. Candidates must pass seven 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.

Courses

MUSI 625b, Sonata Theory James Hepokoski
Introduction to the sonata-theory method of hearing, analyzing, and interpreting complete movements or works. Close analysis of selected sonata-form movements from sonatas, chamber works, symphonies, and concertos. The focus is primarily on works by Mozart, with additional examples from Haydn and Beethoven, though in the final sessions we may extend our inquiries into music from later decades.

MUSI 627b/REL 683b, Liturgy, Ritual, and Chant of Medieval England (Sarum Use) Bryan Spinks, Henry Parkes
This course focuses on the rites, ceremonies, and music of the Use of Sarum, which was the predominant Use for services in the late medieval period in England. It includes preliminary study of the emergence of the Romano-Western liturgical synthesis and considers some of the Anglo-Saxon representation of this synthesis. It considers the aims of the Anglo-Norman church and especially the siting and building of the Old Sarum Cathedral. It compares the Sarum Use to those of Rouen, Hereford, and York and examines the new Cathedral of Salisbury and the liturgical implications of its architecture and decoration. It considers the various services of the Use of Sarum and their musical repertories, both monophonic and polyphonic, as well as the wider cultural significance of Sarum traditions beyond the medieval era.

MUSI 697a, Proseminar: Ethnomusicology Michael Veal
A survey of the major works, topics, issues, and techniques of ethnomusicological research as it has developed over the past century. We consider the position of the field within the broader contexts of society and the academy and provide a bibliographic foundation for further work in the field.

MUSI 698b, Proseminar: Music Theory Daniel Harrison
A survey of the major works, topics, questions, and techniques of research in the field of music theory as it has developed over the past half-century. We consider the position of the field within the broader contexts of the academy and provide a bibliographic foundation for further work in the field.

MUSI 720b, History of Theory I
A survey of the history of music theory from Greek antiquity to the Renaissance. Readings are drawn from Aristoxenos, the *Sectio canonis,* Ptolemy, Boethius, the *Musica enchiriadis,* Guido of Arezzo, John of Garland, Franco of Cologne, Jehan de Murs, Marchetto of Padua, Philippe de Vitry, Tinctoris, Glarean, Gaffurius, and Zarlino. Topics include systems and scales, tuning, transmission, institutional sites, speculative and practical traditions, methodology, and the scientific status of music theory.

MUSI 816a, Materials of Music Research Rebekah Ahrendt
An introduction to research using primary sources. Concepts of critical bibliography, the "new" materialism, and source-based argumentation are addressed. Students work with original manuscripts, prints, and archival materials from Yale collections and develop a final project based on previously unstudied or understudied material. Meets in the Beinecke Library.

MUSI 837a/DRAM 406a/FILM 804a, Opera, Media, Technology Gundula Kreuzer
To what extent does Wagner prefigure, as Friedrich Kittler has argued, modern "media technologies"? And what are the implications of opera's increasing mediatization? In search of answers, this seminar explores opera from the perspectives of media archaeology and other recent approaches in opera, media, and science and technology studies. Topics include the roles of architecture and stage technologies from Renaissance spectacle to twenty-first-century "mobile opera"; Wagner's theory of the *Gesamtkunstwerk;* immersion, illusion, and the cinematic; the orchestra as sound technology; and

nineteenth-century attempts at "recording" productions. From there we turn to recent hybridizations in the form of onstage video and HD broadcasts, as well as alternative conceptions of opera. Does technology offer a saving grace for opera in the digital age?

MUSI 850a, Analysis of Russian Music: Glinka to Stravinsky Patrick McCreless
The tradition of art music in Russia, from Glinka's *Life for the Tsar* to the early music of Stravinsky, has hardly been touched by anglophone music theory and analysis. Yet the operas, romances (songs), and instrumental works of the central composers of the period—Glinka, Dargomyzhsky, Borodin, Balakirev, Mussorgsky, Tchaikovsky, Rimsky-Korsakov, Taneyev, Scriabin, and Rachmaninoff—constitute a rich, diverse, and challenging repertoire. The seminar centers on close readings of individual pieces, using whatever analytical techniques, old or new, seem to work best. At the same time, since context is essential to the interpretation of this music, we strive for a broad command of the repertoire as a whole, and of the nineteenth-century Russian culture that produced it.

MUSI 911a, Music and Language Gary Tomlinson
This seminar examines the ongoing, shifting dialectic of music and language in the Western tradition by taking up four historicized case studies from the early modern period to the twentieth century. The first sits at the meeting point of Italian madrigal and early music-drama, examining the epochal turn in music/word relations shared by these often contrasted repertories; the second considers eighteenth-century theories of the origin of language in song, with particular focus on Rousseau, exposing the dilemmas of the attempt to locate sung speech in now sundered media; the third observes the aftereffects of this eighteenth-century formation in the music and prose of Wagner; and the fourth explores the place of sung words in an era of philosophical formalism.

MUSI 938b, Sound Studies Brian Kane
Sound studies is an interdisciplinary field, situated at the intersection of science and technology studies, film, music, media, anthropology, and cultural studies. Scholars in sound studies analyze both the technologies and cultural techniques involved in the production, reception, and meaning of sound and listening. This seminar is intended as a broad introduction to sound studies. We read major texts and theorists in the field and investigate some of the central topics of concern, such as soundscape (contemporary and historical), acoustic ecology, listening (from philosophical, sociological, and cultural perspectives), electronic music and noise, sound art, histories of audio technologies, and cultural techniques of sound production and reception. Substantial weekly readings and a final research project are required.

MUSI 952a, Musical Meter Richard Cohn
Describing and representing musical meters and their relations; interpreting metric syntaxes in terms of musical "form." Nineteenth-century central-European concert music (Beethoven, Schumann, Brahms, Dvořák); West African drumming; American minimalism, jazz, and EDM; if sufficient time, musics of south Asia and/or southeastern Europe.

MUSI 986a, Corpus Methods in Music Research Ian Quinn
The course covers computer-assisted methods for formulating and investigating empirical research questions at what Meyer called the "interopus" level: i.e., corpora rather than individual works. We also consider the role of empirical research of this type in the field

of musicology generally and its relationship to the specific questions of music theory in particular. Students learn to use the music21 software package under development at MIT. A special focus this year is mode.

MUSI 998a, Prospectus Workshop Gundula Kreuzer

MUSI 999b, Dissertation Colloquium Gundula Kreuzer

NEAR EASTERN LANGUAGES AND CIVILIZATIONS

314 Hall of Graduate Studies, 203.432.2944
http://nelc.yale.edu
M.A., M.Phil., Ph.D.

Acting Chair
Christina Kraus

Director of Graduate Studies
Eckart Frahm

Professors John Darnell, Benjamin Foster, Eckart Frahm, Dimitri Gutas (*on leave* [Sp]), Peter Pormann, Shawkat Toorawa, Harvey Weiss (*on leave* [F])

Lecturers Karen Foster, Christina Geisen, Enrique Jiménez-Sanchez, Agnete Lassen, Kathryn Slanski

Senior Lector II Shiri Goren

Senior Lectors Sarab al-Ani, Muhammad Aziz, Jonas Elbousty, Dina Roginsky, Farkhondeh Shayesteh

Lectors Ozgen Felek, Orit Yeret

Fields of Study

Fields include Arabic and Islamic studies (also with interdisciplinary minor), Greco-Arabic studies, Assyriology, and Egyptology.

Special Admissions Requirements

Applicants should state their specific field of study and intended specialization. Evidence of a reading knowledge of both French and German is required of all Ph.D. 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. Ph.D. 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 department 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, for instance, for native speakers of French or German, may be made by the department upon recommendation of the director of graduate studies (DGS). For students in the M.A. program, evidence of a reading knowledge of either French or German is sufficient.

Special Requirements for the Ph.D. Degree

COURSE WORK

The department normally requires three full years of course work, four year courses or eight term courses per year being considered a full load. This may be reduced to two years

in cases of exceptional background in Near Eastern languages. Normal progress in course work is considered to be consistent achievement of grades of High Pass or better, and at least four term courses or two year courses with Honors per year.

Of the twenty-four required courses for graduate study, at least eighteen should be taken within the department, usually within the student's primary field of study. Courses taken outside of the department should be clearly related to the student's primary field or constitute a coherent second field. For students who take no courses outside of the department, minimum competence in a second field within NELC is required, defined as follows: at least two terms of a Near Eastern language to be evaluated either by examination or a course grade of High Pass or better, or at least two terms of nonlanguage courses outside the area of specialization.

Advanced standing In rare cases, upon presenting evidence of successful completion of graduate courses at other universities or at Yale prior to their matriculation in the Ph.D. program, students with significant prior knowledge in their primary fields of study may apply for a waiver of up to eight courses toward the twenty-four required for candidacy. The faculty adviser and the DGS will normally present such applications to the faculty of the department, with a recommendation, no later than the end of the second year.

Interdisciplinary minor In Arabic-Islamic Studies, up to eight courses taken in one outside department and inclusion of that department's subject in the comprehensive exams constitute an interdisciplinary track.

COMMITTEES

While doing course work, students are mentored by a faculty adviser from their field and by the DGS. Students writing dissertations may, if they so wish, be mentored by a committee headed by a primary adviser from NELC (not necessarily the faculty adviser from the course work years) and staffed with one, two, or more additional members, from either inside or outside the department, depending on the student's specific needs. Committees are to be approved by the DGS. Interested students are encouraged to seek out suitable and willing faculty to serve on their advisory committees.

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; *Assyriology:* Sumerian and Akkadian; *Egyptology:* Egyptian and at least four terms of Demotic or Coptic. Minimum competence in a secondary field of study is defined as follows: at least two terms of a Near Eastern language to be evaluated either by examination or with a course grade of High Pass or better, or at least two terms of nonlanguage courses outside the area of specialization. A minimum grade of High Pass in these courses will be considered successful fulfillment of this requirement.

In Arabic and Islamic Studies, the minimum competence can be extended to an interdisciplinary course of study in a minor field. Minors may include six to eight term courses in the following departments and programs: Anthropology, Comparative Literature, French, German Studies, Classics, History, History of Science and Medicine, Italian,

Judaic Studies, Linguistics, Medieval Studies, Philosophy, Political Science and Sociology, Religious Studies, Spanish and Portuguese, or others, by permission of the DGS. 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.

TRAINING IN TEACHING

NELC students normally acquire four terms of teaching experience, between their second and fourth years in residence. Once faculty have determined the courses that they plan to teach in the upcoming academic year, they will inform the DGS of courses that may require Teaching Fellows. The DGS will compile a list of these courses and circulate it among NELC graduate students who have completed the first year of study. Students may then inform the DGS of those courses for which they would prefer to serve as Teaching Fellows. The faculty members in charge, in consultation with the DGS, will subsequently choose the Teaching Fellows for their courses.

EXAMINATIONS AND THE DISSERTATION

The comprehensive examination is normally taken at the end of the third year of study or no later than the beginning of the fourth year of study. When advanced standing has been granted, the comprehensive examination could be taken at the end of the second year. Comprehensive examinations normally include three written and one oral examination including language, literature, history, and other topics to be determined by the DGS in consultation with the student and the relevant faculty. Comprehensive examinations may be based in part on reading lists of primary core texts and secondary literature compiled well in advance by the student and the relevant faculty. Primary texts and secondary literature studied by the students during their years of course work may also become topics of the examination. For language examinations, texts that the student has not seen may also be included. In the case of the program in Arabic and Islamic Studies with an interdisciplinary minor, the written portion will consist of two language examinations and one subject in the minor field, and the oral of two subjects in Arabic studies and one in the minor field. The written examinations will be set by the individual faculty members responsible for particular areas of study, but the oral portion will be conducted by the full staff of the department. The dissertation proposal is normally submitted one month following the completion of the qualifying examination.

In their final term of course work, students may, with the permission of the DGS and the instructor, enroll in a Directed Readings course related to the general field of the prospective dissertation topic. Course work should include preparation of a comprehensive, annotated bibliography for the prospective topic and exploration of some aspects of the topic in a research paper. Students availing themselves of this option should also present some of their work at the NELC Roundtable.

The dissertation prospectus may comprise up to thirty pages, excluding the bibliography. A two-page summary of the prospectus will normally be circulated among and voted upon by the faculty, though the full prospectus will be available for consideration.

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.

YISAP Graduate Qualification

Students can participate in the Yale Initiative for the Study of Antiquity and the Premodern World (YISAP) and receive a graduate qualification by fulfilling the necessary requirements.

Master's Degrees

M.Phil. See Degree Requirements under Policies and Regulations. Additionally, students in Near Eastern Languages and Civilizations are eligible to pursue a supplemental M.Phil. degree in Medieval Studies. For further details, see Medieval Studies.

Terminal Master's Degree Program Applicants who do not enroll in the Ph.D. program may pursue a Master of Arts degree. Students enrolled in the M.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. Because of the thesis requirement, the Graduate School procedure of automatic petitions for the M.A. degree is not available to students in Near Eastern Languages and Civilizations.

Courses

AKKD 501[U], Elementary Akkadian
Introduction to the language of ancient Babylonia and its cuneiform writing system, with exercises in reading, translation, and composition. TTH 9–10:15

[**AKKD 502a[U], Intermediate Akkadian**]

AKKD 503a, Advanced Akkadian: Akkadian Literary Texts Eckart Frahm

AKKD 505b, Historical and Archival Texts from First-Millennium Assyria Eckart Frahm

[**AKKD 545a, Historical and Archival Texts from Neo-Babylonian and Late Babylonian Times**]

ARBC 501[U], Elementary Modern Standard Arabic Muhammad Aziz
A two-term course for students who have no previous background in Arabic. Students learn the Arabic alphabet, basic vocabulary and expression, and basic grammatical structures and concepts, and concentrate on developing listening and speaking skills. The course aims at developing the following skills: reading to extract the gist of written Modern Standard Arabic texts; speaking with increased ease, good pronunciation, sound grammatical forms, and correct usage; writing to respond to simple daily life issues; forming and recognizing grammatically correct Modern Standard Arabic.
501a: MTWTHF 9:25–10:15, 10:30–11:20, or 11:35–12:25
501b: MTWTHF 9:25–10:15, 10:30–11:20, or 11:35–12:25

ARBC 502[U], Intermediate Modern Standard Arabic Jonas Elbousty
A two-term course for students with previous background in Arabic. It is designed to improve proficiency in aural and written comprehension as well as in speaking and writing skills. The course aims to develop the following skills: reading to extract the gist as well as key details of written Modern Standard Arabic texts on a variety of academic, social, cultural, economic, and political topics; speaking with greater fluency and enhanced engagement in conversations on a variety of topics; mastering writing, easily forming and recognizing grammatically correct Arabic sentences. Prerequisite: ARBC 501 or successful completion of a placement test.
502a: MTWTHF 10:30–11:20 or 11:35–12:25
502b: MTWTHF 9:25–10:15 or 10:30–11:20

ARBC 503[U], Advanced Modern Standard Arabic Sarab al-Ani
A two-term course for students with an intermediate to high level of Arabic who wish to reach an advanced level. The course emphasizes contemporary Arabic culture through reading and discussing modern texts, in addition to oral presentations on present-day issues (all in Modern Standard Arabic). The course is designed to improve proficiency in aural and written comprehension as well as in speaking and writing skills. Through text comprehension strategies and vocabulary enrichment, complex sentence structures as well as common written phrasal expressions are tackled, with the aim of usage mastery through writing, speaking, and listening. Prerequisites: ARBC 501 and 502 or successful completion of a placement test.
503a: MWF 10:30–11:20 or 11:35–12:25
503b: MWF 11:35–12:25

ARBC 505a[U], Arabic Seminar Dimitri Gutas
Study and interpretation of classical Arabic texts for advanced students. Prerequisite: ARBC 510 or permission of the instructor. T 3:30–5:20

[**ARBC 507b[U], Modern Arabic Seminar**]

ARBC 510a[U] or b[U], Intermediate Classical Arabic
Introduction to classical Arabic, with emphasis on analytical reading skills, grammar, and prose composition. Readings from the Qur'an, Islamic theology, and literature and history of the Middle East, as well as Jewish and Christian religious texts in Arabic.
MW 11:35–12:50

[**ARBC 511[U], Advanced Classical Arabic**]

[**ARBC 513b[U], Modern Arabic Political Thought**]

[**ARBC 514a, The Maqāmāt**]

ARBC 519a[U], Levantine Arabic Sarab al-Ani
MW 1–2:15

[**ARBC 520a[U], Egyptian Arabic**]

[**ARBC 522[U], Business Arabic**]

[**ARBC 523b[U], Arabic Prose Narrative**]

[**ARBC 524b[U], Iraqi and Gulf Arabic**]

[**ARBC 832b, Introduction to Classical Arabic Literary Criticism**]

EGYP 501[U], Introduction to Classical Hieroglyphic Egyptian Christina Geisen
A two-term 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. TTH 9–10:15

[**EGYP 502a, Historical Texts of Egypt and Nubia**]

[**EGYP 510[U], Elementary Biblical Coptic**]

[**EGYP 511a, Introduction to Coptic Literature**]

EGYP 512a[U]/RLST 658a[U], Egyptian Monastic Literature in Coptic Stephen Davis
Readings in the early Egyptian classics of Christian ascetism in Sahidic Coptic, including the Desert Fathers and Shenoute. Prerequisite: EGYP 510b or equivalent. MW 9–10:15

[**EGYP 513a, Research Seminar on the Monastic Federation of Shenoute**]

EGYP 514b[U]/REL 555b/RLST 653b[U], Gnostic Texts in Coptic Harold Attridge
The course reads selected portions of important texts from the Nag Hammadi collection, including the Apocryphon of John, the Gospel of Thomas, the Gospel of Truth, Thunder, the Treatise on Resurrection, the Tripartite Tractate, as well as other noncanonical texts preserved in Coptic, including the Gospel of Mary and the Gospel of Judas. Prerequisite: EGYP 510b or equivalent. TTH 1:30–3

[**EGYP 516b, Coptic Prose Texts: Apa Shenoute**]

EGYP 528b[U]/ANTH 528b[U]/ARCG 528b[U], Magic and Ritual in Ancient Egypt
John Darnell, Christina Geisen
Introduction to ancient Egyptian magic and rituals with an overview on the use of magic and discussion of the different rituals and festivals attested in ancient Egypt. T 1:30–3:20

[**EGYP 531a[U], Intermediate Egyptian I: Texts Relating to Egypt and Nubia**]

[**EGYP 533a[U], Intermediate Egyptian I: Literary Texts**]

[**EGYP 535b[U], Intermediate Egyptian II: Late Egyptian Stories**]

EGYP 539b, Intermediate Egyptian: Cosmogonic Texts John Darnell
Close reading of Egyptian creation accounts, from the First Intermediate Period through the Roman Period, with an emphasis on the diachronic development of religious concepts, the variety of coexisting local traditions, the Amarna Period, possible influences on Hermetic and Gnostic writings or borrowings from Greco-Roman and Near Eastern religions. Texts cover a range of formats, including Coffin Texts, magical and ritual papyri, and hieroglyphic temple inscriptions. M 1:30–3:20

[**EGYP 540a, Ancient Egyptian Epistolography**]

[**EGYP 550a[U], Introduction to Demotic**]

EGYP 568a, Intermediate Egyptian: Historical Texts from the Amarna Period
John Darnell
Close reading of Middle Egyptian historical texts in original hieroglyphic and hieratic script. Initial survey of ancient Egyptian historiography and grammatical forms peculiar to this genre of text. Prerequisite: EGYP 501. M 1:30–3:20

[**EGYP 577a[U], Egyptian Rock Inscriptions**]

[**EGYP 578b, The Egyptian Netherworld Books**]

EGYP 579, Directed Readings: Egyptology John Darnell

[**EGYP 580b, Temple Inscriptions: Medinet Habu**]

[**EGYP 590b[U], Egyptian Coffin Texts**]

[**EGYP 591a[U], Ancient Egyptian Love Poetry**]

HEBR 501[U], Elementary Modern Hebrew Dina Roginsky [F], Orit Yeret [Sp]
A two-term introduction to the language of contemporary Israel, both spoken and written. Fundamentals of grammar; extensive practice in speaking, reading, writing, and comprehension under the guidance of a native speaker. No previous knowledge required. Successful completion of the fall term required to enroll in the spring term.
501a: MTWTHF 9:25–10:20 or 10:30–11:20
501b: MTWTHF 9:25–10:20 or 10:30–11:20

HEBR 502[U], Intermediate Modern Hebrew Shiri Goren, Orit Yeret
A two-term review and continuation of grammatical study leading to a deeper comprehension of style and usage. Focus on selected readings, writing, comprehension, and speaking skills. Prerequisite: HEBR 501 or equivalent.
502a: MW 1–2:15 or TTH 2:30–3:45
502b: MW 1–2:15 or TTH 2:30–3:45

HEBR 503a[U], Advanced Modern Hebrew: Daily Life in Israel Orit Yeret
An examination of major controversies in Israeli society. Reading includes newspaper editorials and articles, as well as documentary and historical materials. Advanced grammatical and conversational structures are introduced and practiced. Conducted in Hebrew. Prerequisite: HEBR 502, placement test, or permission of the instructor. WF 9–10:15

[**HEBR 504b[U], Introduction to Modern Israeli Literature**]

HEBR 505b[U], Contemporary Israeli Society in Film Shiri Goren
Examination of major themes in Israeli society through film, with emphasis on language study. Topics include migration, gender and sexuality, Jewish/Israeli identity, and private and collective memory. Readings in Hebrew and English provide a sociohistorical background and basis for class discussion. Conducted in Hebrew. Prerequisite: HEBR 502, placement test, or permission of the instructor. TTH 11:35–12:50

[**HEBR 506a[U], Dynamics of Israeli Culture**]

[**HEBR 509b[U], Reading Academic Texts in Modern Hebrew**]

[**HEBR 510b[U], Conversational Hebrew: Israeli Media**]

HEBR 511[U], Elementary Biblical Hebrew
A two-term introduction to Biblical Hebrew. Intensive instruction in grammar and vocabulary, supplemented by readings from the Bible. No prior knowledge of Hebrew required.

[**HEBR 512[U], Intermediate Biblical Hebrew**]

[**HEBR 516b[U], Israeli Popular Music**]

HEBR 517a[U], Hebrew in a Changing World Dina Roginsky
An advanced Hebrew class that focuses on the ways the Hebrew language is used in Israel for constructing social norms, expectations, and day-to-day experiences. Topics include gendered language, political and PC language, military language, slang, humor, dialects, accents, name-giving practices, and Americanization of the Hebrew language. Materials include advertisements, Internet forums, movie clips, skits, maps, political stickers, and newspapers. Prerequisite: HEBR 502 or equivalent. TTH 1–2:15

HEBR 519b[U], Israel in Ideology and Practice Dina Roginsky
An advanced Hebrew class that focuses on changing ideology and politics in Israel. Topics include right- and left-wing political discourse, elections, state-religion dynamics, the Jewish-Arab divide, and demographic changes. Materials include newspapers, publications, online resources, speeches of different political and religious groups, and contemporary and archival footage. Also, this course draws comparisons to American political and ideological discourse. Prerequisite: HEBR 502 or equivalent. MW 1–2:15

HEBR 523/REL 3604, Elementary Biblical Hebrew Eric Reymond
A two-term introduction to the language of the Hebrew Scriptures—Biblical Hebrew. Students work through the grammar book, doing exercises and practicing paradigms. Among these exercises is the reading of specific biblical texts. By the end of the year, students should have a basic grasp of this ancient language's grammar and some experience reading Hebrew.

[**HEBR 563[U], From Biblical to Modern Hebrew**]

HEBR 576a/REL 576a, Advanced Biblical Hebrew Prose Joel Baden
This course examines topics in the grammatical and syntactical analysis of Biblical Hebrew prose. It introduces students to the fine points of the Hebrew grammar and syntax so that students are capable of reading the biblical text fluently and carefully.

[**MESO 505a, Mesopotamian History in the Late Bronze Age**]

[**MESO 506a, Selected Mesopotamian Texts: Scholarly Texts**]

[**MESO 506b, Selected Mesopotamian Texts: Bilingual Texts**]

MESO 507a, History of Mesopotamia: Second Millennium Benjamin Foster
Readings and discussion of issues and evidence for the second millennium of Mesopotamian history.

[**MESO 507b, Mesopotamian Humorous Texts**]

[**MESO 508b, History of Mesopotamia: 2000–1550 B.C.E.**]

[**MESO 510b, Transitions in Mesopotamian History**]

[**MESO 512, Women in Assyria and Babylonia**]

MESO 531, Beginning Sumerian
A two-term introduction to the Sumerian language.

[**MESO 532a,b, Intermediate Sumerian**]

MESO 533a, Advanced Sumerian Benjamin Foster

[**MESO 543a, Neo-Assyrian History**]

MESO 544a, Mesopotamian Selected Texts: Sumerian Benjamin Foster

MESO 559b, Directed Readings: Assyriology Benjamin Foster

[**MESO 560a, Historical Horizons in Ancient Mesopotamia**]

[**MESO 572a, Prophecy in Mesopotamia**]

[**MESO 574b, Reading, Editing, and Copying Cuneiform Tablets**]

[**NELC 502b^{U}, Worlds of Homer**]

[**NELC 503a^{U}, Art of Ancient Palaces**]

[**NELC 504b^{U}, Art of the Ancient Near East and Aegean**]

[**NELC 507a^{U}, Modern Arab Thought**]

NELC 508a^{U}, Ancient Painting and Mosaics Karen Foster
Study of the major developments in wall painting, vase painting, and mosaics as seen in ancient Egypt, the Aegean Bronze Age, and the Greek, Etruscan, and Roman world. MW 2:30–3:45

[**NELC 509b^{U}/ARCG 744b^{U}, The Age of Akhenaton**]

NELC 512a, Egyptian Religion through the Ages John Darnell
Diachronic approach to topics in Egyptian religion. Religious architecture, evidence for protodynastic cults, foreigners in Egyptian religious celebrations, music and vocal expression in Egyptian religion, Re and Osiris, the Amarna interlude and the Ramesside solar religion, and the goddess of the eye of the sun. Readings in translation. TTH 11:35–12:50

[**NELC 513a, Readings in Egyptian History**]

[**NELC 514a^{U}, Buried Cities: Thera, Pompeii, and Herculaneum**]

NELC 515a^{U}/REL 540a, The Bible in Its Ancient Near Eastern Setting (Seminar) Eckart Frahm
History of the Assyrian, Babylonian, and Persian empires of the first millennium B.C.E., and how their rise and fall influenced the politics, religion, and literary traditions of biblical Israel. Topics include the role of prophecy and (divine) law, political and religious

justifications of violence, the birth of monotheism, and the historical reliability of the Hebrew Bible. TTH 11:35–12:50

[**NELC 516b[U], Myth and Ritual in the Ancient Near East**]

[**NELC 518b[U], Assyria: The First Near Eastern Empire (Seminar)**]

[**NELC 519a[U], Religion and Politics in the Ancient Near East**]

NELC 520a, Mesopotamian History of the Third Millennium Benjamin Foster
Readings and discussion of issues and evidence for a selected 500-year period of Mesopotamian history.

[**NELC 524b[U], Egyptian Literature through the Ages**]

[**NELC 525a, Toward an Art History for Ancient Egypt: Issues, Approaches, and Object Study**]

[**NELC 531b[U], Antiquity into Islam**]

NELC 533b/ANTH 531b/ARCG 531b/CLSS 815b/CPLT 547b/HIST 502b/JDST 653b/RLST 803b, Fakes, Forgeries, and the Making of Antiquity Eckart Frahm, Irene Peirano Garrison
A comparative exploration of notions of forgery and authenticity in the ancient and premodern worlds, in a variety of civilizations (ancient Greece, Mesopotamia, Egypt, Israel, China, India, etc.) and different political, religious, literary, and artistic contexts. Emphasis is also placed on the pivotal role played by the "authentic" in the modern era in disciplines such as philology and aesthetics, the manipulative uses of ancient history for purposes of modern nation building and identity formation, copies and reconstructions of ancient artifacts, and the role of forgeries in today's antiquities trade. TH 2:30–4:30

[**NELC 534b[U], The Making of Monasticism**]

NELC 535a/REL 544a, History and Methods of Old Testament Interpretation I John J. Collins
In this course, students report on classic secondary works from the history of Old Testament scholarship.

NELC 536a/REL 500a, Old Testament Interpretation Joel Baden
The first half of a two-term introduction to the content of and basic critical approaches to the Old Testament (Genesis through 2 Kings).

NELC 547b, Survey of Mesopotamian and Akkadian Literature Benjamin Foster
Introduction to Sumerian and Akkadian literature, in translation, from their beginnings through the Hellenistic period.

[**NELC 554a[U], Israeli Identity and Culture: 1948 to the Present**]

[**NELC 555a, Classical Arabic Literature in Translation**]

[**NELC 556a[U], Classics: The Arabic-Islamic World**]

[**NELC 557b[U], Israeli Narratives**]

[**NELC 561a[U], Jewish Sectarianism in the Middle Ages**]

[**NELC 563b, From Pictograph to Pixel: Changing Ways of Human Communication**]

[**NELC 566b, Prehistory of Nubia**]

[**NELC 567a[U]/ARCG 746a[U], Ancient Civilizations of Nubia**]

NELC 569a[U], Visible Language: The Origins of Writing in Mesopotamia and Ancient Egypt Christina Geisen, Agnete Lassen
Exploration of writing in the ancient Near East and the profound effects this new method of communication had on human society. Focus on Egypt and Mesopotamia, where advanced writing systems first developed and were used for millennia. T 1:30–3:20

[**NELC 580a, Settlement Archaeology in Egypt**]

[**NELC 587b[U], Environmental History of the Near East**]

NELC 588b[U]/ANTH 773b[U]/ARCG 773b[U]/F&ES 793b, Abrupt Climate Change and Societal Collapse Harvey Weiss
Collapse documented in the archaeological and early historical records of the Old and New Worlds, including Mesopotamia, Mesoamerica, the Andes, and Europe. Analysis of politicoeconomic vulnerabilities, resiliencies, and adaptations in the face of abrupt climate change, anthropogenic environmental degradation, resource depletion, "barbarian" incursions, or class conflict. TH 3:30–5:20

[**NELC 589a[U], Archaeologies of Empire**]

[**NELC 590b[U], Identity in Modern Turkey**]

NELC 592b[U]/JDST 785b[U], State and Society in Israel Dina Roginsky
The interplay between state and society in Israel; current Israeli discourse on controversial issues such as civil rights in a Jewish-democratic state, Jewish-Arab relations, right and left politics, orthodoxy, military service, globalization, and multiculturalism. Sociopolitical changes that have taken place in Israel since the establishment of the state led to the reshaping of Israeli Zionist ideology. Conducted in English. TTH 1–2:15

NELC 601a[U], *The Arabian Nights,* Then and Now Shawkat Toorawa
The medieval Arabic cycle of stories known as *The Arabian Nights* or *The Thousand and One Nights* is a classic of world literature. In the first part of this course, we read the *Nights* and discuss both its dominant themes—inter alia deceit, love, sex, revenge, violence, and justice—and its storytelling contexts and antecedents, such as the Middle Persian *Tales of Bidpai*. In the second part, we explore the ways in which these themes and tales have been adapted and appropriated by later authors, including Neil Gaiman, Mary Zimmerman, and G. Willow Wilson in English, Jorge Luis Borges in Spanish, and Naguib Mahfouz in Arabic. We also study the films of Korda, Pasolini, and Barron.

NELC 701a[U]/JDST 736a[U]/RLST 746a[U], Midrash Seminar: The Revelation at Sinai Steven Fraade
The giving of the Torah to Israel as seen through rabbinic eyes. Close readings of midrashic texts. Views of revelation, tradition, interpretation, law, and commandment in

their literary and historical contexts. Interpretations and interpretive strategies compared and contrasted with those of other ancient biblical exegetes (Jewish and non-Jewish). Prerequisite: reading fluency in ancient Hebrew. TH 9:25–11:15

NELC 702a[U]/JDST 727a[U]/RLST 752a[U], Mishnah Seminar: Tractate Ta'anit on Fasting Steven Fraade

Close study of a section of the Mishnah, the earliest digest of Jewish law, treating procedures for public fasts in response to drought and other forms of collective adversity. Particular attention to the textual practices of rabbinic legal discourse in relation to its social function, and to the interplay of law and narrative. Prerequisite: reading fluency in ancient Hebrew. W 9:25–11:15

NELC 703b[U]/JDST 721b[U]/RLST 751b[U], Introduction to Judaism in the Ancient World: From Temple to Talmud Steven Fraade

The emergence of classical Judaism in its historical setting. Jews and Hellenization; varieties of early Judaism; apocalyptic and postapocalyptic responses to suffering and catastrophe; worship and atonement without sacrificial cult; interpretations of scriptures; law and life; the rabbi; the synagogue; faith in reason; Sabbath and festivals; history and its redemption. MW 11:35–12:50

NELC 704b[U]/JDST 725b[U]/RLST 757b[U], The Dead Sea Scrolls and the History of Ancient Judaism: The Damascus Document Steven Fraade

Study of one of the most important of the Dead Sea Scrolls, the Damascus Document. Attention to its place in the history of biblical interpretation and ancient Jewish law; the nature and rhetorical function of its textual practices, both narrative and legal; and its ideological formulations, literary history, and relation to the central sectarian writings of the Qumran community. Prerequisite: reading fluency in ancient Hebrew. TH 9:25–11:15

NELC 720b[U]/ANTH 720b[U]/ARCG 720b[U], Babylon to Bush Harvey Weiss

Analysis of Mesopotamian transformations from the earliest agriculture villages to the earliest cities, states, and civilization, to the earliest empires, as well as the region-wide collapses that punctuated these developments. Forces that drove these uniquely early Mesopotamian developments. Essential archaeological questions, including why each transformation happened, developed, and evolved. The end of the Ottoman empire and the British (1917) and American (1991, 2003) invasions. TH 1:30–3:20

[**NELC 735a[U], Gnostic Religion and Literature**]

[**NELC 774a[U]/F&ES 774a, Agriculture: Origins, Evolution, Crises**]

[**NELC 829b, History of the Arabic Language**]

NELC 830a/HIST 860a, From Medina to Constantinople: The Middle East from 600 to 1517 Adel Allouche

The seminar discusses the religious and political events that shaped the Middle East from the rise of Islam to the Ottoman conquest of Egypt. It encompasses Arab lands, Iran, and Turkey. TH 1:30–3:20

[**NELC 831b, Greco-Arabic Seminar**]

[**NELC 844b, Arabic Textual Criticism and Editorial Technique**]

[**NELC 845, Seminar in Arabic Philosophy: Plato's *Laws* in Arabic**]

[**NELC 846b, Seminar in the Philosophy of Avicenna**]

[**NELC 849a or b, Directed Readings: Arabic**]

NELC 850a[U], Introduction to Arabic and Islamic Studies Dimitri Gutas
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. T 1:30–3:20

NELC 853b[U]/CPLT 685b[U]/JDST 850b[U], Literature at the Limit: Palestine and Israel Hannan Hever, Robyn Creswell
Readings and films from post-1948 Palestine and Israel, with special attention to historical and political contexts. This course focuses on Hebrew- and Arabic-language culture produced in Palestine and Israel since the year of the Palestinian Haqba and the Jewish War of Independence. These poems, novels, and films consistently probe the figure of the limit—in the geographical sense of borders and checkpoints, as well as in the existential sense of extremity and trauma. What are the limits of one's political and linguistic community? What is the role of culture in defining, deconstructing, or bridging those borders? The course is intended to serve as an introduction to canonical texts of both national traditions, as well as the methods of comparative literature. Readings include works by Darwish, Yehoshua, Kanafani, Oz, Habibi, Ballas, and Shammas. All readings in English. W 2:30–4:20

NELC 854b[U]/CPLT 682b[U]/JDST 851b[U], Cultural Critique and Israel Hannan Hever
An overview of the poetics, culture, history, and political dynamics of modern Hebrew literature as a national literature over the past three hundred years. No background in Jewish literature and Jewish culture is required. All readings in English. T 1:30–3:20

PERS 501[U], Elementary Persian Farkhondeh Shayesteh
A two-term introduction to modern Persian with emphasis on all four language skills: reading, writing, listening, and speaking. The objective is to allow students to develop the foundational knowledge necessary for further language study. Designed for nonnative speakers. MTWTHF 10:30–11:20

PERS 502[U], Intermediate Persian Farkhondeh Shayesteh
This two-term course is a continuation of PERS 501 with emphasis on expanding vocabulary and understanding of more complex grammatical forms and syntax. Designed for nonnative speakers. Prerequisite: PERS 501 or permission of the instructor. MW 11:35–12:50, 1 HTBA

[**PERS 503b, Persian Seminar: Identity and Change**]

PERS 504b[U], Thematic Survey of Modern Persian Literature Farkhondeh Shayesteh
An advanced course focusing on continuing development of language skills for nonnative speakers. Emphasis on reading and writing through modern Persian literary prose and poetry. Prerequisite: PERS 502 or permission of the instructor. T 1:30–3:20

[PERS 505, Introduction to Pahlavi (Middle Persian)]

[PERS 560a[U], Classical Persian Literature]

[PERS 561b[U], Persian Culture and Media]

PERS 589a[U] or b[U], Directed Readings: Persian

[SMTC 501b, Introduction to Comparative Semitics]

[SMTC 502a, Linguistic Topics in Akkadian]

SMTC 520, Introduction to Ugaritic Jimmy Daccache
A two-term introduction to the Ugaritic language. The first term is devoted to acquiring the essentials of Ugaritic grammar and vocabulary. The second focuses on reading and analysis of Ugaritic texts from various genres and time periods.

SMTC 521, Elementary Syriac Jimmy Daccache
A two-term introduction to the Syriac language. The first term is devoted to acquiring the essentials of Syriac grammar and vocabulary. The second focuses on reading and analysis of Syriac texts from various genres and time periods.

[SMTC 522, Intermediate Syriac]

[SMTC 523a, Intermediate Syriac: Prose Texts]

[SMTC 524b, Intermediate Syriac: Poetic Texts]

[SMTC 525a, Introduction to Syriac Christianity]

[SMTC 531, Introduction to Aramaic]

[SMTC 542a, Introduction to Classical Ethiopic]

[SMTC 543b, Readings in Classical Ethiopic]

SMTC 545b/RLST 835b, Northwest Semitic Inscriptions (Phoenician, Aramaic, Moabite, and Hebrew) Jimmy Daccache
This introduction to Semitic epigraphy is designed to lay the groundwork for the study of Phoenician, Hebrew, and Aramaic grammar, illustrated through a wide variety of inscriptions stretching from the early centuries of the first millennium B.C.E. to the Roman period.

[SMTC 793a, Biblical Aramaic]

[SMTC 794b, Aramaic of the Dead Sea Scrolls]

TKSH 501[U], Elementary Turkish Ozgen Felek
Development of a basic knowledge of modern Turkish, with emphasis on grammatical analysis, vocabulary acquisition, and the training of reading and writing skills. This is a two-term course. MTWTHF 10:30–11:20

TKSH 502[U], Intermediate Turkish Ozgen Felek
Continued study of modern Turkish, with emphasis on advanced syntax, vocabulary acquisition, and the beginnings of free oral and written expression. This is a two-term course. Prerequisite: TKSH 501 or permission of the instructor. TTH 11:35–12:50, 1 HTBA

TKSH 503a[U] or b[U], Advanced Turkish Ozgen Felek
Emphasis on advanced oral and written expression. Prerequisite: TKSH 502 or permission of the instructor. MW 1–2:15

[**TKSH 505a[U], Structure of Modern Turkish**]

TKSH 560, Beginning Ottoman Turkish Ozgen Felek

TKSH 570a or b, Directed Readings and Research

NEUROSCIENCE

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Chair
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Professors Amy Arnsten, Hal Blumenfeld (*Neurology*), Marvin Chun (*Psychology*), Michael Crair, Pietro De Camilli, Nihal de Lanerolle (*Neurosurgery*), Sabrina Diano (*Obstetrics, Gynecology & Reproductive Sciences*), Ralph DiLeone (*Psychiatry*), Ronald Duman (*Psychiatry*), Joel Gelernter (*Psychiatry*), Charles Greer (*Neurosurgery*), Murat Gunel (*Neurosurgery*), Joy Hirsch (*Psychiatry*), Tamas Horvath (*Comparative Medicine*), Jeffery Kocsis (*Neurology*), Anthony Koleske (*Molecular Biophysics & Biochemistry*), John Krystal (*Psychiatry*), Robert LaMotte (*Anesthesiology*), Daeyeol Lee, Csaba Leranth (*Obstetrics, Gynecology & Reproductive Sciences*), Paul Lombroso (*Child Study Center*), David McCormick, Godfrey Pearlson (*Psychiatry*), Marina Picciotto (*Psychiatry*), Vincent Pieribone (*Cellular & Molecular Physiology*), Marc Potenza (*Psychiatry*), Pasko Rakic, Joseph Santos-Sacchi (*Surgery*), Nenad Sestan, Gordon Shepherd, Rajita Sinha (*Psychiatry*), Stephen Strittmatter, Susumu Tomita, Flora Vaccarino (*Child Study Center*), Christopher van Dyck (*Psychiatry*), Stephen Waxman (*Neurology*), Z. Jimmy Zhou (*Ophthalmology & Visual Science*)

Associate Professors Meenakshi Alreja (*Psychiatry*), Charles Bruce, Sreeganga Chandra, Daniel Colón-Ramos, Kelly Cosgrove (*Psychiatry*), Jaime Grutzendler (*Neurology*), Marc Hammarlund, Elizabeth Jonas (*Internal Medicine/Endocrinology*), Chiang-Shan Ray Li (*Psychiatry*), Angeliki Louvi (*Neurosurgery*), James Mazer, Dhasakumar Navaratnam (*Neurology*), Michael Schwartz, Justus Verhagen

Assistant Professors Jessica Cardin, Steve Chang (*Psychology*), Bo Chen (*Ophthalmology & Visual Science*), Marcelo de Oliveira Dietrich (*Comparative Medicine*), George Dragoi (*Psychiatry*), Jason Gerrard (*Neurosurgery*), Elena Gracheva, Michael Higley, In-Jung Kim (*Ophthalmology & Visual Science*), Alex Kwan (*Psychiatry*), Ifat Levy (*Comparative Medicine*), Janghoo Lim

Fields of Study

Fields include the development, neuronal organization, and function of the mammalian central nervous system. The range of methods includes molecular-genetic and cellular neuroscience, neuroanatomy, biochemistry, neuropharmacology, computational modeling, neurophysiology, neuroimaging and behavior. An integrative, multidisciplinary approach is encouraged.

Special Admissions Requirements

To enter the Department of Neuroscience Ph.D. program, students apply to the Neuroscience track within the interdepartmental graduate program in Biological and Biomedical Sciences (BBS), http://bbs.yale.edu. At the end of the first year of study, the student selects the Neuroscience Ph.D. program as the degree program.

Special Requirements for the Ph.D. Degree

COURSE REQUIREMENTS

Six courses are required, and students must obtain a grade of Honors in two of these courses and maintain an HP average or better. Students not achieving this will be put on academic probation and may be dismissed from the graduate program. Without exception, students are required to earn two Honors by the end of the second year of enrollment. All students will be reviewed academically at the end of the year. For purposes of calculating an overall High Pass or above average, Honors=3, High Pass=2, Pass=1, and Fail=0.

Required courses are Principles of Neuroscience (NBIO 701a), Neurobiology (NBIO 720a), and Structural and Functional Organization of the Human Nervous System (NBIO 500b). In addition, three more elective graduate-level courses are required. Additional degree requirements are successful completion of both terms of Lab Rotation for First-Year Students (NBIO 512a/b) and both terms of Second-Year Thesis Research (NBIO 513a/b). This will ensure that degree candidates obtain a solid background in systems, cellular, and molecular approaches to neuroscience. In addition to all other requirements, students must successfully complete NBIO 580b, Bioethics in Neuroscience, prior to the end of their first year of study. This requirement must be met prior to registering for a second year of study. In their fourth year of study, all students must successfully complete B&BS 503b, RCR Refresher for Senior BBS Students.

LABORATORY ROTATIONS

Two rotations are required; they are typically completed in the first year. Rotations outside the Neuroscience track will count toward this requirement upon approval of the Neuroscience track directors.

TEACHING REQUIREMENTS

An important aspect of graduate training in Neuroscience 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 at the undergraduate, graduate, and medical school levels. Ph.D. students are required to serve as Teaching Fellows (TF) for two terms. First-year students may not serve as a TF without written permission from the Neuroscience track directors. It is recommended that one term of teaching should be completed by the end of the third year, and both requirements be completed by the end of the fourth year.

Specifically, it is recommended that the first requirement be met by teaching in either Principles of Neuroscience (NBIO 701a), Neurobiology (NBIO 720a), Brain and Thought (CGSC 201a), or Structural and Functional Organization of the Human Nervous System (NBIO 500b). The second course may be chosen from the list of neuroscience-related

courses in the Graduate School of Arts and Sciences bulletin, or from the Interdepartmental Neuroscience Program's Bioethics course. A course not directly related to neuroscience must have the approval of the director of graduate studies (DGS).

QUALIFYING EXAM

Ph.D. students must complete their qualifying exam by June 1 of their second year as a graduate student. The student must choose four faculty members to read with in consultation with the DGS and the student's Ph.D. mentor; it is strongly encouraged that these faculty represent interests spanning from molecular to systems/cognitive neuroscience and not include the Ph.D. mentor. The student and faculty should devise a reading list of about fifteen papers on a defined topic. They should meet regularly (at least three or four meetings) to discuss the papers in depth. For the written exam, the student is given two questions from each faculty member. The student has three hours to write an answer to one of the two questions for each faculty member, i.e., a twelve-hour written exam spread over two days. The exam is performed on a laptop observing the honor system and is proctored by the DGS. The student may refer to the papers and his/her notes but not to the Internet. The answers are distributed to the faculty, and several days later an oral exam is held to further evaluate the student's knowledge. A fifth faculty member (a reader) chosen by the student may also be present at the oral exam, along with the DGS. If the student fails the qualifying exam, he/she may have one more attempt at passage; this must be completed within one term of taking the original exam. A unanimous Pass vote from the Qualifying Examination committee is required. Students who do not pass the Qualifying Examination will be put on academic probation and will be required to either retake parts of the qualifier and/or complete additional course work. They will receive a letter from the DGS explaining why their performance was marginal, and they may be dismissed from the graduate program if they do not show improvement within one term. Areas of weakness will be outlined, as well as specific guidelines as to how they can demonstrate improvement. Proof of timely continual academic progress will be required.

PROSPECTUS

Ph.D. students must complete and submit their dissertation prospectus (also called thesis proposal) by June 1 of the third year as a graduate student. The guidelines are as follows:

1. The student should discuss with his/her mentor an appropriate topic and research plan for the thesis proposal, as well as discuss likely names of faculty to serve on the thesis committee. The thesis committee is required to have four members: the mentor and three other faculty, with at least one of those three faculty with a primary appointment in the Department of Neuroscience and one member with a primary appointment outside the Department of Neuroscience. Faculty outside of Yale can be included if they can attend on a regular basis. Non-Yale faculty are often best included as a fifth member, so that a meeting can officially be held in their absence if needed. One member of the thesis committee (not the mentor) is appointed chair.
2. The student should write a proposal of approximately seven (7) pages (following the format of an NIH/NRSA application). This should include (a) the hypothesis to be addressed (specific aims), (b) a few pages of background and significance,

(c) preliminary data to demonstrate feasibility, and (d) a research plan including strategies in case proposed experiments fail. It is highly recommended that the thesis include a core of conservative experiments, i.e., very feasible, well-controlled studies. High-risk/high-payoff studies should only be included as "halo" research; i.e., if these fail, the student should still be able to graduate.

3. The mentor should approve the thesis proposal.
4. The student should distribute the proposal to his/her thesis committee members at least one week before the thesis committee meeting, and optimally discuss the proposal with each member individually prior to the meeting to ensure that there are no major problems.
5. The student meets with the thesis committee to approve the thesis proposal. It is at this time that the proposal is often modified, for instance by the suggestion of an additional control experiment. Goals should be realistic and in the interest of the student completing his/her degree in a timely manner. The finalized approved protocol is then provided to the Neuroscience business office, where the registrar will complete the paperwork for advancement to candidacy, obtain the DGS's signature, and then send it to the Graduate School. As this must be completed before June 1, students should convene the thesis committee meetings prior to mid-May.

The student is required to meet with his/her thesis committee on at least a yearly basis to update progress and problems. A one-page summary of this meeting is written and signed by the chair of the thesis committee. The student is provided with written feedback. The registrar receives a copy of the report and files it in the student's file.

ADMISSION TO CANDIDACY

Ph.D. students are required to have been admitted to candidacy by June 1 of the third year as a graduate student. Generally, the submission of the thesis prospectus is the final requirement for admission to candidacy. The paperwork for both is submitted to the Graduate School at the same time. Students who do not meet this standard may be required to petition the Graduate School for permission to register for the following term and can be placed on academic probation until these requirements have been met.

OTHER REQUIREMENTS

All graduate students who are admitted to candidacy are required to have an annual thesis committee meeting; more frequent meetings are encouraged. All graduate students are required to give a student research presentation annually (a brief INP rotation talk early in the graduate career, followed by a longer Neuroscience Student Research Talk as the student's research advances). All students are expected to attend rotation/student research talks.

THESIS DEFENSE

There are several parts to the thesis defense: (1) The student gives the full thesis document to the thesis committee with sufficient time (approximately two weeks) for the committee to read and comment on this large document before the thesis defense. (2) The student defends the thesis in front of the thesis committee in a private setting. It is expected that small changes to the thesis document will be made before submission

to the Graduate School. Major changes to the thesis may require additional meetings between the student and the thesis committee before a public defense can be scheduled. (3) The student gives the public defense no less than one month following the private (thesis committee) defense, following approval of the DGS. The public defense is a one-hour seminar summarizing the research and open to the community.

VACATION POLICY

Students making satisfactory progress toward the completion of their Ph.D. degree will have two weeks of vacation in addition to the stated Yale University holidays and the break from Christmas Eve through New Year's Day. Additional vacation time will require permission from the thesis adviser. Although classes are not held, Fall and Spring recesses are not considered Yale University holidays. Proposed exceptions must be discussed with the DGS.

Special Requirements for the M.D./Ph.D.

Requirements for M.D./Ph.D. students are the same as for Ph.D. students with the following differences: three courses are required (Principles of Neuroscience, Structural and Functional Organization of the Human Nervous System, and one elective graduate-level course). M.D./Ph.D. students are required to serve for one term as teaching assistants; however, two terms of teaching are preferred.

Master's Degrees

M.Phil. See Degree Requirements under Policies and Regulations. 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. Students must have successfully completed our equivalent of 30 credit hours in the doctoral program. This includes a passing grade in the four required courses plus two elective courses, a minimum of two Honors grades, and successful completion of both terms of Lab Rotation for First-Year Students (NBIO 512a/b) and both terms of Second-Year Thesis Research (NBIO 513a/b). Students are not admitted for this degree.

Program materials are available upon request to the Director of Graduate Studies, Department of Neuroscience, Yale University, PO Box 208001, New Haven CT 06520-8001.

Courses

NBIO 500b/INP 510b, Structural and Functional Organization of the Human Nervous System Michael Schwartz, Charles Greer, 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. Lectures in neurophysiology cover various aspects of neural function at the cellular and systems levels, with a strong emphasis on the mammalian nervous system. Clinical correlations

consist of sessions applying basic science principles to understanding pathophysiology in the context of patients. Seven two-hour laboratory sessions are coordinated with lectures throughout the course to provide an understanding of the structural basis of function and disease. Case-based conference sections provide an opportunity to integrate and apply the information learned about the structure and function of the nervous system in the rest of the course to solving a focused clinical problem in a journal club format. Variable class schedule; contact course instructors. This course is offered to graduate and M.D./Ph.D. students only and cannot be audited.

[**NBIO 504b/INP 504b/MCDB 735b[U], Seminar in Brain Development and Plasticity**]

NBIO 507b/INP 507b, Cellular and Molecular Mechanisms of Neurological Disease William Cafferty, Sreeganga Chandra
This course focuses on diseases/disorders such as Alzheimer's, Parkinson's, schizophrenia, multiple sclerosis, autism, and epilepsy, in which modern neuroscience has advanced mechanistic explanations for clinical conditions. The course highlights recent genetic, molecular, electrophysiological, and imaging experiments in parsing disease mechanisms. TTH 4–5

NBIO 512a/b/INP 512a/b, Lab Rotation for First-Year Students Charles Greer
Required of all first-year Neuroscience track graduate students. Rotation period is one term. Both terms required. Grading is Satisfactory/Unsatisfactory.

NBIO 513a/b, Second-Year Thesis Research Michael Crair
Required of all second-year Department of Neuroscience graduate students. Both terms required. Grading is Satisfactory/Unsatisfactory.

NBIO 532a/INP 532a, Neurobiology of Cortical Systems Michael Crair
This is a lecture, reading, and discussion-based course focused on the mammalian cerebral cortex. Students learn about the evolution, development, function, and dysfunction of the cortex. Significant emphasis is placed on examining unique aspects of the cortex, including cortical circuit structure, plasticity, cognition, and models of higher-order cognitive processing. We also examine disease processes in which cortical dysfunction is specifically implicated. Offered every other year.

[**NBIO 533a/INP 533a, Function and Dysfunction of the Visual System** Offered every other year]

[**NBIO 535b, History of Modern Neuroscience**]

NBIO 540a/INP 540a, How to Give a Talk Jessica Cardin
This course is a practical introduction to the art and science of giving a data-based neuroscience seminar. The ability to give a clear, convincing, and engaging talk about your work is one of the key career skills of successful scientists. Content, visual presentation, body language, and delivery all combine to determine your impact on your audience. The focus in class is on student presentation skills and detailed feedback, interspersed with short example talks by invited guests. Students give at least two talks over the course of the term and participate in weekly Q&A and feedback. Grading is based on class participation. Enrollment limited to ten.

NBIO 570b/C&MP 570b, Sensory Physiology David Zenisek, Joseph Santos-Sacchi, Z. Jimmy Zhou
The course provides an overview of the mammalian special sensory systems, including molecular and cellular bases of vision, audition, taste, olfaction, and somatosensation. Faculty with focus in those areas lead presentations and discussions on peripheral and central mechanisms. Psychophysical aspects of sensation are introduced. TTH 2:30–3:45

NBIO 580b/INP 580b, Bioethics in Neuroscience Charles Greer
This course is an introduction to ethics and ethical decision making in the neurosciences. Format for the course is an informal discussion. Each week we are joined by members of the Yale faculty and community who can share their experiences and expertise as it relates to the topic of the week. This course is mandatory for first-year graduate students in the Interdepartmental Neuroscience Program (INP). Grading is Satisfactory/Unsatisfactory and is based on attendance/participation, weekly reaction papers, and a final term paper. The successful (Satisfactory) completion of this course is worth one full graduate course credit. TH 4–5:15

[**NBIO 590a, Sensory Neuroethology: Bats and Owls, Electric Fish, and Beyond**]

NBIO 595b/INP 595b, Seminar in Visuomotor Neurophysiology Daeyeol Lee
Review and discussion of seminal papers in neurophysiological and computational studies of visual system. The course covers papers on the receptive field physiology of neurons in the retina and central visual pathway, motor cortex, and computational theories of vision and motor control. It largely focuses on the literature in primates, but also draws on behavioral and neurophysiological studies in other mammals, such as cats and humans. Contact course instructor for first class date and time.

[**NBIO 596a/INP 596a, Seminar in Neurophysiology of Decision Making**]

NBIO 597b/INP 597b, Neuroeconomics Daeyeol Lee, Ifat Levy
This course introduces some of the main topics in decision-making research. We discuss how behavioral economics methods are combined with neuroscientific tools, in particular functional MRI and single-neuron recordings, to study the neural mechanisms underlying decision and valuation processes. The course includes both introductory presentations by the instructors and paper presentations by the students. Offered every other year.

NBIO 602a/b, Topics in Cortical Development and Evolution Pasko Rakic
This advanced tutorial course involves extensive reading, discussion, and pilot experiments on the topic.

NBIO 610b/C&MP 620b, Fundamentals in Neurophysiology Vincent Pieribone, Fred Sigworth
The 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 701a/INP 701a, Principles of Neuroscience Ralph DiLeone, Angeliki Louvi
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. TF 2:15–3:45

NBIO 720a/INP 720a/MCDB 720a[U], Neurobiology Haig Keshishian, Paul Forscher
Examination of the excitability of the nerve cell membrane as a starting point for the study of molecular, cellular, and intracellular mechanisms underlying the generation and control of behavior. MWF 11:35–12:25

INTERDEPARTMENTAL NEUROSCIENCE PROGRAM

Sterling Hall of Medicine L-200, 203.785.5932
http://medicine.yale.edu/inp
M.S., M.Phil., Ph.D.

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Professors Amy Arnsten (*Neuroscience; Psychology*), Anton Bennett (*Pharmacology; Comparative Medicine*), Hal Blumenfeld (*Neurology; Neuroscience; Neurosurgery*), Angélique Bordey (*Neurosurgery; Cellular & Molecular Physiology*), Tyrone Cannon (*Psychology; Psychiatry*), John Carlson (*Molecular, Cellular & Developmental Biology; on leave* [Sp]), Marvin Chun (*Psychology; Neuroscience*), Lawrence Cohen (*Cellular & Molecular Physiology*), R. Todd Constable (*Radiology & Biomedical Imaging; Neurosurgery*), Michael Crair (*Neuroscience; Ophthalmology & Visual Science*), Pietro De Camilli (*Cell Biology; Neuroscience*), Nihal DeLanerolle (*Neurosurgery; Neuroscience*), Sabrina Diano (*Obstetrics, Gynecology & Reproductive Sciences; Comparative Medicine; Neuroscience*), Ralph DiLeone (*Psychiatry; Neuroscience*), Ronald Duman (*Psychiatry; Neuroscience*), Barbara Ehrlich (*Pharmacology; Cellular & Molecular Physiology*), Paul Forscher (*Molecular, Cellular & Developmental Biology*), Charles Greer (*Neurosurgery; Neuroscience*), Murat Gunel (*Neurosurgery; Genetics; Neuroscience*), David Hafler (*Neurology; Immunobiology*), Joy Hirsch (*Psychiatry; Comparative Medicine; Neuroscience*), Tamas Horvath (*Comparative Medicine; Neuroscience; Obstetrics, Gynecology & Reproductive Sciences*), Arthur Horwich (*Genetics; Pediatrics*), Jonathon Howard (*Molecular Biophysics & Biochemistry; Physics*), James Howe (*Pharmacology*), D.S. Fahmeed Hyder (*Radiology & Biomedical Imaging; Biomedical Engineering*), Marcia Johnson (*Psychology; Law*), Leonard Kaczmarek (*Pharmacology; Cellular & Molecular Physiology*), Haig Keshishian (*Molecular, Cellular & Developmental Biology*), Kenneth Kidd (*Genetics; Ecology & Evolutionary Biology; Psychiatry*), Jeffery Kocsis (*Neurology; Neuroscience*), Anthony Koleske (*Molecular Biophysics & Biochemistry; Neuroscience*), John Krystal (*Psychiatry; Neuroscience*), Robert LaMotte (*Anesthesiology; Neuroscience*), Daeyeol Lee (*Neuroscience; Psychology*), Paul Lombroso (*Child Study Center; Neuroscience; Psychiatry*), Laura Manuelidis (*Neuropathology*), Gregory McCarthy (*Psychology*), David McCormick (*Neuroscience; Psychology*), Mark Mooseker (*Molecular, Cellular & Developmental Biology; Cell Biology*), Angus Nairn (*Psychiatry; Pharmacology*), Michael Nitabach (*Cellular & Molecular Physiology; Genetics*), Marina Picciotto (*Psychiatry; Pharmacology; Neuroscience*), Vincent Pieribone (*Cellular & Molecular Physiology; Neuroscience*), Marc Potenza (*Psychiatry; Child Study Center; Neuroscience*), Pasko Rakic (*Neuroscience; Neurology*), Robert Roth, Jr. (*Psychiatry*), Gary Rudnick (*Pharmacology*), W. Mark Saltzman (*Biomedical Engineering; Cellular & Molecular Physiology; Chemical & Environmental Engineering*), Laurie Santos (*Psychology*), Joseph Santos-Sacchi (*Surgery;*

Cellular & Molecular Physiology; Neuroscience), Nenad Sestan (*Neuroscience; Comparative Medicine; Genetics; Psychiatry*), Gordon Shepherd (*Neuroscience*), Fred Sigworth (*Cellular & Molecular Physiology; Biomedical Engineering*), Dana Small (*Psychiatry; Psychology [Assoc. Prof.]*), Stephen Strittmatter (*Neurology; Neuroscience*), Jane Taylor (*Psychiatry; Psychology*), Susumu Tomita (*Cellular & Molecular Physiology; Neuroscience*), Flora Vaccarino (*Child Study Center; Neuroscience*), Christopher van Dyck (*Psychiatry; Neuroscience; Neurology*), Stephen Waxman (*Neurology; Pharmacology; Neuroscience*), Robert Wyman (*Molecular, Cellular & Developmental Biology; on leave* [Sp]), Tian Xu (*Genetics*), David Zenisek (*Cellular & Molecular Physiology; Ophthalmology & Visual Science*), Z. Jimmy Zhou (*Ophthalmology & Visual Science; Cellular & Molecular Physiology; Neuroscience*), Steven Zucker (*Computer Science; Biomedical Engineering*)

Associate Professors Meenakshi Alreja (*Psychiatry; Neuroscience*), Charles Bruce (*Neuroscience*), Sreeganga Chandra (*Neurology; Neuroscience; Molecular, Cellular & Developmental Biology*), Daniel Colon-Ramos (*Cell Biology; Neuroscience*), Kelly Cosgrove (*Psychiatry; Radiology & Biomedical Imaging; Neuroscience*), Ivan De Araujo (*Psychiatry; Cellular & Molecular Physiology*), Jonathan Demb (*Ophthalmology & Visual Science; Cellular & Molecular Physiology*), Thierry Emonet (*Molecular, Cellular & Developmental Biology; Physics*), Jaime Grutzendler (*Neurology; Neuroscience*), Marc Hammarlund (*Genetics; Neuroscience*), Elizabeth Jonas (*Internal Medicine; Neuroscience*), Michael Koelle (*Molecular Biophysics & Biochemistry*), Ifat Levy (*Comparative Medicine; Neuroscience*), Chiang-shan Ray Li (*Psychiatry; Neuroscience*), Angeliki Louvi (*Neurosurgery; Neuroscience*), Evan Morris (*Radiology & Biomedical Imaging; Biomedical Engineering; Psychiatry*), Dhasakumar Navaratnam (*Neurology; Neuroscience*), Maria Piñango (*Linguistics*), Christopher Pittenger (*Psychiatry; Child Study Center; Psychology*), Michael Schwartz (*Neuroscience*), Justus Verhagen (*Neuroscience*), Weimin Zhong (*Molecular, Cellular & Developmental Biology*)

Assistant Professors Nii Addy (*Psychiatry; Cellular & Molecular Physiology*), Alan Anticevic (*Psychiatry; Psychology*), Sviatoslav Bagriantsev (*Cellular & Molecular Physiology*), William Cafferty (*Neurology*), Jessica Cardin (*Neuroscience*), Steve Chang (*Psychology; Neuroscience*), Damon Clark (*Molecular, Cellular & Developmental Biology; Physics; on leave* [F]), Philip Corlett (*Psychiatry*), Marcelo de Oliveira Dietrich (*Comparative Medicine; Neuroscience*), George Dragoi (*Psychiatry; Neuroscience*), Tore Eid (*Laboratory Medicine; Neurosurgery*), Jason Gerrard (*Neurosurgery; Neuroscience*), Elena Gracheva (*Cellular & Molecular Physiology; Neuroscience*), Michael Higley (*Neuroscience*), Kristopher Kahle (*Neurosurgery; Pediatrics; Cellular & Molecular Physiology*), Erdem Karatekin (*Cellular & Molecular Physiology; Molecular Biophysics & Biochemistry*), In-Jung Kim (*Ophthalmology & Visual Science; Neuroscience*), Hedy Kober (*Psychiatry; Psychology*), Alex Kwan (*Psychiatry; Neuroscience*), Janghoo Lim (*Genetics; Neuroscience*), John Murray (*Psychiatry*), Timothy Newhouse (*Chemistry*), Gregory Samanez-Larkin (*Psychology*), Satinder Singh (*Cellular & Molecular Physiology*), Jiangbing Zhou (*Neurosurgery; Biomedical Engineering*)

Fields of Study

The Interdepartmental Neuroscience Program (INP) 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 an annual research-in-progress talk and 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 Interdepartmental 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 Interdepartmental Neuroscience Ph.D. program, students apply to the Neuroscience track within the program in Biological and Biomedical Sciences (BBS), http://bbs.yale.edu.

Special Requirements for the Ph.D. Degree

Each entering student is assigned a faculty advisory committee to provide guidance. This committee is responsible for establishing the student's course of study and for monitoring his or her progress. This committee will be subsequently modified to include faculty with expertise in the student's emerging area of interest. Although each student's precise course requirements are set individually to take account of background and educational goals, the course of study is based on a model curriculum beginning with five core required courses (Principles of Neuroscience, Neurobiology, Bioethics in Neuroscience, Structural and Functional Organization of the Human Nervous System, all completed in the first year of enrollment; and Responsible Conduct of Research Refresher for Senior BBS Students, completed during the fourth year of enrollment). Collectively, these courses are designed to ensure broad competence in modern neuroscience. Students are also required to complete at least three additional elective courses from a broad set of neuroscience-related courses. The Graduate School uses grades of Honors, High Pass, Pass, and Fail and requires two term grades of Honors during the first two years of study. Students are expected to maintain at least a High Pass average. Additional degree requirements are successful completion of both terms of Lab Rotation for First-Year Students (INP 512a/b) and both terms of Second-Year Thesis Research (INP 513a/b). This will ensure that degree candidates obtain a solid background in systems, cellular, and molecular approaches to neuroscience. Admission to candidacy requires passing

a qualifying examination normally given during the second year, and submission of a dissertation prospectus (NIH NRSA grant format) before the end of the third year. In accordance with the expectations of the BBS program, Ph.D. students are expected to participate in two terms (or the equivalent) of teaching. Thesis committee meetings are required annually. Also required is the completion and satisfactory defense of the thesis.

Requirements for M.D./Ph.D. students are the same as for Ph.D. students with the following differences: three courses are required (Principles of Neuroscience, Structural and Functional Organization of the Human Nervous System, and one elective graduate-level course). M.D./Ph.D. students are required to serve for one term as teaching assistants; however, two terms of teaching are preferred.

Master's Degrees

M.Phil. See Degree Requirements under Policies and Regulations.

M.S. Awarded only to students who are not continuing for the Ph.D. degree and have successfully completed the equivalent of 30 credit hours in the doctoral program. This includes a passing grade in the four required courses plus two elective courses, a minimum of two Honors grades, and successful completion of both terms of Lab Rotation for First-Year Students (INP 512a/b) and both terms of Second-Year Thesis Research (INP 513a/b). Students are not admitted for this degree.

Program information is available at http://medicine.yale.edu/inp.

Courses

[INP 502b/MCDB 730b^{U}, Cell Biology of the Neuron]

[INP 504b/MCDB 735b^{U}/NBIO 504b, Seminar in Brain Development and Plasticity]

INP 507b/NBIO 507b, Cellular and Molecular Mechanisms of Neurological Disease William Cafferty, Sreeganga Chandra

This course focuses on diseases/disorders such as Alzheimer's, Parkinson's, schizophrenia, multiple sclerosis, autism, and epilepsy, in which modern neuroscience has advanced mechanistic explanations for clinical conditions. The course highlights recent genetic, molecular, electrophysiological, and imaging experiments in parsing disease mechanisms. TTH 4–5

INP 510b/NBIO 500b, Structural and Functional Organization of the Human Nervous System Michael Schwartz, Charles Greer, 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. Lectures in neurophysiology cover various aspects of neural function at the cellular and systems levels, with a strong emphasis on the mammalian nervous system. Clinical correlations consist of sessions applying basic science principles to understanding pathophysiology in the context of patients. Seven two-hour laboratory sessions are coordinated with lectures

throughout the course to provide an understanding of the structural basis of function and disease. Case-based conference sections provide an opportunity to integrate and apply the information learned about the structure and function of the nervous system in the rest of the course to solving a focused clinical problem in a journal club format. Variable class schedule; contact course instructors. This course is offered to graduate and M.D./Ph.D. students only and cannot be audited.

INP 512a/b/NBIO 512a/b, Lab Rotation for First-Year Students Charles Greer
Required of all first-year Neuroscience track graduate students. Rotation period is one term. Both terms required. Grading is Satisfactory/Unsatisfactory.

INP 513a/b, Second-Year Thesis Research Charles Greer
Required of all second-year INP graduate students. Both terms required. Grading is Satisfactory/Unsatisfactory.

INP 519a/b, Tutorial
By arrangement with faculty and approval of DGS.

INP 521b/PHAR 521b, Neuroimaging in Neuropsychiatry II: Clinical Applications Irina Esterlis
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. The course is designed to provide an overview of the application of state-of-the-art neuroimaging methods to research in neurologic and psychiatric disorders. TH 9–10:30

INP 523a/ENAS 880a, Imaging Drugs in the Brain Evan Morris, Kelly Cosgrove, Michelle Hampson
Seminar course to explore the uses of PET, SPECT, and fMRI to study the mechanisms of action and long-term effects of drugs (legal and illegal) on brain function. Basic research is the main focus, augmented by two class periods allotted to uses of imaging in drug development by Pharma. Syllabus is comprised of review articles, book chapters, and journal articles. Some class periods begin with a short lecture to cover methodological concepts, followed by discussion of reading material. Topics include basic understanding of imaging technology (physics, biochemistry, and mathematics) as it relates to imaging of drugs, receptors, neurotransmitters; understanding the primary outcomes of imaging experiments; imaging experiment design; recent findings related to drug abuse; common neurophysiological pathways of addictive drugs (how to image reward); and uses of imaging in drug development (what do drug companies want to measure?). T 3:30–5:20

INP 532a/NBIO 532a, Neurobiology of Cortical Systems Michael Crair
This is a lecture, reading, and discussion-based course focused on the mammalian cerebral cortex. Students learn about the evolution, development, function, and dysfunction of the cortex. Significant emphasis is placed on examining unique aspects of the cortex,

including cortical circuit structure, plasticity, cognition, and models of higher-order cognitive processing. We also examine disease processes in which cortical dysfunction is specifically implicated. Offered every other year.

[**INP 533a/NBIO 533a, Function and Dysfunction of the Visual System** Offered every other year]

INP 540a/NBIO 540a, How to Give a Talk Jessica Cardin
This course is a practical introduction to the art and science of giving a data-based neuroscience seminar. The ability to give a clear, convincing, and engaging talk about your work is one of the key career skills of successful scientists. Content, visual presentation, body language, and delivery all combine to determine your impact on your audience. The focus in class is on student presentation skills and detailed feedback, interspersed with short example talks by invited guests. Students give at least two talks over the course of the term and participate in weekly Q&A and feedback. Grading is based on class participation. Enrollment limited to ten.

INP 562b/AMTH 765b/CB&B 562b/ENAS 561b/MB&B 562b^{U}/MCDB 562b^{U}/ PHYS 562b, Dynamical Systems in Biology Damon Clark, Jonathon Howard
This course covers advanced topics in computational biology. How do cells compute, how do they count and tell time, how do they oscillate and generate spatial patterns? Topics include time-dependent dynamics in regulatory, signal-transduction, and neuronal networks; fluctuations, growth, and form; mechanics of cell shape and motion; spatially heterogeneous processes; diffusion. This year, the course spends roughly half its time on mechanical systems at the cellular and tissue level, and half on models of neurons and neural systems in computational neuroscience. Prerequisite: MCDB 561a or equivalent, or a 200-level biology course, or permission of the instructor. TTH 2:30–3:45

INP 580b/NBIO 580b, Bioethics in Neuroscience Charles Greer
This course is an introduction to ethics and ethical decision making in the neurosciences. Format for the course is an informal discussion. Each week we are joined by members of the Yale faculty and community who can share their experiences and expertise as it relates to the topic of the week. This course is mandatory for first-year graduate students in the Interdepartmental Neuroscience Program (INP). Grading is Satisfactory/Unsatisfactory and is based on attendance/participation, weekly reaction papers, and a final term paper. The successful (Satisfactory) completion of this course is worth one full graduate course credit. Enrollment limited to Neuroscience track students. TH 4–5:15

INP 595b/NBIO 595b, Seminar in Visuomotor Neurophysiology Daeyeol Lee
Review and discussion of seminal papers in neurophysiological and computational studies of visual system. The course covers papers on the receptive field physiology of neurons in the retina and central visual pathway, motor cortex, and computational theories of vision and motor control. It largely focuses on the literature in primates, but also draws on behavioral and neurophysiological studies in other mammals, such as cats and humans. Contact course instructor for first class date and time.

[**INP 596a/NBIO 596a, Seminar in Neurophysiology of Decision Making**]

INP 597b/NBIO 597b, Neuroeconomics Daeyeol Lee, Ifat Levy
This course introduces some of the main topics in decision-making research. We discuss how behavioral economics methods are combined with neuroscientific tools, in particular functional MRI and single-neuron recordings, to study the neural mechanisms underlying decision and valuation processes. The course includes both introductory presentations by the instructors and paper presentations by the students. Offered every other year.

[**INP 611b/PSYC 611b[U], Systems Neuroscience**]

[**INP 612b/ENAS 812b, Molecular Transport and Intervention in the Brain**]

INP 701a/NBIO 701a, Principles of Neuroscience Angeliki Louvi
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. TF 2:15–3:45

INP 720a/MCDB 720a[U]/NBIO 720a, Neurobiology Haig Keshishian, Paul Forscher
Examination of the excitability of the nerve cell membrane as a starting point for the study of molecular, cellular, and intracellular mechanisms underlying the generation and control of behavior. MWF 11:35–12:25

NURSING

400 West Campus Drive, 203.785.2389
http://nursing.yale.edu/phd-program
M.Phil., Ph.D.

Dean
Ann Kurth

Director of Graduate Studies
Robin Whittemore (203.737.2351, robin.whittemore@yale.edu)

Professors Jane Dixon, Marjorie Funk, Margaret Grey, Holly Kennedy, M. Tish Knobf, Ann Kurth, Ruth McCorkle, Nancy Redeker, Nancy Reynolds, Lois Sadler, Robin Whittemore

Associate Professors Wei-Ti Chen, Joanne Iennaco, Mark Lazenby, Linda Pellico, Allison Shorten, Jacquelyn Taylor, Julie Womack

Assistant Professor Soohyun Nam

Fields of Study

Fields include chronic illness (diabetes, cardiovascular disease, cancer, HIV/AIDS); self- and family management; maternal and child health; sleep and sleep disorders; global health; health equity and care of vulnerable populations; acute and critical care; end-of-life and palliative care; genetic and environmental influences on health; gerontology and long-term care; and school- and community-based interventions.

Special Admissions Requirements

Applicants should have a master's degree in nursing, or the equivalent, including previous course work in statistics and graduate-level course work in research methods. The Graduate Record Examination (GRE) General Test is required. The Test of English as a Foreign Language (TOEFL) is required of all applicants for whom English is a second language. Samples of written work (e.g., published article, thesis, literature review) and a curriculum vitae are required. Qualified applicants will be invited for an interview with a member of the doctoral faculty.

Special Requirements for the Ph.D. Degree

COURSE WORK

Completion of thirteen core courses and four cognates in the student's area of specialization (including one advanced analysis course) is required. Successful completion of the dissertation seminar (NURS 907) every term is also required. The required core courses are: NURS 901a, Research Methods I: Research Designs; NURS 901b, Research Methods II: Mixed Methods; NURS 903a, Research Methods III: Measurement of Health Variables; NURS 905a, Research Methods IV: Intervention Development; NURS 907, Dissertation Seminar (required in each term for years 1–4); NURS 911a, Science, Scholarship, and Communication of Knowledge I; NURS 911b, Science, Scholarship, and

Communication of Knowledge II; NURS 913a, Foundations of Scientific Inquiry I: Philosophical and Theoretical Basis for Nursing Science; NURS 913b, Foundations of Scientific Inquiry II: Biopsychosocial Theories of Health; Symptom Management; Self-Management; NURS 915a, Science, Scholarship, and Communication of Knowledge III; NURS 915b, Science, Scholarship, and Communication of Knowledge IV; NURS 917b, Advanced Statistics for Nursing Research; NURS 929b, Ethical Conduct of Clinical Research; and NURS 941a, Health Policy, Leadership, and Systems.

The grading system includes Honors, High Pass, Pass, and Fail. Students must maintain a High Pass average and achieve a grade of Honors in at least two core courses to remain in good standing. High Pass is required in all core courses in the first year for a student to be eligible to take the Preliminary Examination. After the first year, no more than one grade of Pass in a core course will be permitted. A grade of Pass or better is required for all cognates, including the required advanced analysis course.

In addition to all other requirements, students must successfully complete NURS 929b, Ethical Conduct of Clinical Research, prior to the end of their first year of study. This requirement must be met prior to registering for a second year of study.

GRADUATE RESEARCH ASSISTANT AND TEACHING FELLOW EXPERIENCE

During the first two years of the program, students are Graduate Research Assistants with faculty mentors and participate in the mentor's ongoing research.

Teaching experience is also considered to be an integral part of graduate education. Therefore, two terms as a Teaching Fellow are required. Teaching Fellows assist with the teaching of larger master's-level courses, typically during their third year of doctoral study.

EXAMINATIONS

Successful completion of three examinations is required.

1. The Preliminary Examination is taken in June after the first year of course work has been completed. A grade of High Pass or better in each core course is required. The Preliminary Examination is intended to allow the student to demonstrate mastery of doctoral course work. Passing the Preliminary Examination is a prerequisite for continuing in the second year of doctoral study.
2. The Qualifying Examination typically takes place at the end of the second year of study, when required course work is completed. If the Qualifying Examination is not completed by the end of the sixth term, the student will be placed on Academic Probation. If not completed by the end of the seventh term, the student will be dismissed from the program. The student prepares a comprehensive dissertation proposal containing a statement of the problem to be studied, conceptual framework, critical review of relevant literature, design, methods, and plan for analysis. The oral Qualifying Examination typically lasts 1 to 1.5 hours. The student gives a 15-minute formal presentation of the proposed study and answers questions regarding the research and related topics. Successful completion of the Qualifying Examination is required for candidacy for the doctoral degree.

3. The Final Oral Examination is based on the dissertation. The dissertation is intended to demonstrate that the student is competent in the chosen area of study and has conducted independent research. The Final Oral Examination typically lasts 1.5 to 2 hours. The student gives a 15- to 20-minute formal presentation of the dissertation and answers questions. Successful completion of the Final Oral Examination is required before the Ph.D. can be awarded.

Master's Degree

M.Phil. This degree will be granted to Ph.D. students who successfully complete two years of course work, but do not progress to the dissertation stage. To be awarded the M.Phil. degree, students need to complete all core courses, six cognates (may include independent study with faculty), and two years of Graduate Research Assistant experience, and must pass the Preliminary Examination. This degree is normally granted only to students who are withdrawing from the Ph.D. program.

For information on the terminal master's degree offered by the Yale School of Nursing (Master of Science in Nursing), please visit the School's Web site, http://nursing.yale.edu.

Required Courses

The Nursing Ph.D. program curriculum is currently under review by program faculty, and some changes for implementation during the 2016–2017 academic year may be made. The curriculum changes will not alter the time frame for degree completion.

NURS 901a, Research Methods I: Research Designs Jane Dixon, Holly Kennedy
This introductory course in research methods provides an opportunity to survey and evaluate various scientific designs to investigate problems of importance to nursing and health. Emphasis is placed on the interrelationships of the clinical problem, study aims, and study design—with goal of understanding methods decisions that are made by researchers, and how these decisions influence study validity and credibility. Qualitative and quantitative approaches to research methods are explored. Required of all Ph.D. students in nursing. Open to master's students with permission of the instructors. Three hours per week.

NURS 901b, Research Methods II: Mixed Methods Robin Whittemore, M. Tish Knobf
The purpose of this course is to provide an overview of mixed methods research. This overview consists of the history, philosophical foundations, purpose, data collection, analysis, and evaluation of the common mixed methods designs. Required of all Ph.D. students in nursing. Three hours per week for seven weeks.

NURS 903a, Research Methods III: Measurement of Health Variables Jane Dixon
This course focuses on theory of measurement and reliability and validity of research instruments—with emphasis on interaction of conceptual, methodological, and pragmatic considerations. An integration of seminar and lecture is employed. Required of all second-year Ph.D. students in nursing. Open to advanced graduate students in other schools of the University. Three hours per week for seven weeks.

NURS 904a/b, Doctoral Independent Study
This elective is initiated by the student and negotiated with faculty. The purpose is to allow in-depth pursuit of individual areas of interest and/or practice. A written proposal must be submitted and signed by the student, the faculty member(s), and the program chairperson.

NURS 905a, Research Methods IV: Intervention Development M. Tish Knobf, Lois Sadler
This seminar focuses on the research methods necessary for the understanding, developing, and testing of interventions to improve outcomes in health and illness. Content includes the use of various approaches to the development of biobehavioral interventions. The second half of the module deals with methodological issues in carrying out clinical intervention research. Required of all second-year Ph.D. students in nursing. Open to others with permission of the instructor. Three hours per week for seven weeks.

NURS 907a/b, Dissertation Seminar Nancy Redeker
This required doctoral course provides the student with advanced study and direction in research leading to development of the dissertation proposal and completion of the dissertation. Students are guided in the application of the fundamentals of scientific writing and criticism. All Ph.D. students in nursing are required to take this seminar every term. Three hours per month.

NURS 911a, Science, Scholarship, and Communication of Knowledge I Robin Whittemore
This is the first course in a four-course sequence designed to socialize the student into the roles and responsibilities of a Ph.D.-prepared nurse scientist. Students develop specific beginning competencies necessary to engage in a career as an independent nurse scientist, including basic principles and processes of scientific writing and communication, and research priorities and strategies for building a program of research. The NURS 911/915 seminar series accompanies the research practicum and is required of all Ph.D. students in nursing. One hour every other week.

NURS 911b, Science, Scholarship, and Communication of Knowledge II Robin Whittemore
This is the second course in a four-course sequence designed to socialize the student into the roles and responsibilities of a Ph.D.-prepared nurse scientist. Students develop specific beginning competencies necessary to engage in a career as an independent nurse scientist, including basic principles and processes of grant writing and communicating research results. The NURS 911/915 seminar series accompanies the research practicum and is required of all Ph.D. students in nursing. One hour every other week.

NURS 913a, Foundations of Scientific Inquiry I: Philosophical and Theoretical Basis for Nursing Science Nancy Redeker, Robin Whittemore
In this course students examine the nature of the philosophical and theoretical basis for nursing science. The nature of science is explored through a dialogue of competing philosophical perspectives, such as logical positivism, post-positivism, historicism, critical theory, and post-structuralism. The philosophies that have informed the scientific process and the conceptual and theoretical underpinnings of nursing science are

discussed. Specific approaches to concept/theory development and analysis, with linkages to philosophical perspectives, are examined. Required of all Ph.D. students in nursing. Three hours per week.

NURS 913b, Foundations of Scientific Inquiry II: Biopsychosocial Theories of Health; Symptom Management; Self-Management Nancy Reynolds

This course examines major conceptualizations of health and illness, self- and family management, and research supporting these conceptualizations. Emphasis is placed on the link between health and illness self-management, with particular emphasis on vulnerable populations, and related concepts such as symptom distress, self-efficacy and coping, and the contributions of risk and protective factors to self-management. Self-management is considered from both an individual and family perspective, and sociocultural influences on self-management are explored. Required of all Ph.D. students in nursing. Three hours per week.

NURS 915a, Science, Scholarship, and Communication of Knowledge III Nancy Reynolds

This is the third course in a four-course sequence designed to socialize the student into the roles and responsibilities of a Ph.D.-prepared nurse scientist. Students develop specific beginning competencies necessary to engage in a career as an independent nurse scientist, including basic principles and processes of peer review, responding to research critiques, and publishing research results. The NURS 911/915 seminar series accompanies the research practicum and is required of all Ph.D. students in nursing. One hour every other week.

NURS 915b, Science, Scholarship, and Communication of Knowledge IV Nancy Reynolds

This is the fourth course in a four-course sequence designed to socialize the student into the roles and responsibilities of a Ph.D.-prepared nurse scientist. Students develop specific beginning competencies necessary to engage in a career as an independent nurse scientist, including basic principles and processes of grant management, mentorship, career planning, and roles and responsibilities of the nurse scientist and leader. The NURS 911/915 seminar series accompanies the research practicum and is required of all Ph.D. students in nursing. One hour every other week.

NURS 917b, Advanced Statistics for Nursing Research Margaret Holland

This course starts with a review of basic descriptive and inferential statistics and advances to multivariate analyses most commonly used in nursing studies. The emphasis is on attaining a conceptual understanding of these statistical techniques, selecting appropriate techniques for a given clinical research problem, conducting computer-assisted data analyses, and correctly expressing the results of such analyses. The laboratory part of the course covers fundamentals of data management and statistical analysis, and proceeds to the conduct of advanced analyses. The course emphasizes using programming language in SAS; however, the menu-driven user interfaces in SAS, SPSS, n-Query, MS Excel, and MS Access also are briefly covered. This course is required of all Ph.D. students in nursing and may be elected by M.S.N. students with permission of the instructors. Three hours per week plus weekly lab hours.

NURS 929b, Ethical Conduct of Clinical Research Lois Sadler
The course introduces major concepts in the ethical conduct of clinical research from the perspective of the advanced practice nurse and the nurse-researcher. National and international ethical codes for research and regulatory requirements are reviewed. Emphasis is placed on the protection of vulnerable populations and community-based research, including international research. Required of all Ph.D. students in nursing. Open to others with permission of the instructor. One hour per week.

NURS 941a, Health Policy, Leadership, and Systems
The course addresses salient issues in health policy and the challenges to linking research and clinical care with public and private policy agendas. The course covers the following topics: health care delivery systems; policy and political factors that affect access to care and its financing, delivery, and quality; challenges to evidence-based policy and the dissemination of research findings to policy and community-based leaders. It also includes theories of leadership and policy change relevant to students' research topics. Critical thinking, problem-solving skills, and research-based analysis are integrated throughout the course. A major written assignment suitable for submission to a peer-reviewed journal (or that can be easily modified for same) is a course requirement. Prerequisite: students must pass a test based on the online Yale University School of Nursing Health Policy Module. Required of all Ph.D. students in nursing. Three hours per week.

Electives

NURS 923a, Current Issues in Cardiovascular Nursing Research Marjorie Funk
Students examine current issues in cardiovascular nursing research. Topics vary each year to reflect the current state of the science. Prerequisites: clinical background in cardiovascular nursing and doctoral-student standing. Open to others with permission of the instructors. Two hours every other week and thirty hours at the Scientific Sessions of the American Heart Association.

NURS 927b, Research in Care of People with Cancer or at Risk for Cancer and Their Families M. Tish Knobf
This course focuses on the current state of the science in care of people with cancer, or at risk for cancer, and their families. Specific attention is paid to factors associated with quality-of-life outcomes, such as symptoms, functional status, and affect; and factors that place people at high risk, such as family history, ethnicity, and socioeconomic class. Research from nursing, medicine, and the social sciences is discussed. Two hours per week.

NURS 931b, Creating Methods: Innovation and Synthesis Jane Dixon
This elective doctoral seminar explores methodological development in nursing and health research, through illustration of how methodological perspectives are conceptualized and systematically analyzed, in order to prepare the learner to contribute to the methods literature. During the first part of the course, we examine methods papers of various types. Each student prepares a methods paper of publishable quality. Ideally, this may become a methods paper for the dissertation. There is a focus on advanced quantitative design, including large datasets and secondary analysis.

PHARMACOLOGY

Sterling Hall of Medicine B316, 203.785.7469
http://medicine.yale.edu/pharm
M.S., M.Phil., Ph.D.

Chair
Joseph Schlessinger

Director of Graduate Studies
Elias Lolis (SHM B345, 203.785.6233, elias.lolis@yale.edu)

Director of Medical Studies
Benjamin Turk (SHM B395, 203.737.2494, ben.turk@yale.edu)

Professors Karen Anderson, Anton Bennett, Yung-Chi Cheng, Jack Cooper (*Emeritus*), Priscilla Dannies (*Emerita*), Barbara Ehrlich, Jonathan Ellman, James Howe, Leonard Kaczmarek, Mark Lemmon, Elias Lolis, Gary Rudnick, Joseph Schlessinger, William Sessa, Dianging (Dan) Wu

Associate Professors Titus Boggon, David Calderwood, Kathryn Ferguson, Ya Ha, Irit Lax, Benjamin Turk

Assistant Professor Bryce Nelson

Fields of Study

Major emphases in the department are in the areas of molecular pharmacology, mechanisms of drug action, signal transduction, 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 should apply to an interest-based track within the interdepartmental graduate program in Biological and Biomedical Sciences (BBS), http://bbs.yale.edu. Most students interested in a Ph.D. in Pharmacology apply through the Molecular Medicine, Pharmacology, and Physiology track or the Biochemistry, Biophysics, and Structural Biology track.

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. Students must take the core graduate pharmacology course (PHAR 504a) and the two terms of the graduate seminar course (PHAR 502a/b) or equivalent from another department. The other courses will be selected based on each student's interest but must include at least two of three other courses: PHAR 528a, PHAR 529b, and PHAR 550a; PHAR 560b may be substituted for PHAR 550a. Students are

required to do three laboratory rotations. The Graduate School requires a grade of Honors for a minimum of two courses. Honors for seminar courses or rotations cannot be used toward this requirement. Students must meet the Honors requirement by the end of the fourth term of full-time study. Students must also maintain an overall High Pass average. A grade of Honors or High Pass is required for PHAR 504a. Student progress toward these goals is reviewed at the end of the second term.

Prior to registering for a second year of study, students must successfully complete PHAR 580b, The Responsible Conduct of Research, or the equivalent from another department. In addition, two lectures from PHAR 580b and one lecture from B&BS 503, RCR Refresher for Senior BBS Students, must be completed by the end of the fourth year.

Students are also required to pass the qualifying examination by the end of their fourth term. Before the end of the third year, a thesis prospectus must be submitted and accepted for admission to candidacy. A doctoral dissertation based upon original research includes an oral presentation given only to the pharmacology faculty (pre-defense). Within six months of passing the pre-defense, the student must submit a preliminary written thesis to the thesis committee and an outside reader. A public Ph.D. dissertation seminar will be scheduled, followed by a closed examination by the thesis committee and the outside examiner. Once the draft of the written thesis is approved by the thesis committee, it is submitted to the Graduate School. Two first-author manuscripts are required from the thesis research.

An important aspect of graduate training in pharmacology is the acquisition of teaching skills through the participation in courses related to 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 levels. Ph.D. students are required to participate in two terms (or the equivalent) of teaching. Fulfillment of this requirement occurs by the end of the third year. Students are not expected to teach during their first year.

M.D./Ph.D. Students

M.D./Ph.D. students must satisfy all of the above requirements for the Ph.D. with the following modifications: (1) only two of three laboratory rotations are required; (2) some medical school courses (except Pharmacology) can qualify as Graduate School courses as long as the M.D./Ph.D. student registers for them in OCS (Online Course Selection); and (3) only one term of teaching is required. Current Graduate School courses cannot be used to fulfill any medical school course requirements.

Master's Degrees

M.Phil. See Degree Requirements under Policies and Regulations.

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. This includes one year of lab rotations and course requirements.

Program materials are available upon request to the Director of Graduate Studies, Department of Pharmacology, Yale University, PO Box 208066, New Haven CT 06520-8066.

Courses

PHAR 502a/C&MP 630a/PATH 680a, Seminar in Molecular Medicine, Pharmacology, and Physiology Don Nguyen, Titus Boggon, Susumu Tomita
Readings and discussion on a diverse range of current topics in molecular medicine, pharmacology, and physiology. The class emphasizes analysis of primary research literature and development of presentation and writing skills. Contemporary articles are assigned on a related topic every week, and a student leads discussions with input from faculty who are experts in the topic area. The overall goal is to cover a specific topic of medical relevance (e.g., cancer, neurodegeneration) from the perspective of three primary disciplines (i.e., physiology: normal function; pathology: abnormal function; and pharmacology: intervention).

PHAR 504a, Principles of Pharmacology Elias Lolis
This course covers the molecular mechanisms of therapeutics, which are presented in a conceptual framework to increase understanding but decrease memorization. Topics include (but are not limited to) receptor affinity, efficacy, multiple equilibria, pharmacokinetics, and toxicity; enzyme kinetics and inhibition, drug discovery and design; molecular basis of antimicrobial therapy, cardiology drugs, anticancer and antiviral therapies; and therapeutics for inflammatory disorders, asthma, and allergy. MW 11:35–12:50

PHAR 506a and b, Methods in Pharmacological Research (Rotations) Elias Lolis
Students work in laboratories of faculty of their choice. The schedule for each rotation is announced at the beginning of the fall term.

PHAR 521b/INP 521b, Neuroimaging in Neuropsychiatry II: Clinical Applications Irina Esterlis
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. The course is designed to provide an overview of the application of state-of-the-art neuroimaging methods to research in neurologic and psychiatric disorders. TH 9–10:30

PHAR 528a, Principles of Signal Transduction Anton Bennett
The regulation of intracellular signaling is of fundamental importance to the understanding of cell function and regulation. This course introduces the broad principles of intracellular signal transduction. More detailed lectures on specific intracellular signaling pathways are given in which students learn both the basic and most recent and cutting-edge concepts of intracellular signaling. Topics include regulation of signaling by protein phosphorylation, small G proteins, G-protein-coupled receptors, hormones, phospholipids, adhesion, and gasses. TTH 2:30–3:45

PHAR 529b, Structural Pharmacology Ya Ha, Titus Boggon
The goal of the course is to show students how concepts of structural biology are applied to areas of great importance in pharmacology such as protein kinases, proteases, cell surface receptors, integrins and other membrane-bound enzymes, and transporters and channels, and how these concepts facilitate drug development. TTH 2–3:30

PHAR 530b, Practical Applications in Structural Pharmacology Ya Ha, Titus Boggon
This 0.5-credit course begins on February 24, joining PHAR 529b. The goal of the course is to show students how concepts of structural biology are applied to areas of great importance in pharmacology such as protein kinases, proteases, cell surface receptors, integrins and other membrane-bound enzymes, and transporters and channels, and how these concepts facilitate drug development. TTH 2–3:30

PHAR 550a/C&MP 550a^{U}/ENAS 550a^{U}/MCDB 550a^{U}, Physiological Systems Emile Boulpaep, Stuart Campbell
The course develops a foundation in human physiology by examining the homeostasis of vital parameters within the body, and the biophysical properties of cells, tissues, and organs. Basic concepts in cell and membrane physiology are synthesized through exploring the function of skeletal, smooth, and cardiac muscle. The physical basis of blood flow, mechanisms of vascular exchange, cardiac performance, and regulation of overall circulatory function are discussed. Respiratory physiology explores the mechanics of ventilation, gas diffusion, and acid-base balance. Renal physiology examines the formation and composition of urine and the regulation of electrolyte, fluid, and acid-base balance. Organs of the digestive system are discussed from the perspective of substrate metabolism and energy balance. Hormonal regulation is applied to metabolic control and to calcium, water, and electrolyte balance. The biology of nerve cells is addressed with emphasis on synaptic transmission and simple neuronal circuits within the central nervous system. The special senses are considered in the framework of sensory transduction. Weekly discussion sections provide a forum for in-depth exploration of topics. Graduate students evaluate research findings through literature review and weekly meetings with the instructor. MWF 9:25–10:15

PHAR 560b/C&MP 560b^{U}/ENAS 570b^{U}/MCDB 560b^{U}, Cellular and Molecular Physiology: Molecular Machines in Human Disease Emile Boulpaep, Fred Sigworth
The course focuses on understanding the processes that transfer molecules across membranes at the cellular, molecular, biophysical, and physiological levels. Students learn about the different classes of molecular machines that mediate membrane transport, generate electrical currents, or perform mechanical displacement. Emphasis is placed on the relationship between the molecular structures of membrane proteins and their individual functions. The interactions among transport proteins in determining the physiological 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. MWF 9:25–10:15

PHAR 580/C&MP 650/PATH 660, The Responsible Conduct of Research

Barbara Ehrlich, Demetrios Braddock

Organized to foster discussion, the course is taught by faculty in the Pharmacology, Pathology, and Physiology departments and two or three senior graduate students. Each session is based on case studies from primary literature, reviews, and two texts: Francis Macrina's *Scientific Integrity* and Kathy Barker's *At the Bench*. Each week, students are required to submit a reaction paper discussing the reading assignment. Students take turns leading the class discussion; a final short paper on a hot topic in bioethics is required. TH 11–12:15

PHILOSOPHY

Connecticut Hall, 203.432.1665
http://philosophy.yale.edu
M.A., M.Phil., Ph.D.

Chair
Stephen Darwall

Director of Graduate Studies
Zoltán Szabó (C301, 203.432.1669, zoltan.szabo@yale.edu)

Professors Seyla Benhabib (*on leave* [Sp]), David Charles (*on leave* [F]), Stephen Darwall, Michael Della Rocca, Keith DeRose (*on leave* [F]), Paul Franks, Tamar Gendler, John Hare, Karsten Harries, Verity Harte, Brad Inwood (*on leave* [Sp]), Shelly Kagan (*on leave* [F]), Joshua Knobe, Thomas Pogge, Scott Shapiro, Sun-Joo Shin (*on leave* [F]), Steven Smith (*on leave* [Sp]), Jason Stanley, Zoltán Szabó, Kenneth Winkler, Gideon Yaffe

Assistant Professors Daniel Greco (*on leave* [F]), Elizabeth Miller, John Pittard (*on leave* [F])

Fields of Study

The department offers a wide range of courses in various traditions of philosophy, with strengths and a well-established reputation in the history of philosophy, ethics, metaphysics, epistemology, and philosophy of art, as well as other central topics.

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 the history of philosophy, 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 skills required for research in their field of expertise in one of the following ways (normally by the end of the second year): (a) competence in at least one of the following languages: French, German, Greek, or Latin; (b) competence in another language whose literature is directly related to their philosophical research; or (c) competence in some set of skills required for independent research in their areas of expertise. Students in Philosophy will teach in the third and fourth (and possibly sixth) years. They must have teaching experience in at least two distribution areas. Approval of the dissertation prospectus is expected before the end of the sixth term. Upon completion of all predissertation requirements,

including the prospectus, students are admitted to candidacy for the Ph.D. Admission to candidacy must take place by the end of the third year of study. The norm for completion of the Ph.D. degree is five to six years.

Classics and Philosophy Combined Ph.D. Program

The Classics and Philosophy Program is a combined program, offered by the Departments of Classics and Philosophy at Yale, for students wishing to pursue graduate study in ancient philosophy. Suitably qualified students may apply for entry to the program either through the Classics department for the Classics track or through the Philosophy department for the Philosophy track.

Applicants for the Classics track of the combined program must satisfy the general requirements for admission to the Classics graduate program, in addition to the requirements of the Classics track of the combined program. Details of the Classics track of the program are available online at www.yale.edu/classics/research_philosophy_program.html.

Applicants for the Philosophy track of the combined program must satisfy the general requirements for admission to the Philosophy graduate program, in addition to the requirements of the Philosophy track of the combined program. Details of the Philosophy track of the program are available online at http://philosophy.yale.edu/graduate-program/classics-and-philosophy-program.

The combined program is overseen by an interdepartmental committee currently consisting of Verity Harte, David Charles, and Brad Inwood together with the director of graduate studies for Classics and the director of graduate studies for Philosophy.

Philosophy and Psychology Combined Ph.D. Program

The Philosophy and Psychology Program is a combined program, offered by the Departments of Philosophy and Psychology at Yale. Students enrolled in the program complete a series of courses in each discipline as well as an interdisciplinary dissertation that falls at the intersection of the two. On completing these requirements, students are awarded a Ph.D. either in Philosophy and Psychology, or in Psychology and Philosophy.

Students can be admitted into the combined program either through the Psychology department or through the Philosophy department. Students must be accepted into one of these departments (the "home department") through the standard admissions process, and both departments must then agree to accept the student into the combined program.

Students can be accepted into the combined program either (a) at the time they initially apply for admission to their home department, or (b) after having already competed some course work within the home department. In either case, students must be accepted into the combined program by each department.

Students in the combined program complete two-thirds of the course requirements of each of the two disciplines, then write a qualifying paper and a dissertation that are fully interdisciplinary. For more details about the program requirements, see http://philosophy.yale.edu/graduate-program/philosophy-and-psychology-combined-phd-program.

Master's Degrees

M.Phil. See Degree Requirements under Policies and Regulations.

M.A. (en route to the Ph.D.) An M.A. degree is awarded to students after completion of seven term courses with an average grade of High Pass.

Please see the Philosophy Web site for information on the program: http://philosophy.yale.edu.

Courses

PHIL 567b[U], Mathematical Logic I Sun-Joo Shin
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. MW 11:35–12:25

PHIL 607b[U]/CLSS 620b[U], The Central Books of Aristotle's *Metaphysics* David Charles
Examination of Aristotle's *Metaphysics*. Discussion of substance and essence in the central books, Z, H, and Θ, and assessment of recent attempts to interpret his account. Prerequisites: previous study of ancient philosophy and permission of the instructor. W 3:30–5:20

PHIL 609b[U]/CLSS 609b[U], Plato's *Philebus* Verity Harte
Discussion of Plato's *Philebus* (in translation), the late work in which he examines the competing claims of pleasure and reason to be the basis of human happiness and in which he provides a portrait of the best human life. M 1:30–3:20

PHIL 606b[U]/CPLT 651b[U]/GMAN 647b[U], Systems and Their Theory Henry Sussman
Conceptual systems that have, since the outset of modernity, furnished a format and platform for rigorous thinking at the same time that they have imposed on language the attributes of self-reflexivity, consistency, repetition, purity, and dependability. Texts by Kant, Hegel, Bergson, Kafka, Proust, and Borges.

PHIL 624b[U], Hegel's *Phenomenology of Spirit* Paul Franks
A close reading of sections of one of the major works in post-Kantian philosophy, currently receiving renewed attention within analytic philosophy. Themes discussed include varieties of skepticism and responses to skepticism; the relationship of epistemology to questions concerning the structures of social practices of reasoning; the historical character of reason; the relationship between natural processes and social developments; the intersubjectivity of consciousness; and the possibility of a philosophical critique of culture. Attention is paid both to commentaries that focus on historical development and to approaches that view historical narratives as allegories whose deeper meaning may be formulated as a logical or semantic theory. TH 9:25–11:15

PHIL 626b[U], Cognitive Science of Morality Joshua Knobe
Introduction to the emerging field of moral cognition. Focus on questions about the philosophical significance of psychological findings. Topics include the role of emotion in moral judgment; the significance of character traits in virtue ethics and personality

psychology; the reliability of intuitions and the psychological processes that underlie them. T 7–8:50

PHIL 627b[U], Computability and Logic Sun-Joo Shin
A technical exposition of Gödel's first and second incompleteness theorems and of some of their main consequences in consequences in proof theory and model theory, such as Lob's theorem, Tarski's undefinability of truth, provability logic, and nonstandard models of arithmetic. M 1:30–3:20

PHIL 642a[U], Language and Power Jason Stanley
An investigation into the way language shapes our social world, drawing on readings from feminist theory, critical race theory, formal semantics and pragmatics, political psychology, and European history. M 1:30–3:20

PHIL 643b[U], Philosophy of Quantum Mechanics Elizabeth Miller
An examination of a wide range of philosophical issues as informed by quantum mechanics. Evaluation of different, and controversial, interpretations of quantum mechanics and their distinct ontologies. Subtopics include the measurement problem, nonlocality and holism, wave function realism, and the relationship between physics and metaphysics. T 3:30–5:20

PHIL 648b[U], Moral and Epistemic Dilemmas Daniel Greco
Genuine dilemmas are cases in which one cannot fulfill all of one's obligations—whatever one does, one will do something wrong. Or in the epistemic case, whatever one believes, one will thereby be irrational, or unreasonable. This course covers recent work on moral and epistemic dilemmas. We discuss both the particular cases alleged to give rise to dilemmas, as well as more general theoretical considerations that have been adduced for and against recognizing a category of dilemmas in normative theorizing. Emphasis is placed on drawing connections between the two literatures. F 9:25–11:15

PHIL 649a[U], Personal Identity Kenneth Winkler
The nature of persons, their unity, and the conditions of their identity over time. Readings in classical and contemporary sources, among them Locke, Hume, Shaftesbury, Butler, Reid, Bernard Williams, Derek Parfit, Charles Taylor, Sally Haslanger, and David Lewis. Consideration of the metaphysics of kinds; social construction; philosophical methodology; and the bearing of ethics on metaphysics. W 7–8:50

PHIL 652a[U], History of Early Modern Ethics Stephen Darwall
The seventeenth and eighteenth centuries were an unusually fertile period in philosophical ethics. Among other things, thinkers of the period attempted to work out and investigate a distinctive ethical conception, the idea of morality and its distinctive demands or obligations. We investigate major and some lesser-known figures, including Hobbes, Francis Hutcheson, Hume, Bishop Joseph Butler, Rousseau, Kant, Adam Smith, and Bentham. The main topics include the nature of moral obligation and moral motivation, whether morality can be based on reason or sentiment, and the relation between the right and the good. T 3:30–5:20

PHIL 655b[U], Normative Ethics Shelly Kagan
A systematic examination of normative ethics, the part of moral philosophy that attempts to articulate and defend the basic principles of morality. The bulk of the course surveys and explores some of the main normative factors relevant in determining the moral status of a given act or policy (features that help make a given act right or wrong). Brief consideration of some of the main views about the foundations of normative ethics (the ultimate basis or ground for the various moral principles). M 1:30–3:20

PHIL 657b[U]/PLSC 611b[U], Recent Work on Justice Thomas Pogge
In-depth study of one contemporary book, author, or debate in political philosophy, political theory, or normative economics. Depending on student interest, this might be a ground-breaking new book, the life's work of a prominent author, or an important theme in contemporary political thought. M 3:30–5:20

PHIL 664a[U], Justice, Taxes, and Global Financial Integrity Thomas Pogge
This seminar studies the formulation, interpretation, and enforcement of national and international tax rules from the perspective of national and global economic justice. M 3:30–5:20

PHIL 674a[U]/PLSC 580a[U], Borders, Culture, and Citizenship Seyla Benhabib
The contemporary refugee crisis in Europe and elsewhere; new patterns of migration, increasing demands for multicultural rights on the part of Muslim minorities in the West, and transnational effects of globalization faced by contemporary societies. This course examines these issues in a multidisciplinary perspective in the light of political theories of citizenship and migration, and laws concerning refugees and migrants in Europe and the United States.

PHIL 675b[U], The Bavarian Rococo Church Karsten Harries
A case study, exploring the relationship of architecture, reason, and the sacred. The focus is on the epochal threshold that both separates and joins the theatrical culture of the Baroque from our modern world-picture. T 1:30–3:20

PHIL 681b[U], Reconsidering Early Modern Rationalism Michael Della Rocca, Julia Borcherding
Reexamination of early modern rationalism and the narrative underlying it. Focus on both canonical and noncanonical figures who seem to bear marks of rationalist thinkers, such as René Descartes, Baruch Spinoza, G.W.F. Leibniz, Anne Conway, and Émilie du Châtelet. Attention to the apparent clash between rationalism and empiricism and to related methodological issues. T 1:30–3:20

PHIL 690b[U]/LING 776b[U], Implicature and Pragmatic Theory Laurence Horn
Theoretical and experimental approaches to conversational and conventional implicature. Pragmatic intrusion into what is said; constraints on truth-conditional content in neo-Gricean pragmatics and relevance theory. Arguments for and against the grammatical view of scalar implicature. Evidence from studies on the acquisition and processing of implicature and presupposition. Prerequisite: one course in semantics or pragmatics, or permission of the instructor.

PHIL 700a/REL 976a, Kant's Philosophy of Religion John Hare
This course looks at Kant's writings on the philosophy of religion, from the *Critique of Pure Reason* to *Conflict of the Faculties*. TH 3:30–5:20

PHIL 703a/LAW 20308, Philosophy of Law I Gideon Yaffe
This course examines a variety of historically influential responses to basic questions concerning the nature of law and the difference (if any) between law and morality. Readings include works by legal positivists, natural lawyers, legal realists, and critical legal scholars. This course is the first half of a two-course sequence that continues with PHIL 715b. Follows Law School academic calendar. WF 10:10–11:35

PHIL 705a, First-Year Seminar Elizabeth Miller, Michael Della Rocca
Required of and limited to first-year students in the Philosophy Ph.D. program. Topic varies from year to year. Preparation for graduate work. Reading, writing, and presentation skills. W 1:30–3:20

PHIL 706a, Work in Progress I Zoltán Szabó
In consultation with the instructor, each student presents a significant work in progress, e.g., a revised version of an advanced seminar paper or a dissertation chapter. Upon completion of the writing, the student presents the work in a mock colloquium format, including a formal question-and-answer period. W 1:30–3:20

PHIL 715b/LAW 21408, Philosophy of Law II Gideon Yaffe
This course concerns philosophical topics that arise in connection with particular areas of law. Such topics include the justification of criminal punishment; discrepancy in punishment of attempted and completed crimes; the relevance of ignorance of the law to criminal responsibility; self-defense and other forms of preventive violence; the rationale for double-jeopardy restrictions; the conception of justice of import to tort law; the concepts of causation and intention in tort law; the relationship between promises and contracts; the fundamental rationale for property rights; the grounds for and nature of the individualization of the reasonable person standard; the rationale for variations in standards of proof across areas of law. A selection of such topics is examined through consideration of both philosophical essays written about them and legal materials that bear on them. Follows Law School academic calendar. WF 10:10–11:35

PHIL 716b, Work in Progress II Jason Stanley
In consultation with the instructor, each student presents a significant work in progress, e.g., a revised version of an advanced seminar paper or a dissertation chapter. Upon completion of the writing, the student presents the work in a mock colloquium format, including a formal question-and-answer period. M 7–8:50

PHIL 717b, Recent Work and Research in Epistemology Keith DeRose
A study of some prominent issues in current epistemology, focusing on literature relevant to research interests of students and the instructor. Topics may include skepticism, internalist vs. externalist accounts of knowledge and of justification, the structure of knowledge and of justification (foundationalism, coherentism), contextualism in epistemology, relevant alternative accounts of knowledge, and the epistemology of lotteries. Students

not in the Philosophy graduate program are welcome, but should contact the instructor for permission and further information before enrolling. T 1:30–3:20

PHIL 718a/LAW 20104/PLSC 553a, Justice Bruce Ackerman
An examination of contemporary theories, together with an effort to assess their practical implications. Authors this year include Peter Singer, Richard Posner, John Rawls, Robert Nozick, Michael Walzer, Marion Young, Avishai Margalit, and Cass Sunstein. Topics: animal rights, the status of children and the principles of educational policy, the relation of market justice to distributive justice, the status of affirmative action. Self-scheduled examination or paper option. Follows Law School academic calendar. MT 4:10–6

PHIL 719b/REL 965b, Faith and the Will John Pittard
An investigation of questions concerning the nature of religious faith, the relationship of faith to the will and to desire, and the merits of various prudential, moral, and existential arguments for and against religious faith. Questions to be treated include the following: Is faith in some sense "meritorious" (to use Aquinas's language)? Do the commitments of faith essentially involve believing propositions? Can belief be voluntary? Can trust or hope be voluntary? Should we hold religious beliefs to the same epistemic standards that apply to more mundane beliefs? Or should we persist in faith even if these beliefs do not meet conventional rational standards? We explore these questions through writings by Aquinas, Pascal, Kierkegaard, Nietzsche, James, Freud, Wittgenstein, and various contemporary philosophers.

PHIL 725a, Kant: *The Critique of Judgment* Karsten Harries
While most readings of *The Critique of Judgment* focus on issues in aesthetics, this seminar also examines Kant's different concepts of nature. Issues to be discussed include such questions as: Why does Kant place the beauty of nature above that of art? What is the relationship between the two? What need is there for a metaphysics of nature? Are all sciences in principle reducible to physics? What are the limits of the scientific understanding of nature? What room does the world picture offered by science leave for freedom and thus for ethics? What is the moral significance of beautiful nature? Does the beauty or teleology of nature support claims of the existence of God? T 1:30–3:20

PHIL 731b/REL 922b, Theological Predication John Pittard
An exploration of philosophical debates concerning the nature of theological language and the nature of God. Topics include theories of analogical predication, divine simplicity, God's relation to time, divine impassibility, the nature of God's love, divine freedom, the compatibility of foreknowledge and human freedom, and theories of providence.

PHIL 733a/CLSS 843a, Readings in Greek Philosophy: Plato's *Phaedo* Verity Harte, Brad Inwood
The course reads and discusses the Greek text of Plato's *Phaedo,* set on the last day of Socrates' life. The *Phaedo* is notable for a series of arguments for the immortality of soul and for discussions of the Forms, the acquisition of knowledge, philosophical method, and the value of philosophy. This is a core course for the combined Ph.D. program in Classics and Philosophy. Prerequisite: the course is open to all Classics or Philosophy graduate students who have suitable preparation in Attic Greek and some prior study

of ancient philosophy. Others interested in taking or attending the class must have the permission of the instructor. W 3:30–5:20

PHIL 734a/GMAN 651a/PLSC 583a, Contemporary Critical Theory
Seyla Benhabib
An examination of the themes of statelessness, migration, and exile in the works of Arendt, Benjamin, Adorno, Shklar, and Berlin. W 9:25–11:15

PHIL 742b/LING 671b, Philosophy of Language Zoltán Szabó, Timothy Williamson
The course focuses on the relationship between philosophy and linguistics. It is aimed at graduate students in both departments who are interested in exploring the different ways questions are approached in the two fields and in developing the skills for cooperative research. We start with three foundational debates of the twentieth century: Quine vs. Carnap on ontological commitment, Russell vs. Strawson on reference, and Ayer vs. Geach on expressivism. The remainder of the class is divided into two parts: the philosophy of semantics and the philosophy of pragmatics. The first part covers the topics of reference and quantification, tense and modality, intentionality, and compositionality. The second deals with context and content, force and mood, implicature, and common ground. The core of the course is a manuscript written jointly with Rich Thomason, which will be supplemented with classic papers in the philosophy of language. W 1:30–3:20

PHIL 744b/LAW 21779/PSYC 609b, Addiction and the Law: Perspectives from Philosophy, Economics, and Neuroscience Gideon Yaffe, Alan Schwartz, M. Moore, Hedy Kober
This course concerns the bearing of addiction on various forms of treatment under the law, including but not limited to the criminal liability of addicts. The course addresses this broad set of issues through consideration of the import for the law of philosophical, economic, and neuroscientific conceptions of the nature of addiction. Follows Law School academic calendar. T 2:10–4

PHIL 745b, Antinomy of Being Karsten Harries
Whenever an attempt is made to comprehend nature without loss, our thinking is led into antinomies. Every attempt to force reality into some logical framework must in the end suffer shipwreck. But that shipwreck opens us to the claims made on us by our fellow human beings and by nature, gives us to understand that we cannot invent what gives our life meaning and direction, but have to receive it. Not that we should tear down the house our reason has built us; but only if we open windows and doors in that house to what lies beyond, does our life become meaningful. Readings in Descartes, Fichte, Heidegger, Kant, Nietzsche, Schopenhauer, Wittgenstein, and others. TH 1:30–3:20

PHIL 750a or b, Tutorial
By arrangement with faculty.

PHYSICS

35 Sloane Physics Laboratory, 203.432.3607
http://physics.yale.edu
M.S., M.Phil., Ph.D.

Chair
Paul Tipton

Director of Graduate Studies
Sean Barrett (SPL 24, 203.432.6928, graduatephysics@yale.edu)

Professors Robert Adair (*Emeritus*), Charles Ahn (*Applied Physics*), Yoram Alhassid, Thomas Appelquist, Charles Bailyn (*Astronomy*), O. Keith Baker, Charles Baltay, Sean Barrett, Cornelius Beausang (*Adjunct*), Hui Cao (*Applied Physics*), Richard Casten (*Emeritus*), Paolo Coppi (*Astronomy*), David DeMille, Michel Devoret (*Applied Physics*), Frank Firk (*Emeritus*), Bonnie Fleming, Marla Geha (*Astronomy*), Steven Girvin, Leonid Glazman, John Harris, Karsten Heeger, Victor Henrich (*Applied Physics*), Jay Hirshfield (*Adjunct*), Francesco Iachello, Sohrab Ismaill-Beigi (*Applied Physics*), Steve Lamoreaux, Samuel MacDowell (*Emeritus*), Simon Mochrie, Vincent Moncrief, Priyamvada Natarajan (*Astronomy*), Peter Parker (*Emeritus*), Daniel Prober (*Applied Physics*), Nicholas Read, Jack Sandweiss (*Emeritus*), Robert Schoelkopf (*Applied Physics*), Ramamurti Shankar, Witold Skiba, Charles Sommerfield (*Emeritus*), A. Douglas Stone (*Applied Physics*), Hongxing Tang (*Electrical Engineering*), Paul Tipton, Thomas Ullrich (*Adjunct*), C. Megan Urry, Pieter van Dokkum (*Astronomy*), John Wettlaufer (*Geology & Geophysics*), Robert Wheeler (*Emeritus*), Werner Wolf (*Emeritus*), Michael Zeller (*Emeritus*)

Associate Professors Helen Caines, Sarah Demers, Thierry Emonet (*Molecular, Cellular & Developmental Biology*), Walter Goldberger, Jack Harris, Daisuke Nagai, Corey O'Hern (*Mechanical Engineering & Materials Science*), Nikhil Padmanabhan

Assistant Professors Murat Acar (*Molecular, Cellular & Developmental Biology*), Damon Clark (*Molecular, Cellular & Developmental Biology; on leave* [F]), Reina Maruyama, David Poland

Fields of Study

Fields include atomic physics and quantum optics; nuclear physics; particle physics; astrophysics and cosmology; condensed matter; biological physics; quantum information physics; applied physics; and other areas in collaboration with the School of Engineering & Applied Science, and the departments of Applied Physics; Mathematics; Chemistry; Molecular Biophysics and Biochemistry; Molecular, Cellular, and Developmental Biology; Geology and Geophysics; and Astronomy.

Special Admissions Requirements

The prerequisites for work toward a Ph.D. degree in physics include a sound undergraduate training in physics and a good mathematical background. The GRE General Test and the Subject Test in Physics are required.

Integrated Graduate Program in Physical and Engineering Biology (PEB)

Students applying to the Ph.D. program in Physics may also apply to be part of the PEB program. See the description under Non-Degree-Granting Programs, Councils, and Research Institutes for course requirements, and http://peb.yale.edu for more information about the benefits of this program and application instructions.

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 (Advanced Classical Mechanics, 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 a required course in quantum field theory, provides an introduction to modern physics and research. Certain equivalent course work and successful completion of a pass-out examination may reduce the course requirement or allow substitution of elective courses 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 taking a course offered by the department or by carrying out an approved Special Investigation with individual faculty. In addition to all other requirements, students must successfully complete PHYS 590b, Responsible Conduct in Research for Physical Scientists, prior to the end of their first year of study. This requirement must be met prior to registering for a second year of study.

Students who have completed their course requirements with satisfactory grades (a grade of Honors in PHYS 990, Special Investigations, may be counted toward the Graduate School requirement of two grades of Honors), pass the qualifying examination, and submit an acceptable thesis prospectus are recommended for admission to candidacy. The qualifying examination, normally taken at the beginning of the third term (and no later than the beginning of the fifth term), is a six-hour written examination covering the five core courses and mathematical methods as described above. Students normally submit the dissertation prospectus before the end of the third year of study.

There is no foreign language requirement. Teaching experience is regarded as an integral part of the graduate training program. During their study students are expected to serve as teaching fellows, usually in the first two years. 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 (DGS), provided the dissertation topic is deemed suitable for a physics Ph.D.

Master's Degrees

M.Phil. Students who have successfully advanced to candidacy qualify for the M.Phil. degree.

M.S. (en route to the Ph.D.) Students who complete the first-year graduate courses with a satisfactory record (including 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, http://physics.yale.edu.

Courses

PHYS 500a, Advanced Classical Mechanics Yoram Alhassid
Newtonian dynamics, Lagrangian dynamics, and Hamiltonian dynamics. Rigid bodies and Euler equations. Oscillations and eigenvalue equations. Classical chaos. Introduction to dynamics of continuous systems. TTH 11:35–12:50

PHYS 502b, Electromagnetic Theory I Thomas Appelquist
Classical electromagnetic theory including boundary-value problems and applications of Maxwell equations. Macroscopic description of electric and magnetic materials. Wave propagation. MW 11:35–12:50

PHYS 504Lb, Modern Physics Measurements Steve Lamoreaux, Reina Maruyama
A laboratory course with experiments and data analysis in soft and hard condensed matter, nuclear and elementary particle physics. MW 1:30–4:20

PHYS 506a[U], Mathematical Methods of Physics Nicholas Read
Survey of mathematical techniques useful in physics. Includes vector and tensor analysis, group theory, complex analysis (residue calculus, method of steepest descent), differential equations and Green's functions, and selected advanced topics. MW 9–10:15

PHYS 508a, Quantum Mechanics I Thomas Appelquist
The principles of quantum mechanics with application to simple systems. Canonical formalism, solutions of Schrödinger's equation, angular momentum, and spin. MW 11:35–12:50

PHYS 512b, Statistical Physics I Nicholas Read
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, enormalization group, irreversible processes, fluctuations. TTH 9–10:15

[PHYS 515b, Topics in Modern Physics Research]

PHYS 517b3/ENAS 517b/MB&B 517b3/MCDB 517b3, Methods and Logic in Interdisciplinary Research Lynne Regan, Julien Berro, Enrique De La Cruz, Thierry Emonet, Paul Forscher, Jonathon Howard, Megan King, Simon Mochrie, Corey O'Hern, Thomas Pollard, Yongli Zhang, and staff
This half-term PEB class is intended to introduce students to integrated approaches to research. Each week, the first of two sessions is student-led, while the second session is led by faculty with complementary expertise and discusses papers that use different

approaches to the same topic (for example, physical and biological or experiment and theory). Counts as 0.5 credit toward graduate course requirements. MW 5–7

[**PHYS 522a, Introduction to Atomic Physics**]

PHYS 523a/CB&B 523a/ENAS 541a/MB&B 523a, Biological Physics Corey O'Hern
An introduction to the physics of several important biological phenomena including transport in the cell cytoplasm, protein folding, DNA packaging, and thermodynamics of protein binding and aggregation. The material and approach are positioned at the interface of the physical and biological sciences, and involve significant computation. This course teaches the basics of computer programming necessary for quantitative studies of biological systems. We start with the foundations of programming in MATLAB. During the course, students perform sophisticated data analyses, view and analyze protein structures, and perform Monte Carlo and molecular dynamics simulations. No prior programming experience is needed. TTH 1–2:15

PHYS 524a, Introduction to Nuclear Physics Reina Maruyama
Introduction to a wide variety of topics in nuclear structure, nuclear reactions, and the emerging area of exotic and weakly bound nuclei far from the valley of stability. A number of related nuclear models as well as experimental methods are discussed. The course also covers topics in nuclear astrophysics and in the use of relativistic heavy ion collisions to study quark-gluon interactions in high density. The aim is to give a broad perspective on the subject and to develop the key ideas in simple ways, with more weight on physics ideas than on mathematical formalism. The course assumes no prior knowledge of nuclear physics and only elementary quantum mechanics. It is accessible to advanced undergraduates.

PHYS 526b, Introduction to Elementary Particle Physics Sarah Demers
An overview of particle physics, including an introduction to the standard model, experimental techniques, symmetries, conservation laws, the quark-parton model, and open questions in particle physics.

[**PHYS 528a/ENAS 848a, Soft Condensed Matter Physics**]

PHYS 530a, Scientific Teaching for Physical Sciences

PHYS 538b, Introduction to Relativistic Astrophysics and General Relativity Vincent Moncrief
Basic concepts of differential geometry (manifolds, metrics, connections, geodesics, curvature); Einstein's equations and their application to such areas as cosmology, gravitational waves, black holes.

PHYS 548a^{U} and 549b^{U}/APHY 548a^{U} and 549b^{U}/ENAS 850a^{U} and 851b^{U}, Solid State Physics I and II Victor Henrich [F], Michel Devoret [Sp]
A two-term sequence covering the principles underlying the electrical, thermal, magnetic, and optical properties of solids, including crystal structures, phonons, energy bands, semiconductors, Fermi surfaces, magnetic resonance, phase transitions, and superconductivity. Fall: TTH 1–2:15; Spring: TTH 1–2:15

PHYS 561a/MB&B 561a/MCDB 561a[U], Introduction to Dynamical Systems in Biology Thierry Emonet, Jonathon Howard
Biological systems make sophisticated decisions at many levels. This course explores the molecular and computational underpinnings of how these decisions are made, with a focus on modeling static and dynamic processes in example biological systems. We emphasize analytical and numerical models to explore the relationship between molecular mechanisms and behavior. Topics include molecular switches, regulatory networks, feedback, and signal transduction. The course contains significant instruction in MATLAB, while students also read papers from the primary literature. The course aims to turn ball-and-arrow diagrams into quantitative models with testable predictions. Prerequisite: PHYS 170 or equivalent, or permission of the instructor. TTH 2:30–3:45

PHYS 562b/AMTH 765b/CB&B 562b/ENAS 561b/INP 562b/MB&B 562b[U]/MCDB 562b[U], Dynamical Systems in Biology Damon Clark, Jonathon Howard
This course covers advanced topics in computational biology. How do cells compute, how do they count and tell time, how do they oscillate and generate spatial patterns? Topics include time-dependent dynamics in regulatory, signal-transduction, and neuronal networks; fluctuations, growth, and form; mechanics of cell shape and motion; spatially heterogeneous processes; diffusion. This year, the course spends roughly half its time on mechanical systems at the cellular and tissue level, and half on models of neurons and neural systems in computational neuroscience. Prerequisite: MCDB 561a or equivalent, or a 200-level biology course, or permission of the instructor. TTH 2:30–3:45

[**PHYS 570a/ASTR 570a, High-Energy Astrophysics**]

PHYS 590b/APHY 590b, Responsible Conduct in Research for Physical Scientists
Required seminar for all first-year students.

PHYS 600b/ASTR 600b[U], Cosmology Priyamvada Natarajan
A comprehensive introduction to cosmology at the graduate level. The standard paradigm for the formation, growth, and evolution of structure in the universe is covered in detail. Topics include the inflationary origin of density fluctuations; the thermodynamics of the early universe; assembly of structure at late times and current status of observations. The basics of general relativity required to understand essential topics in cosmology are covered. Advanced undergraduates may register for the course with permission of the instructor.

[**PHYS 601b/APHY 601b, Quantum Information and Computation**]

PHYS 608b, Quantum Mechanics II Jack Harris
Approximation methods, scattering theory, and the role of symmetries. Relativistic wave equations. Second quantized treatment of identical particles. Elementary introduction to quantized fields. TTH 11:35–12:50

PHYS 609a, Relativistic Field Theory I Walter Goldberger
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. TTH 11:35–12:50

PHYS 610b/APHY 610b, Quantum Many-Body Theory Leonid Glazman
Identical particles and second quantization. Electron tunneling and spectral function. General linear response theory. Approximate methods of quantum many-body theory. Dielectric response, screening of long-range interactions, electric conductance, collective modes, and photon absorption spectra. Fermi liquid; Cooper and Stoner instabilities; notions of superconductivity and magnetism. BCS theory, Josephson effect, and Majorana fermions in condensed matter; superconducting qubits. Bose-Einstein condensation; Bogoliubov quasiparticles and solitons. TTH 11:35–12:50

PHYS 624b, Group Theory Francesco Iachello
Lie algebras, Lie groups, and some of their applications. Representation theory. Explicit construction of finite-dimensional irreducible representations. Invariant operators and their eigenvalues. Tensor operators and enveloping algebras. Boson and fermion realizations. Differential realizations. Quantum dynamical applications. MW 9–10:15

PHYS 628a/APHY 628a, Statistical Physics II Leonid Glazman
An advanced course in statistical mechanics. Topics may include mean field theory of and fluctuations at continuous phase transitions; critical phenomena, scaling, and introduction to the renormalization group ideas; topological phase transitions; dynamic correlation functions and linear response theory; quantum phase transitions; superfluid and superconducting phase transitions; cooperative phenomena in low-dimensional systems. TTH 2:30–3:45

PHYS 630b, Relativistic Field Theory II Walter Goldberger
An introduction to non-Abelian 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. TTH 1–2:15

[**PHYS 633b/APHY 633b, Introduction to Superconductivity**]

[**PHYS 634a/APHY 634a, Mesoscopic Physics I**]

[**PHYS 650a/APHY 650a, Theory of Solids I**]

[**PHYS 662b, Special Topics in Particle Physics: Beyond the Standard Model**]

PHYS 663a, Special Topics in Particle Theory David Poland

PHYS 675a^{U}/APHY 675a^{U}, Principles of Optics with Applications Hui Cao
Introduction to the principles of optics and electromagnetic wave phenomena with applications to microscopy, optical fibers, laser spectroscopy, nanophotonics, plasmonics, and metamaterials. Topics include propagation of light, reflection and refraction, guiding light, polarization, interference, diffraction, scattering, Fourier optics, and optical coherence. TTH 11:35–12:50

PHYS 676a/APHY 676a, Introduction to Light-Matter Interactions Peter Rakich
Optical properties of materials and a variety of coherent light-matter interactions are explored through the classical and quantum treatments. The role of electronic, phononic, and plasmonic interactions in shaping the optical properties of materials is examined

using generalized quantum and classical coupled-mode theories. The dynamic response of media to strain, magnetic, and electric fields is also treated. Modern topics are explored, including optical forces, photonic crystals, and metamaterials; multi-photon absorption; and parametric processes resulting from electronic, optomechanical, and Raman interactions. TTH 1–2:15

PHYS 677a/APHY 677a, Noise, Dissipation, Amplification, and Information
Michel Devoret
Graduate-level non-equilibrium statistical physics applied to noise phenomena, both classical and quantum. The aim of the course is to explain the fundamental link between the random fluctuations of a physical system in steady state and the response of the same system to an external perturbation. Several key examples in which noise appears as a resource rather than a limitation are treated: spin relaxation in nuclear magnetic resonance (motional narrowing), Johnson-Nyquist noise in solid state transport physics (noise thermometry), photon correlation measurements in quantum optics (Hanbury Brown-Twiss experiment), and so on. The course explores both passive and active systems. It discusses the ultimate limits of amplifier sensitivity and speed in physics measurements. MW 9–10:15

PHYS 678a, Computing for Scientific Research Daisuke Nagai
An introduction to basic computational tools and techniques utilized in science and engineering research. The course focuses on developing hands-on experience via a mixture of lectures and practical programming. Introduction to the fundamentals of PC hardware, the UNIX/Linux operating system, scripting languages (Perl), and the development of programs to solve physical and mathematical problems. Programming languages with emphasis on C/C++ (procedural and object-orientated) as well as the conceptual underlying numerical methods are covered to provide the tools for scientific problem solving. This course is intended for students with little basic programming experience. F 1–3:30

[**PHYS 679b/APHY 679b, Nonlinear Optics and Lasers**]

[**PHYS 687, Physics of Diatomic Molecules**]

[**PHYS 688, Advanced Topics in Field Theory**]

PHYS 691b/APHY 691b, Quantum Optics Liang Jiang
Quantization of the electromagnetic field, coherence properties and representation of the electromagnetic field, quantum phenomena in simple nonlinear optics, atom-field interaction, stochastic methods, master equation, Fokker-Planck equation, Heisenberg-Langevin equation, input-output formulation, cavity quantum electrodynamics, quantum theory of laser, trapped ions, light forces, quantum optomechanics, Bose-Einstein condensation, quantum measurement and control. MW 9–10:15

[**PHYS 705b/ENAS 705b/MB&B 715b, Numerical Simulations of Liquids**]

[**PHYS 816a/APHY 816a, Techniques of Microwave Measurements and RF Design**]

PHYS 990a and b, Special Investigations
Directed research by arrangement with individual faculty members and approved by the DGS.

POLITICAL SCIENCE

Rosenkranz Hall, 203.432.5241
http://politicalscience.yale.edu
M.A., M.Phil., Ph.D.

Chair
Steven Wilkinson

Director of Graduate Studies
Elisabeth Wood

Professors Bruce Ackerman, Akhil Amar (*Law*), Seyla Benhabib (*on leave* [Sp]), Paul Bracken (*Management*), David Cameron, Bryan Garsten, Alan Gerber, Jacob Hacker, Gregory Huber (*on leave* [Sp]), Stathis Kalyvas, David Mayhew, Barry Nalebuff (*Management*), Douglas Rae, John Roemer, Susan Rose-Ackerman, Frances Rosenbluth, James Scott, Ian Shapiro, Stephen Skowronek, Steven Smith (*on leave* [Sp]), Susan Stokes, Peter Swenson, Ivan Szelenyi (*Sociology*), John Wargo (*Forestry & Environmental Studies*), Steven Wilkinson, Elisabeth Wood

Associate Professors Ana De La O Torres, Alexandre Debs, Hélène Landemore (*on leave*), Adria Lawrence (*on leave*), Jason Lyall, Karuna Mantena, Andrew March, Nuno Monteiro, Milan Svolik, Vesla Weaver

Assistant Professors Peter Aronow, Katharine Baldwin (*on leave*), Deborah Beim, Alexander Coppock, Allan Dafoe, John Henderson, Eitan Hersh, Sigrun Kahl, Daniel Mattingly, Kelly Rader, Thania Sanchez

Fields of Study

Fields include political theory, international relations, comparative politics, American politics, political economy, quantitative empirical methods, qualitative and archival methods, and formal theory.

Special Admissions Requirement

The department requires that scores from the GRE General Test and a writing sample accompany an application. Additional details about the application process are available on the department Web site. The department only accepts applications for the Ph.D. program.

Special Requirements for the Ph.D. Degree

Overall program requirements Students are required to pass sixteen term courses by the end of their fourth term in the program, to receive a grade of Honors in at least two Political Science courses, and to maintain an overall High Pass or above average (for purposes of calculating this average, Honors=3, High Pass=2, Pass=1, and Fail=0). The High Pass average must also be met for graduate courses listed in the Political Science department. To remain in good standing throughout their time in the Ph.D. program, students are expected to actively participate in classes and workshops, produce high

quality written work, and demonstrate regular progress toward completion of the dissertation. The department regularly offers about sixty term courses for graduate students each year. Courses are conducted as seminars and typically have small enrollments. Four of the courses required for the degree may be in departments other than Political Science (two of these can be advanced language courses with the approval of the director of graduate studies [DGS]).

Each student must demonstrate elementary reading competence in one foreign language. Such competence is usually demonstrated by taking, or having completed, two years of undergraduate course work or by examination. Alternatively, the language requirement can be satisfied by successfully completing two terms of formal theory or two terms of statistical methods at the graduate level (beyond the introductory course in statistical methods offered in the department).

Courses are offered in five substantive fields—political theory, international relations, comparative politics, American politics, and political economy—and three methods fields: quantitative empirical methods, qualitative and archival methods, and formal theory. Courses taken must include one each in at least three of the department's substantive fields. Courses cannot be counted in more than one field. Each student must demonstrate competence in three fields (two of which must be substantive fields) before the start of the fifth term. Competence can be demonstrated either by passing the comprehensive examination in the field or by course work, provided that each student takes at least two comprehensive exams. The fields of formal theory and quantitative empirical methods offer certification only through examination. For fields to be certified by course work, students are required to satisfactorily complete three courses in the field, where courses in the field are determined by the faculty and the DGS, including one in which a research paper is written and presented. The paper must be submitted to review by the instructor of the course for which the paper was written. The department offers exams twice a year, in late August and in early January. Students are expected to pass their comprehensive examinations by August of their second year. Each examination is based on a reading list compiled by the faculty within the field and updated each year. Each list offers an introduction and framework for study in the field and preparation for the examination. A committee of faculty within the field grades the exams as Distinguished, Satisfactory, or Unsatisfactory.

Students who successfully complete the Ph.D. in Political Science will often join the faculties of colleges and universities. For that reason, learning what is involved in teaching and gaining teaching experience are also essential components of graduate education. The department normally expects students to devote themselves exclusively to course work and comprehensive examinations in their first two years in the Ph.D. program. Students in Political Science typically teach in their third and fourth years.

During each year in residence, graduate students are expected to participate actively and regularly in one or more of the many research workshops run by the department. Students beyond their fourth term are required to enroll in at least one of the workshops for credit, and all workshops are graded on a Satisfactory/Unsatisfactory basis. All students are expected to present a research paper of their own at one of these workshops before the end of their fourth year. Workshop participation does not count toward the requirement of sixteen term courses.

Prior to registration for the second year (1) Students must have taken and passed at least seven courses, including the required Introduction to the Study of Politics, and maintained an overall High Pass average. At least five of these courses must be graduate courses in Political Science. While only seven courses are required, students are normally expected to complete eight courses in the first year to be on track to complete sixteen courses by the end of the second year. (2) Students are strongly encouraged to complete at least one field certification prior to the beginning of their second year. (3) Students are strongly encouraged to attend one of the subfield weekly workshops. (Note that these workshops do not count toward the required number of completed courses.)

Prior to registration for the third year (1) Students must have taken at least sixteen term courses and have received a grade of at least Pass in each of them, including the two-term required Research and Writing course for second-year students. Research and Writing is devoted to the preparation of a manuscript based on original research on a topic of the student's choice and will count as two of the sixteen credits needed to advance to candidacy. (2) Students must have received a grade of Honors in at least two Political Science courses and maintained an overall High Pass average. (3) Students must have completed certification in three fields by the end of their second year. (For purposes of fulfilling this requirement, students registered for the August exams are assumed to have passed those exams when determining eligibility for enrollment in the third year.) At the discretion of the DGS, students who fail an exam may be granted a one-term extension (to January of the third year) for obtaining certification. (4) Students are strongly encouraged to attend one of the required subfield weekly workshops. (Note that these workshops do not count toward the required number of completed courses.)

Admission to candidacy Students must 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 the Department of Political Science after having completed departmental requirements listed above and the Graduate School's prospectus requirement. As part of admission to candidacy, a student must have a prospectus approved by a dissertation director and two other members of the faculty. This must occur no later than May 1 of the student's third year of study.

Submitting the dissertation A student's dissertation research is guided by a committee of no fewer than three faculty members, at least two of whom must be members of the Yale Department of Political Science. One of the committee members is designated as chair. When a dissertation is completed, the student will select two members to write written reports on the final dissertation, at least one of whom must be a member of the Yale Department of Political Science. The DGS will also appoint one additional member of the department to write an additional evaluation.

Combined Degrees

The Graduate School offers a combined degree in Political Science and African American Studies. For details, see the entry under African American Studies in this bulletin. Students may also pursue a joint degree with the Law School.

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 prospectus and 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 eight term courses) with an average of High Pass or better. The courses must include at least six listed in the Political Science department and one each in at least three of the department's substantive fields. Language requirements are the same as for the Ph.D. degree.

Courses

EMPIRICAL ANALYSIS AND RESEARCH METHODOLOGY

PLSC 500a, Statistics Alexander Coppock
An introduction to basic statistical theory and techniques for Political Science graduate students. The first part of the course covers probability theory, and the second is devoted to estimation and inference, including an introduction to the classic multiple linear regression framework. Although emphasis is on the development of the relevant theory and statistical concepts, a series of applications and examples is considered on a variety of political science problems.

PLSC 503b, Quantitative Methods Peter Aronow
An introduction to statistical identification, causal inference, and quantitative research design under the frequentist paradigm. Special emphasis is placed on identification of causal effects under the Neyman-Rubin causal model of potential outcomes.

PLSC 504a, Advanced Quantitative Methods Allan Dafoe
The course covers a wide range of topics in quantitative methodology. The recurrent theme is the challenge of drawing secure causal inferences from data. Topics covered include matching estimators, differences-in-differences estimators, instrumental variable methods, and regression discontinuity analysis. We also introduce maximum likelihood estimation and an array of linear and nonlinear regression applications such as dichotomous and polychotomous response models, models for censored and truncated data, sample selection models, duration models, and models for count data. The broader aim of the course is to provide students with the statistical background necessary to read and conduct quantitative research. The course assumes students have command of the material covered in PLSC 500a and PLSC 503b, including basic probability theory, matrix algebra, and the linear regression model.

PLSC 505b/SOCY 508b, Qualitative Field Research Jason Stearns
In this seminar we discuss and practice qualitative field research methods. The course covers the basic techniques for collecting, interpreting, and analyzing ethnographic data, with an emphasis on the core ethnographic techniques of participant observation and in-depth interviewing. All participants carry out a local research project. Open to undergraduates with permission of the instructor.

PLSC 506b, Measurement, Estimation, and Inference John Henderson
A number of practical challenges often arise in the design and analysis of political science research. This course covers a wide array of methodologies that aim to improve the quality of our measures, estimates, and inferences given these challenges. Topics include survey instrumentation, missing data, nonresponse and attrition bias, the bootstrap, sensitivity analysis, multiple testing, and p-hacking. The course also covers some applications of Bayesian inference in the analysis of choice and text data, and introduces some nonparametric alternatives to the linear model. The aim of the course is to provide students with a host of practical tools that can be used to evaluate and replicate other research, as well as to help students address inferential issues arising in their own work. Prerequisite: PLSC 500a, 503b, 504a, or equivalent.

PLSC 508b, Causal Inference and Research Design Peter Aronow
This seminar exposes students to cutting-edge empirical and statistical research across the social and health sciences, with a focus on topics relevant to causal questions in the domain of political science. The class features five or six presentations by visiting speakers (primarily faculty at other universities) who discuss their work. When visiting speakers are not present (roughly every other week), lectures and discussions focus on selected methodological topics, including experimental design, partial identification, design-based inference, network analysis, semiparametric efficiency theory, and qualitative/mixed-methods research. Statistical training at the level of PLSC 503 is expected, though training in probability theory at the level of STAT 600 or ECON 550 is suggested.

PLSC 510a, Introduction to the Study of Politics Stathis Kalyvas
The course introduces students to some of the major controversies in political science. We focus on the five substantive themes that make up the Yale Initiative: Order, Conflict, and Violence; Representation and Popular Rule; Crafting and Operating Institutions; Identities, Affiliations, and Allegiances; and Distributive Politics. We divide our time between discussing readings on these subjects and conversations with different members of the faculty who specialize in them. There is also some attention to methodological controversies within the discipline. Requirements: an annotated bibliography of one of the substantive themes and a take-home final exam.

PLSC 514b[U], The Logic of Randomized Experiments in Political Science
Alexander Coppock
Randomized experiments have become indispensable tools for businesses, nonprofits, and social scientists to assess causal effects. Companies like Facebook and OKCupid subject nearly every element of their interfaces to intense testing via randomized experimentation in order to optimize engagement. Political organizations randomize the type and frequency of voter contact in order to maximize their chances of electoral and legislative success. Social scientists use the results of randomized experiments to develop and test theories of human behavior. While some research methods classes cover a wide variety of research tools, this course focuses narrowly on the strengths and weaknesses of a single method: randomized experimentation. Students learn to design, execute, and analyze randomized experiments. The goal is to enable students to evaluate the impact of real-world interventions on well-defined political, economic, and social outcomes. We

cover field and survey experiments, though nearly all of the design and analysis principles extend to lab and so-called natural experiments.

PLSC 517b, Fundamentals of Modeling John Roemer
The course is an introduction to techniques of microeconomic modeling, as applied to problems in political economy and political science. The level is that of a sophisticated course in intermediate microeconomics. Topics include preferences, utility functions, Pareto efficiency, competitive economic equilibrium, the first theorem of welfare economics, Hotelling-Downs political equilibrium, Nash equilibrium, Wittman-Nash political equilibrium, Nash bargaining, Arrow's theorem and social welfare functions, and distributive justice. Prerequisites: differential calculus and/or the Political Science Math Camp. Microeconomics at the intermediate level is helpful but not mandatory.

PLSC 518a, Fundamentals of Modeling II Alexandre Debs
Building upon Fundamentals of Modeling I, the course offers a rigorous introduction to noncooperative game theory. The goal of the course is to help students understand the key concepts and ideas in game theory and to provide students with a road map for applying game theoretic tools to their own research. Topics include strategic form games, extensive form games, and Bayesian games, among others. Students are assumed to have mathematical knowledge at the level of the Political Science Math Camp and to have taken Fundamentals of Modeling I or its equivalent.

PLSC 519b, Fundamentals of Modeling III: Applications Milan Svolik
This course surveys key applications of game theory and related methods to the study of politics and political economy. Topics include electoral competition, political accountability, social choice, collective action, democratization, and war. Prerequisite: PLSC 517, PLSC 518, or an introductory course in game theory.

PLSC 520a[U], Game Theory and Political Science Deborah Beim
Introduction to game theory—a method by which strategic interactions among individuals and groups in society are mathematically modeled—and its applications to political science. Concepts employed by game theorists, such as Nash equilibrium, subgame perfect equilibrium, and perfect Bayesian equilibrium. Problems of cooperation, time-consistency, signaling, and reputation formation. Political applications include candidate competition, policy making, political bargaining, and international conflict.

PLSC 522a, Historical Approaches to the Study of Politics Sigrun Kahl
An overview of the how-to, and the payoff, of a historical approach to the study of politics. The course covers a wide range of topics, from the classics of political science and sociology to recent comparative historical work.

PLSC 540, Research and Writing Ana De La O Torres, Susan Stokes
This is a required course for all second-year students. It meets for the first six weeks of the fall term and the first six weeks of the spring term. The fall meetings are devoted to discussion of research design as well as individual student projects. The spring meetings are devoted to discussion of drafts of student papers. The work of the spring-term seminar includes criticism of the organization, arguments, data evaluation, and writing in each student's paper by the instructors and the other students. Using this 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-term meeting and a complete draft of the paper at the first meeting in the spring.

POLITICAL THEORY

PLSC 553a/LAW 20104/PHIL 718a, Justice Bruce Ackerman
An examination of contemporary theories, together with an effort to assess their practical implications. Authors this year include Peter Singer, Richard Posner, John Rawls, Robert Nozick, Michael Walzer, Marion Young, Avishai Margalit, and Cass Sunstein. Topics: animal rights, the status of children and the principles of educational policy, the relation of market justice to distributive justice, the status of affirmative action. Self-scheduled examination or paper option. Follows Law School academic calendar. MT 4:10–6

PLSC 560a[U], Political Theology Steven Smith
Discussion of political theology as the foundation of political authority. The question of whether authority derives from reason or revelation, or from secular or religious sources. Examination of the dialectic of secularization and religious belief in some of the writings of Hobbes, Spinoza, Rousseau, Kant, Maistre, Schmitt, and Strauss.

PLSC 565a/LAW 20538, Democracy and Distribution Ian Shapiro
The attention showered in 2015 on Thomas Piketty's book *Capital in the Twenty-First Century* brought issues of inequality in the distribution of income and wealth to the forefront of public and scholarly attention. An enormous body of research has been produced over the past two decades to understand the nature of the dramatic rise in inequality, especially in the United States, and its causes. A long list of proposals for legal change has emerged in response to the outpouring of data and analysis. This course explores the facts and the causes of and political barriers to potential responses to these recent developments, principally but not exclusively in the United States. Ultimately, the question requires an examination of the relations between democracy and the distribution of income and wealth. Particular attention is paid to the ways in which different groups, classes, and coalitions affect, and are affected by, democratic distributive politics. Attention is paid to theories of distribution, politics of distribution, distributive instruments, and the implementation of policies affecting distribution. Substantive topics covered include regulation, protectionism, taxes, social insurance, welfare, public opinion, education, and unions. Follows Law School academic calendar.

PLSC 575a/ECON 788a, Political Competition John Roemer
Political competition in democracies is party competition. We develop, from the formal viewpoint, theories of party competition in democracies. The familiar "median voter theorem" of A. Downs is the simplest example of such a theory, but it is inadequate in several ways. We develop a theory in which parties (1) compete over several issues, not just one issue, as in Downs; (2) are uncertain about how citizens will respond to platforms; and (3) represent interest groups in the population. Applications, particularly to the theory of income distribution and taxation, are studied.

PLSC 580a[U]/PHIL 674a[U], Borders, Culture, and Citizenship Seyla Benhabib
The contemporary refugee crisis in Europe and elsewhere; new patterns of migration, increasing demands for multicultural rights on the part of Muslim minorities in the West, and transnational effects of globalization faced by contemporary societies. This course examines these issues in a multidisciplinary perspective in the light of political theories of citizenship and migration, and laws concerning refugees and migrants in Europe and the United States.

PLSC 583a/GMAN 651a/PHIL 734a, Contemporary Critical Theory Seyla Benhabib
An examination of the themes of statelessness, migration, and exile in the works of Arendt, Benjamin, Adorno, Shklar, and Berlin. W 9:25–11:15

PLSC 611a[U]/PHIL 657a[U], Recent Work on Justice Thomas Pogge
In-depth study of one contemporary book, author, or debate in political philosophy, political theory, or normative economics. Depending on student interest, this might be a ground-breaking new book, the life's work of a prominent author, or an important theme in contemporary political thought. T 1:30–3:20

PLSC 630a[U], Philosophy of Science for the Study of Politics Ian Shapiro
An examination of the philosophy of science from the perspective of the study of politics. Particular attention to the ways in which assumptions about science influence models of political behavior, the methods adopted to study that behavior, and the relations between science and democracy. Readings include works by both classic and contemporary authors.

PLSC 635b[U], Sovereignty Andrew March
The history of the concept of sovereignty, including current debates over its meaning in political philosophy, international relations, and jurisprudence. Discussion of how these debates relate to both historical and contemporary political problems.

PLSC 640b[U], Advanced Topics in Modern Political Philosophy Karuna Mantena
The topic of empire and its role in the development of modern political thought. Focus on how the imperial experience—discovery of new peoples, conquest, colonial settlement, and global commerce—affected the formation of such central concepts of political theory as reason, freedom, rights, sovereignty, property, and progress. Readings include Vitoria, Montaigne, Locke, Montesquieu, Diderot, Kant, Burke, Mill, Hobson, Arendt.

INTERNATIONAL RELATIONS

PLSC 656a[U], Global Governance Yuriy Sergeyev
Examination of global policy problems, the acceleration of interdependence, and the role, potential, and limits of the institutions of global governance to articulate collective interests and to work out cooperative problem solving arrangements. Consideration of gaps in global governance and controversies between globalization and state sovereignty, universality, and tradition.

PLSC 657a[U], The Global Politics of Artificial Intelligence Allan Dafoe
Study of the processes in which machine intelligence transforms economic, societal, and global politics and of the political challenges in development of beneficial artificial

intelligence. Topics include the provability of beneficial AI; the effects on, and of, inequality and unemployment; military conflict and strategy with autonomous weapons, cyber weapons, and AI-enabled intelligence; and determining which global institutions are best suited for providing global public goods, the legitimate aggregation of preferences, and the control of AI development.

PLSC 662b[U]/MGT 586b, Strategy, Technology, and War Paul Bracken
An integrated, comprehensive examination of technology and strategy in the field of national security. Key concepts—technology strategy, macro-organizational behavior, strategic posture—describe the international strategic environment. Analysis of the changing structure of defense in light of new dynamics: a second nuclear age; the spread of advanced technologies to China, India, militia groups, etc.; network-centric and information warfare; private equity investment in defense and intelligence; and a shifting locus of innovation to lower tier firms. This interdisciplinary course crosses boundaries of management, politics, and economics.

PLSC 665b[U]/GLBL 555b, Causes of War Allan Dafoe
Examination of social, symbolic, and psychological aspects of international relations, with emphasis on the roles of perception and reputation in militarized conflict. Topics include deterrence, honor, prestige, signaling, audience costs, and international law. Rationalist, psychological, and cultural perspectives. Some attention to research design.

PLSC 678a[U], Japan and the World Frances Rosenbluth
The historical development of Japan's international relations since the late Tokugawa period; World War II and its legacy; domestic institutions and foreign policy; implications for the United States; and interactions between nationalism and regionalism.

PLSC 695a, International Relations I
The course examines theories of international relations and evaluates empirical evidence in favor of or against those theories. It surveys the main theoretical traditions in international relations and considers how empirical methods can be used to identify causation in the international relations field. Students acquire broad familiarity with the diverse literature in this field, learn to identify opportunities for new research, and apply rigorous methodology to evaluate theoretical claims. The course is designed for students who plan to pursue doctoral-level research in international relations and want to pass the Ph.D. qualifying exam in the field.

PLSC 696b, International Relations II Jason Lyall
This course introduces students to the various methodological challenges that arise while conducting empirical research in international relations as well as possible research designs for overcoming them. This course, which builds directly on PLSC 695a, draws heavily, though not exclusively, on research issues that arise in the subfield of international security. Each week we tackle a key debate: proposed topics include (1) explaining the origins, conduct, and outcomes of inter- and intrastate wars; (2) the sources of military effectiveness; (3) the uses and limits of coercive diplomacy; and (4) the effects of transnational forces and actors. We use these debates as springboards for broader discussions of the strengths and weaknesses of different research approaches, including

experimental, quasi-experimental, observational, and interview and archival-based work. PLSC 695a is strongly recommended.

COMPARATIVE POLITICS

PLSC 709a/LAW 20518, Comparative Constitutional Law Bruce Ackerman
An effort to define the key concepts adequate for an evaluation of the worldwide development of modern constitutionalism since the Second World War. Enrollment limited. Follows Law School academic calendar.

PLSC 728a[U], Language Politics Volodymyr Kulyk
Various aspects of language politics on the levels of the state, international organizations, non-state entities, and individual citizens. Analysis of official documents, everyday practices, and underlying beliefs informing them. Examination of various domains such as education, public administration, media, churches, workplace, and family.

PLSC 732a[U], State and Society in Contemporary Ukraine Volodymyr Kulyk
Functioning of the state and society in post-Soviet Ukraine. The formation and subsequent transformation of the state, including the constitution, the branches of government, the party system, elections, foreign policy, education, and social welfare. Various facets of society such as religion, media, language use, gender relations, poverty, and racism are considered. Particular attention paid to the Orange Revolution and Euromaidan.

PLSC 734a,b/SOCY 560a,b, Comparative Research Workshop Julia Adams, Philip Gorski
This weekly workshop is dedicated to group discussion of work-in-progress by visiting scholars, Yale graduate students, and in-house faculty from Sociology and affiliated disciplines. Papers are distributed a week ahead of time and also posted on the Web site of the Center for Comparative Research (http://ccr.yale.edu). Students who take the course for a letter grade are expected to present a paper-in-progress the term that they are enrolled for credit. T 11:50–1:20

PLSC 755b[U], European Politics David Cameron
Comparison of the political systems of the major European countries. Topics include political institutions, electoral politics and political parties, public policies, and contemporary problems.

PLSC 756a[U], The European Union David Cameron
Origins and development of the European Community and Union over the past fifty years; ways in which the often conflicting ambitions of its member states have shaped the EU; relations between member states and the EU's supranational institutions and politics; and economic, political, and geopolitical challenges.

PLSC 766a[U], Politics and Markets Peter Swenson
Examination of the interplay between market and political processes in different substantive realms, time periods, and countries. Inquiry into the developmental relationship between capitalism and democracy, including the developmental and functional relationships between the two. Investigation of the politics of regulation in areas such as property rights; social security; international finance; and product, labor, and service

markets. Topics include the economic motives of interest groups and coalitions in the political process.

PLSC 776a[U]/RLST 728a, Islam and Democracy in the Modern Middle East
Andrew March
This seminar studies the development of regimes of government in Muslim countries since the nineteenth century. The focus is on early constitutional movements, the rise of political Islam, the management of religion in various twentieth-century states, the Iranian revolution, and the growth of Salafi ideas, culminating in the ISIS "caliphate."

PLSC 777a, Comparative Politics I: Research Design Susan Stokes
This course, the first in the yearlong introduction to the study of comparative politics for Ph.D. students in political science, examines the purpose and methodology of comparative inquiry. Designed to introduce students to the study of comparative politics and to assist students in developing research topics and strategies, the course explores key themes—the origins of political regimes, the building of nations and states, ethnicity and nationalism, collective action, the politics of welfare states, and the logic of institutional change—through the critical reading and discussion of classic and contemporary works.

PLSC 778b, Comparative Politics II Steven Wilkinson
The second part of a two-part sequence designed to introduce graduate students to the fundamentals of comparative politics, including the major debates, topics, and methods.

PLSC 779a/ANTH 541a/F&ES 836a/HIST 965a, Agrarian Societies: Culture, Society, History, and Development Fabian Drixler, Peter Perdue, James Scott
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. W 1:30–5:20

PLSC 788a[U], European Fascism Bernt Hagtvet
Fascism in Europe, in its variety of national manifestations, between 1918 and 1945. Topics include the range of theories about the social, intellectual, and political origins of Fascism; regime forms implemented by Fascists; crimes perpetrated by Fascist movements in Europe; and the long-term effects of Fascism on political debates in contemporary Europe.

POLITICAL ECONOMY

PLSC 712a[U], Comparative Political Economy Frances Rosenbluth
This seminar is designed to give graduate students a broad-gauged introduction to one of the largest and most vibrant branches of political science. We begin by examining the field's diverse theoretical underpinnings and placing political economy in the context of political science more broadly. The remainder of the course is concerned with the application of theory to practice. We examine the interaction between government and the economy in democratic and nondemocratic regimes, and in developed and developing countries. Topics include micro- and macroeconomic policy, industrial relations, the political economy of gender, and international political economy.

PLSC 714b/LAW 21042, Corruption, Economic Development, and Democracy
Susan Rose-Ackerman
A seminar on the link between political and bureaucratic institutions, on the one hand, and economic development, on the other. A particular focus is the impact of corruption on development and the establishment of democratic government. Enrollment limited to fifteen.

PLSC 717a[U]/MGMT 627a, Business and Government after Communism
Ian Shapiro, Michael Graetz
Reassessment of business's place in society—and its relations with government—in an era when alternatives to capitalism are moribund. Topics include the role of business in regime change, corruption and attempts to combat it, business and the provision of low-income housing and social services, and privatization of such core functions of government as prisons, the military, and local public services.

AMERICAN POLITICS

PLSC 800a, Introduction to American Politics Jacob Hacker
An introduction to the analysis of U.S. politics. Approaches given consideration include institutional design and innovation, social capital and civil society, the state, attitudes, ideology, econometrics of elections, rational actors, formal theories of institutions, and transatlantic comparisons. Assigned authors include R. Putnam, T. Skocpol, J. Gerring, J. Zaller, D.R. Kiewiet, L. Bartels, D. Mayhew, K. Poole & H. Rosenthal, G. Cox & M. McCubbins, K. Krehbiel, E. Schickler, and A. Alesina. Students are expected to read and discuss each week's assignment and, for each of five weeks, to write a three- to five-page analytic paper that deals with a subject addressed or suggested by the reading.

PLSC 801a[U], Political Preferences and American Political Behavior Gregory Huber
Introduction to research methods and topics in American politics. Focus on ideas about choice that are useful for the study of politics. Topics include utility theory, heuristics and biases, proximity vs. directional voting, Bayesian updating, retrospective voting, priming and framing, the role of emotion, and the consequences of political ignorance.

PLSC 802b, Collective Action and Choice Deborah Beim
A graduate-level course, open to undergraduates, about the basic issues of collective action and choice (preference aggregation), with a particular focus on issues of American politics. Topics include externalities and public goods provision, social choice theory, models of electoral competition (including "median voter" models, and extensions to those models that incorporate strategic challenger entry, campaign spending, heterogeneity in voter attentiveness, valence dimensions, and primaries, etc.), the effects of different institutional settings (e.g., competitive versus retention elections) on choices, the incumbency advantage, lobbying, and decision making in small groups (e.g., issues of deliberation). Course work includes reading and writing assignments.

PLSC 803b, American Politics III: Institutions Kelly Rader
A graduate-level course, open to undergraduates, designed to introduce students to research on American political institutions. We examine different explanations for and models of the sources of institutions, discuss their internal organization and governance,

and consider the effects of institutions on outcomes of interest. Topics include alternatives to institutions, agenda-setting models, influences on bureaucratic decisions, the size of government and state building, congressional organization, the presidency, policy feedback and path dependence, and interest groups. Course work includes reading and writing assignments.

PLSC 812b[U], Progressivism: Theory and Practice Stephen Skowronek
The progressive reform tradition in American politics. The tradition's conceptual underpinnings, social supports, practical manifestations in policy and in new governmental arrangements, and conservative critics. Emphasis on the origins of progressivism in the early decades of the twentieth century, with attention to latter-day manifestations and to changes in the progressive impulse over time.

PLSC 842b/LAW 21046, The Constitution: History, Philosophy, and Law Bruce Ackerman
An inquiry into the foundations of the American Constitution, at its founding and at critical moments in its historical transformation—most notably in response to the Civil War, the Great Depression, and the Civil Rights Movement. Philosophically speaking, do we still live under the Constitution founded by the Federalists, or are we inhabitants of the Second or Third or Nth Republic? Institutionally, in what ways are the patterns of modern American government similar to, and different from, those in post-Revolutionary (1787–1860) and post-Civil War (1868–1932) America? Legally, what is or was the role of constitutional law in the organization of each of these historical regimes? Through asking and answering these questions, the course tries to gain a critical perspective on the effort by the present Supreme Court to create a new constitutional regime for the twenty-first century. Self-scheduled examination (web) or paper option.

PLSC 851a/AFAM 622a, Race and Ethnicity in American Politics Vesla Weaver
This course examines different theories for understanding the racial order—non-zero-sum mobility, racial triangulation, interest convergence, racial resentment, capture, among others—as well as strategic responses by minorities to the racial order to undermine disadvantages: linked fate, distancing, threat mobilization, and coalition formation. Various social science methods are used. TH 9:25–11:15

PLSC 853a[U], U.S. National Elections Eitan Hersh
An investigation of electoral realignments, voting for president and Congress, voter turnout, incumbency advantage, nominations, and campaign finance. Paper.

RESEARCH WORKSHOPS

PLSC 919, American Politics Workshop John Henderson, Gregory Huber
The course meets throughout the year in conjunction with the ISPS American Politics Workshop. It serves as a forum for graduate students in American politics to discuss current research in the field as presented by outside speakers and current graduate students. Can be taken as Satisfactory/Unsatisfactory only. W 12–1:20

PLSC 920, Comparative Politics Workshop Ana De La O Torres, Susan Stokes
A forum for the presentation of ongoing research by Yale graduate students, Yale faculty, and invited external speakers in a rigorous and critical environment. The workshop's methodological and substantive range is broad, covering the entire range of comparative politics. There are no formal presentations. Papers are read in advance by participants; a graduate student critically discusses the week's paper, the presenter responds, and discussion ensues. Detailed information can be found at www.yale.edu/cpworkshop. Can be taken as Satisfactory/Unsatisfactory only. T 12–1:20

PLSC 921, Political Theory Workshop Bryan Garsten, Steven Smith
The Political Theory Workshop is an interdisciplinary forum that focuses on theoretical and philosophical approaches to the study of politics. The workshop seeks to engage with (and expose students to) a broad range of current scholarship in political theory and political philosophy, including work in the history of political thought; theoretical investigations of contemporary political phenomena; philosophical analyses of key political concepts; conceptual issues in ethics, law, and public policy; and contributions to normative political theory. The workshop features ongoing research by Yale faculty members, visiting scholars, invited guests, and advanced graduate students. Papers are distributed and read in advance, and discussions are opened by a graduate student commentator. Detailed information can be found at www.yale.edu/isps/seminars/politheo/index.html. Can be taken as Satisfactory/Unsatisfactory only. W 4:15–5:45

PLSC 922, Order, Conflict, and Violence (OCV) Seminar Series Stathis Kalyvas [F], Elisabeth Wood [Sp]
The OCV seminar series focuses on processes related to the emergence and breakdown of order. The key assumption is that understanding and studying these processes requires better theoretical and empirical foundations and calls for challenging existing disciplinary and methodological divides. The seminar series is, therefore, dedicated to the presentation of cutting-edge work from all social science disciplines and includes the presentation of ongoing research by Yale graduate students. Detailed information can be found at www.yale.edu/macmillan/ocvprogram. Can be taken as Satisfactory/Unsatisfactory only.

PLSC 924, Leitner Political Economy Seminar Series Deborah Beim, Milan Svolik
The Leitner Political Economy Seminar Series engages research on the interaction between economics and politics as well as research that employs the methods of political economists to study a wide range of social phenomena. The workshop serves as a forum for graduate students and faculty to present their own work and to discuss current research in the field as presented by outside speakers, faculty, and students. Detailed information can be found at www.yale.edu/leitner/seminars.html. Can be taken as Satisfactory/Unsatisfactory only. M 12–1:20

PLSC 926, International Relations Workshop Allan Dafoe, Nuno Monteiro
The International Relations Workshop engages work in the fields of international security, international political economy, and international institutions. The forum attracts outside speakers, Yale faculty, and graduate students. It provides a venue to develop ideas,

polish work-in-progress, or showcase completed projects. Typically, the speaker would prepare a 35- to 40-minute presentation, followed by a question-and-answer session. More information can be found at http://irworkshop.sites.yale.edu. Can be taken as Satisfactory/Unsatisfactory only. W 12–1:20

PLSC 990, Directed Reading
By arrangement with individual faculty.

PSYCHOLOGY

Kirtland Hall, 203.432.4500
http://psychology.yale.edu
M.S., M.Phil., Ph.D.

Chair
Frank Keil (203.432.4545, frank.keil@yale.edu)

Director of Graduate Studies
Tyrone Cannon [F] (203.436.1545, tyrone.cannon@yale.edu)
Gregory McCarthy [Sp] (203.432.9261, gregory.mccarthy@yale.edu)

Professors Woo-kyoung Ahn, Stephen Anderson (*Linguistics; on leave* [F]), Amy Arnsten (*Neuroscience*), John Bargh, Paul Bloom, Thomas Brown, Tyrone Cannon, B.J. Casey, Marvin Chun, Margaret Clark, Ravi Dhar (*School of Management*), John Dovidio, Carol Fowler (*Haskins Laboratories*), Robert Frank (*Linguistics*), Tamar Gendler (*Philosophy*), Jeannette Ickovics (*Public Health; on leave* [F]), Marcia Johnson, Jutta Joormann, Dan Kahan (*Law School*), Alan Kazdin, Frank Keil, Robert Kerns (*Veterans Administration Medical Center*), Joshua Knobe (*Philosophy*), Marianne LaFrance (*Women's, Gender & Sexuality Studies*), Lawrence Marks (*Public Health*), Linda Mayes (*Child Study Center*), Gregory McCarthy, Nathan Novemsky (*School of Management*), Donald Quinlan (*Psychiatry*), Jennifer Richeson, Peter Salovey, Laurie Santos, Brian Scholl, Jane Taylor (*Psychiatry*), Tom Tyler (*Law School*), Fred Volkmar (*Child Study Center*), Victor Vroom (*School of Management*), Karen Wynn

Associate Professors Walter Gilliam (*Child Study Center*), Elena Grigorenko (*Child Study Center*), Joan Kaufman (*Psychiatry*), Becca Levy (*Public Health*), Kevin Pelphrey (*Psychiatry*), Maria Piñango (*Linguistics*), David Rand, Mary Schwab-Stone (*Child Study Center*)

Assistant Professors Arielle Baskin-Sommers, Steve Chang, Yarrow Dunham, Dylan Gee, Avram Holmes, Hedy Kober (*Psychiatry*), Gregory Samanez-Larkin

Lecturers Nancy Close, Nelson Donegan, Carla Horwitz, Kristi Lockhart, Mary O'Brien, Matthias Siemer

Fields of Study

Fields include clinical psychology; cognitive psychology; developmental psychology; neuroscience; and social/personality psychology.

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) Students are required to assist in teaching four courses by the end of their fourth year. (3) Completion of a First-Year Research Paper due by May 10 of the second term. (4) Completion of a predissertation research project, to be initiated not later than the second term and completed not later than May 1 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, are necessary for continuation beyond the second year. (5) Submission of a dissertation prospectus, 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. (6) 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. 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 (level 20) for four terms 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. Programs

Psychology offers combined Ph.D. degree programs with African American Studies and Philosophy. For the combined program with African American Studies, students must apply to the African American Studies department, with Psychology indicated as the secondary department. For the combined program with Philosophy, students can apply to the Philosophy department or the Psychology department. See 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, 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 a first-year research project, a predissertation research project, and a minimum of eight courses.

Program materials are available online at http://psychology.yale.edu.

Courses

[PSYC 505a, Stereotyping and Prejudice]

[PSYC 506b/LING 540b[U], Computational Models in Cognitive Science]

PSYC 509a, Social Cognition John Bargh
A course in contemporary social cognition theory and research, in which students fully participate in each week's class discussion of the assigned readings. The goal of the course is to bring students up to speed, not only on the major themes and programs of research today, but also on the historical roots and context of that research—in other words, why that research is being done in the first place.

[PSYC 511b, Cognitive Development]

[PSYC 513b, Biological Bases of Psychopathology]

[PSYC 514a[U], Topics in Infant Studies]

PSYC 518a, Multivariate Statistics John Dovidio
Introduction to the analysis of quantitative data from experiments—primarily the analysis of variance and contrast analyses. Some coverage of correlation and regression. Required of first-year students except with instructor's permission.

[PSYC 519b, Advanced Regression Analyses]

[PSYC 520b[U], Computational Modeling of Social Behavior]

[PSYC 521a, Structural Equation Modeling]

[PSYC 522a[U], Mapping the Human Brain]

[PSYC 526b[U], Research Methods in Human Neuroscience]

PSYC 531b[U], Psychopharmacology Thomas Brown
The purpose of this course is to provide an overview of pharmacological principles and the properties of psychoactive drugs. Background is furnished on neuroanatomy and neurophysiology. Topics include therapies for neurological and psychiatric disorders as well as drugs of abuse. Special attention is paid to the molecular, cellular, and physiological mechanisms of drug effects.

PSYC 534a[U], Developmental Psychopathology Fred Volkmar
This course, designed for advanced undergraduates or beginning graduate students, provides an overview of developmental psychopathology during childhood and adolescence. It is team-taught by a child psychiatrist and psychologist and covers aspects of normal development, assessment methods, clinical disorders, treatment, and legal and social policy issues. We begin with a review of normative development and then a discussion of theoretical approaches to understanding developmental aspects of common mental health conditions in childhood. Relevant issues of culture and ethnicity in expression of psychopathology in childhood are also reviewed.

PSYC 539a, Advanced Psychotherapy Technique Jutta Joormann
The aim of this course is to have students master information on theory, assessment, and intervention for major forms of psychopathology using cognitive-behavioral approaches. The focus is on learning how behavior can be conceptualized in cognitivebehavioral terms and how specific clinical interventions are implemented. Students play an active role in this process by participating in class discussions, confronting the complexities of clinical intervention, and making presentations on treatment methods for various clinical problems. F 9:25–11:15

PSYC 541b, Research Methods in Psychology Tyrone Cannon
Research design, methodology, and evaluation considered in the context of clinical research. Emphasis on experimental and quasi-experimental designs, threats to validation, confounding, sources of artifact and bias, alternative assessment strategies, and data evaluation methods.

PSYC 553a/MGMT 753a, Behavioral Decision Making I: Choice Nathan Novemsky, Ravi Dhar
The seminar examines research on the psychology of decision making, focusing on judgment. Although the normative issue of how decisions should be made is relevant, the descriptive issue of how decisions are made is the main focus of the course. Topics of discussion include judgment heuristics and biases, confidence and calibration, issues of well-being including predictions and experiences, regret and counterfactuals. 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. Students generally enroll from a variety of disciplines including cognitive and social psychology, behavioral economics, finance, marketing, political science, medicine, and public health.

[**PSYC 554a/MGMT 754a, Behavioral Decision Making II: Judgment**]

[**PSYC 557b, Social and Emotional Relationships**]

[**PSYC 560a^{U}, Research Methods in Behavioral Genetics**]

[**PSYC 570a, Nonverbal Communication**]

[**PSYC 575b^{U}, Brain and Behavior**]

[**PSYC 579b^{U}, Thinking**]

PSYC 601b/F&ES 862b/HPM 601b/LAW 21141, The Science of Science Communication Dan Kahan
The simple dissemination of valid scientific knowledge does not guarantee it will be recognized by non-experts to whom it is of consequence. The science of science communication is an emerging, multidisciplinary field that investigates the processes that enable ordinary citizens to form beliefs consistent with the best available scientific evidence, the conditions that impede the formation of such beliefs, and the strategies that can be employed to avoid or ameliorate such conditions. This course surveys, and makes a modest attempt to systematize, the growing body of work in this area. Special attention

is paid to identifying the distinctive communication dynamics of the diverse contexts in which non-experts engage scientific information, including electoral politics, governmental policy making, and personal health decision making.

PSYC 604b, Cognition and Emotion Matthias Siemer
The course presents an overview of current research questions and results in the area of cognition and emotion. We explore basic research questions as well as implications of cognitive approaches toward emotions for domains such as emotional disorders and psychological resilience and well-being.

PSYC 605a[U], Social Emotions Margaret Clark
The nature and function of emotions in social context. How emotions such as happiness, sadness, fear, and anger shape how we relate to others; how the ways in which we relate to others shape our experience and expression of these emotions. The nature and functions of additional emotions that seem to arise only within the context of social relationships: feelings of hurt, guilt, gratitude, empathic joy, and empathic sadness.

[**PSYC 607b[U], Cognitive Science of Causality**]

[**PSYC 608b[U], Cognitive Science of Ignorance**]

PSYC 609b/LAW 21779/PHIL 744b, Addiction and the Law: Perspectives from Philosophy, Economics, and Neuroscience Gideon Yaffe, Alan Schwartz, Michael Moore, Hedy Kober
This course concerns the bearing of addiction on various forms of treatment under the law, including but not limited to the criminal liability of addicts. The course addresses this broad set of issues through consideration of the import for the law of philosophical, economic, and neuroscientific conceptions of the nature of addiction. Follows Law School academic calendar. T 2:10–4

[**PSYC 610a[U], The Modern Unconscious**]

[**PSYC 611b[U]/INP 611b, Systems Neuroscience**]

[**PSYC 613b[U], Mind, Brain, and Society**]

[**PSYC 615a, Psychology, Psychotherapy, History, Systems, and Practice**]

PSYC 617a[U], Etiology and Treatment of Addiction Arielle Baskin-Sommers
What is considered a drug? Why do some individuals use substances, but others become addicted? Are there effective treatments for addiction? Why and how does society attempt to control substance use and distribution? Exploring questions such as these is a central concern in this interdisciplinary seminar, which highlights research from cognitive neuroscience, psychology, sociology, and public health perspectives. The focus is on examining social, neurobiological, and genetic explanations for addiction, evaluating addiction treatments, and discussing the social construction of substance policies. Students are asked to think critically about material and evaluate its strengths and weaknesses. To foster critical thinking skills, students have ample opportunities to discuss topics in class, analyze arguments in reading assignments, and apply ideas to real-world situations through projects and presentations. Readings consist primarily of journal articles. W 9:25–11:15

[**PSYC 618b[U], The Social Brain**]

PSYC 621a[U], Cognitive Science of Pleasure Paul Bloom
The appeal of fiction and the imagination. We explore the mysterious appeal of narratives, fantasies, daydreams, nightmares, and other imaginary pursuits. Our approach is eclectic, drawing on fields such as literary criticism, film studies, behavioral economics, evolutionary theory, cognitive psychology, developmental psychology, and analytic philosophy.

PSYC 622a/LAW 20227, Law and Cognition Dan Kahan
The goal of this seminar is to deepen participants' understanding of how legal decision makers—particularly judges and juries—think. We compile an in-depth catalog of empirically grounded frameworks, including ones founded in behavioral economics, social psychology, and political science; relate these to historical and contemporary jurisprudential perspectives, such as "formalism," "legal realism," and the "legal process school"; and develop critical understandings of the logic and presuppositions of pertinent forms of proof—controlled experiments, observational studies, and neuroscience imaging, among others. Students write short response papers on weekly readings. Enrollment capped at twenty-five.

[**PSYC 623b[U], Cognitive Science of Good and Evil**]

PSYC 625b[U], Social Perception Brian Scholl
When exploring the structure of the mind, we typically think of visual perception as among the earliest and most basic of our cognitive processes, while we think of social cognition as among the most advanced forms of higher-level cognition. In this seminar we explore how these two aspects of the mind connect. Specific topics include the perception of animacy, agency, and goal-directedness; biological motion; face perception (including the perception of facial attractiveness); gaze processing and social attention; thin-slicing and perceptual stereotypes; and social and cultural influences on perception. TH 1:30–3:20

PSYC 626a/LAW 20339, Topics in Law and Psychology Tom Tyler
This seminar is an introduction to areas of overlap between the field of psychology and law. It touches on the key areas of interface, including forensic science; eyewitness identification, lie detection, interrogation, decision making by judges and juries; issues of explicit and implicit racism/sexism; media violence; and the psychology consent. For each class, two or three students write a short position paper (1 or 2 pages) on the readings for that week. In some cases, there are several topics covered, and students can choose the one they want to write about. Each student gives a brief presentation of the position paper at the beginning of the class. A 20–30-page paper on some topic of the material is an option. Self-scheduled examination or paper option. T 8:10–10

[**PSYC 627b, Advanced Topics in Infant Studies**]

[**PSYC 629a/LAW 20647, Social Science Research Methods**]

[**PSYC 630b/LAW 21745, Empirical Research Seminar**]

[**PSYC 632b[U], Food and the Brain**]

[PSYC 643a, Psychological Measurement of Individual Differences in Cognitive Functioning, Achievement, and Personality]

[PSYC 646a/LAW 20627, Social Science in Law]

PSYC 647b/LAW 21496, Social Science and Institutional Design: The Empirical Evaluation of Legal Policies and Practices Tom Tyler
The current legal system bases many of its policies and practices upon assumptions concerning human nature. What does research tell us about how those policies and practices actually operate? What alternative social science models are available and how would institutions be different if those models were used? This class considers deterrence models and compares them to models emphasizing legitimacy, morality, and social norms. Policing, the courts, and corrections are examined and evaluated against available empirical evidence. The class also considers alternative models of institutional design and evidence of their potential or actual effectiveness.

PSYC 654b[U], Sensory Information Processing Lawrence Marks
A functional examination of the ways that sensory systems transduce stimulus energies and information. Topics include sensory anatomy and physiology, psychological analysis of the qualitative dimensions of sensory experience, selective attention, and interactions among sensory, perceptual, and cognitive mechanisms. Offered every other year.

PSYC 656b, Developmental Psychopathology and Sensitive Periods of Neural Development B.J. Casey
More than one in five children suffer from serious forms of psychopathology that emerge at different developmental times. These different time courses in the emergence of symptoms suggest sensitive periods of neural development for understanding etiological factors and when and how to intervene. This course provides an overview of brain circuitry implicated in psychiatric illnesses from a neurodevelopmental perspective. Evidence from preclinical nonhuman and human imaging empirical studies is evaluated and discussed in terms of its clinical implications. We examine how understanding the biological state of the developing brain may help to optimize and target treatments more effectively for these disorders.

PSYC 657a/CDE 505a, Social and Behavioral Foundations of Health Becca Levy
The course provides students with an introduction to social and behavioral science issues that influence patterns of health and health care delivery. The focus is on the integration of biomedical, social, psychological, and behavioral factors that must be taken into consideration when public health initiatives are developed and implemented. The course emphasizes the integration of research from the social and behavioral sciences with epidemiology and biomedical sciences.

PSYC 664a/CDE 531a, Health and Aging Becca Levy
This course explores the ways psychosocial and biological factors influence aging health. Topics include interventions to improve mental and physical health; effects of ageism on health; racial and gender health disparities in later life; and how health policy can best adapt to the growing aging population. Students have the opportunity to engage in discussions and to develop a research proposal on a topic of interest.

[**PSYC 670b, Personality and Individual Differences**]

[**PSYC 671a, The Cognitive Science of Mind Reading**]

PSYC 684a, Introduction to Psychotherapy: Technique Mary O'Brien
Introduction to basic clinical skills and clinical issues. Topics for discussion include developing a therapeutic relationship, barriers to effective communication, strategies for managing resistance, and developing a professional identity. Class format includes informal discussion, assigned readings, and student case presentations. Prerequisite: permission of the instructor. Enrollment limited to fifteen.

PSYC 684b, Introduction to Psychotherapy: Technique Mary O'Brien
The focus of the seminar is on formulating and conceptualizing psychological problems from a cognitive-behavioral perspective. Special consideration is paid to individual and cultural diversity in conceptualizing cases and planning treatment. Also discussed are ways in which cognitive-behavioral perspectives can be integrated with other theoretical orientations (e.g., interpersonal theory, experiential therapy).

PSYC 689a, Psychopathology and Diagnostic Assessment Mary O'Brien
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, Ethics and Clinical Practice: Legislation and Diversity Issues
Mary O'Brien
Introduction to ethical and legal guidelines for clinical practice. In addition, supervision on diagnostic interview using the Structured Clinical Interview for DSM-IV is provided.

PSYC 702, Current Work in Cognition
A weekly seminar in which students, staff, and guests report on their research in cognition and information processing. T 11:35–12:50

PSYC 704, Current Work in Behavior, Genetics, and Neuroscience
Examination of the current status of research and scientific knowledge bearing on issues of behavior, genetics, and neuroscience. Weekly speakers present research, which is examined methodologically; recent significant journal articles or technical books are also reviewed. F 11:35–12:50

PSYC 708, Current Work in Developmental Psychology Laurie Santos
A luncheon meeting of the faculty and graduate students in developmental psychology for reports of current research and discussion on topics of general interest. W 11:35–12:50

PSYC 710, Current Work in Social Psychology and Personality
Marianne LaFrance [F], John Bargh [Sp]
Faculty and students in personality/social psychology meet during lunchtime to hear about and discuss the work of a local or visiting speaker. M 11:35–12:50

PSYC 711, Current Work in Child Development and Social Policy
A series of lectures by guest speakers from academia, various levels of government, community organizations, service agencies, the business world, and the media. Speakers discuss their work and its social policy implications. Topics may include early childhood

education, child care, intervention programs for children and families, education reform, mental health, child and family policies, research at the intersection of psychology and social policy, and media presentation of child and family issues, among others.

PSYC 719b, History and Systems in Psychology Arielle Baskins-Sommers
Basic and applied current research on the history and systems in psychology is presented by faculty, visiting scientists, and graduate students and examined in terms of theory, methodology, and ethical and professional implications. Students cannot simultaneously enroll in PSYC 720. TH 11:35–12:50

PSYC 720, Current Work in Clinical Psychology Dylan Gee
Basic and applied current research in clinical psychology that focuses on the cognitive, affective, social, biological, and developmental aspects of psychopathology and its treatment is presented by faculty, visiting scientists, and graduate students. This research is examined in terms of theory, methodology, and ethical and professional implications. Students cannot simultaneously enroll in PSYC 718a or 719b. TH 11:35–12:50

PSYC 721, Research Topics in Infant Cognition Karen Wynn
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. Prerequisite: permission of the instructor.

PSYC 724, Research Topics in Cognition, Emotion, and Psychopathology Jutta Joormann
This weekly seminar focuses on the role of cognition and emotion in psychopathology. We discuss recent research on basic mechanisms that underlie risk for psychopathology such as cognitive biases, cognitive control, and biological aspects of psychological disorders. The seminar also focuses on the interaction of cognition and emotion, on the construct of emotion regulation, and on implications for psychopathology.

PSYC 725, Research Topics in Human Neuroscience Gregory McCarthy
Discussion of current and advanced topics in the analysis and interpretation of human neuroimaging and neurophysiology. T 10–11:15

PSYC 727, Research Topics in Clinical Neuroscience Tyrone Cannon
Current research into the biological bases of schizophrenia and bipolar disorder, including topics related to etiology, treatment, and prevention. T 10–11:15

PSYC 728, Research Topics in Human Cooperation David Rand
Our lab asks why and when people are willing to help others at a cost to themselves, and how we can encourage this cooperative behavior. We combine experiments (mostly using economic games) with computer models, and run studies both in the lab and online.

PSYC 729, Research Topics in Language and Cognition Paul Bloom
Seminar focusing on ongoing research projects in language, cognition, and development. Prerequisite: permission of the instructor.

PSYC 731, Research Topics in Cognition and Development Frank Keil
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 Cognitive Neuroscience Marvin Chun
Examines current research in visual cognitive neuroscience, including discussion of proposed and ongoing research projects. Topics include visual attention, perception, memory, and contextual learning.

PSYC 733, Research Methods in Social Cognitive Development Yarrow Dunham
Investigation of various topics in developmental social cognition. Particular focus on the development of representations of self and other, social groups, and attitudes and stereotypes.

PSYC 734, Research Topics in Decision Neuroscience and Aging
Gregory Samanez-Larkin
Examines current research on decision neuroscience and life-span development, including discussion of proposed and ongoing research projects. Topics include emotion, motivation, learning, cognitive control, and neuromodulation/pharmacology.

PSYC 735, Research Topics in Thinking and Reasoning Woo-kyoung Ahn
In this lab students explore how people learn and represent concepts. Weekly discussions include proposed and ongoing research projects. Some topics include computational models of concept acquisition, levels of concepts, natural kinds and artifacts, and applications of some of the issues.

PSYC 736, Research Topics in Stereotyping and Prejudice John Dovidio
Explores the nature of prejudice in its traditional and contemporary forms. Although the emphasis is on the causes and consequences of racial bias in the United States, the dynamics of intergroup relations are considered more broadly as well. Emphasis is on developing critical thinking, reading, and research skills to test ideas relevant to understanding and combating stereotyping, prejudice, and discrimination.

PSYC 737, Research Topics in Clinical and Affective Neuroscience Avram Holmes
Seminar focusing on ongoing research projects in clinical, cognitive, and translation neuroscience. Prerequisite: permission of the instructor.

PSYC 739, Research Topics in Autism and Related Disorders Fred Volkmar
Focus on research approaches in the study of autism and related conditions including both psychological and neurobiological processes. The seminar emphasizes the importance of understanding mechanisms in the developmental psychopathology of autism and related conditions. F 9–10

PSYC 741, Research Topics in Emotion and Relationships Margaret Clark
Members of this laboratory read, discuss, and critique current theoretical and empirical articles on relationships and on emotion (especially those relevant to the functions emotions serve within relationships). In addition, ongoing research on these topics is discussed along with designs for future research.

PSYC 744, Research Topics in Philosophical Psychology Joshua Knobe
The lab group focuses on topics in the philosophical aspects of psychology.

PSYC 745, Research Topics in Disinhibitory Psychopathology
Arielle Baskin-Sommers
This laboratory course focuses on the study of cognitive and affective mechanisms contributing to disinhibition. We discuss various forms of disinhibition from trait (e.g., impulsivity, low constraint, externalizing) to disorder (e.g., antisocial personality disorder, psychopathy, substance use disorders), diverse methods (e.g., psychophysiology, self-report, neuroimaging, interventions), and multiple levels of analyses (e.g., neural, environmental, social). Members of this laboratory read and critique current articles, discuss ongoing research, and plan future studies.

PSYC 752, Research Topics in Social Neurosciences Steve Chang
A weekly seminar discussing recent advances in social neurosciences. We discuss recent progress in research projects by the lab members as well as go over recently published papers in depth. Our primary topics include neural basis of social decision making, social preference formation, and social information processing. Our lab studies these topics by combining neurophysiological and neuroendocrinological techniques in nonhuman animals.

PSYC 753, Research Topics in Law and Psychology Tom Tyler
Lab focusing on ongoing research projects in law and psychology.

PSYC 754, Research Topics in Clinical Affective Neuroscience and Development
Dylan Gee
This weekly seminar focuses on current research related to the developmental neurobiology of child and adolescent psychopathology. Topics include typical and atypical neurodevelopmental trajectories, the development of fear learning and emotion regulation, effects of early life stress and trauma, environmental and genetic influences associated with risk and resilience, and interventions for anxiety and stress-related disorders in youth.

PSYC 755, Research Topics in Intergroup Relations Jennifer Richeson
Students in this laboratory course are introduced to and participate in social-psychological research examining interactions and broader relations between members of socioculturally advantaged and disadvantaged groups. For instance, we examine the phenomena and processes associated with one's beliefs about members of social groups (stereotypes), attitudes and evaluative responses toward group members (prejudice), and behaviors toward members of a social group based on their group membership (discrimination). We also study how these issues shape the experiences of social group members, especially when they are members of low-status and/or minority groups. We primarily focus on large societal groups that differ on cultural dimensions of identity, with a focus on race, ethnicity, and gender. Notably, we apply the theoretical and empirical work to current events and relevant policy issues.

PSYC 756, Research Topics in the Fundamentals of Adolescent Brain and Behavior
B.J. Casey
We examine and discuss how the brain is sculpted by biological and experiential factors to adapt to the unique challenges of adolescence using behavioral, psychophysiological, genetic, and brain-imaging methods. Emphasis is on how the capacity for self-control changes with age and across different social and emotional situations.

PSYC 766, Research Topics in Perception and Cognition Brian Scholl
Seminar-style discussion of recent research in perception and cognition, covering both recent studies from the literature and the ongoing research in the Yale Perception and Cognition Laboratory.

PSYC 771, Research Topics in Nonconscious Processes John Bargh
The lab group focuses on nonconscious influences of motivation, attitudes, social power, and social representations (e.g., stereotypes) as they impact on interpersonal behavior, as well as the development and maintenance of close relationships.

PSYC 775, Research Topics in Animal Cognition Laurie Santos
Investigation of various topics in animal cognition, including what nonhuman primates know about tools and foods; how nonhuman primates represent objects and number; whether nonhuman primates possess a theory of mind. Prerequisite: permission of the instructor.

PSYC 777/WGSS 767, Research Topics in Gender and Psychology
Marianne LaFrance
The "Gender Lab" meets weekly to consider research being done in the Psychology department that bears on some gender-related issue.

PSYC 778, Research Topics in Clinical and Affective Neuropsychology Hedy Kober
Lab meeting is held once a week throughout the year and is attended by undergraduate and graduate students, research staff, postdoctoral fellows, and other researchers interested in the weekly topics. In a rotating fashion, both internal and external speakers present data and ideas from various research projects, and/or research and methods papers in related areas, including the use of functional magnetic resonance imaging to answer questions in clinical and affective psychology.

PSYC 779, Research Topics in Depression and Treatment Response Ronald Duman
This weekly lab seminar focuses on the molecular and cellular mechanisms that underlie the neuronal and behavioral deficits caused by stress and depression, and conversely the signaling mechanisms underlying the therapeutic actions of antidepressants, including synaptic and behavioral responses.

PSYC 801, Clinical Internship (Child)
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)
Advanced training in clinical psychology with adults. Adapted to meet individual needs with location at a suitable APA-approved internship setting.

PSYC 806, Practicum in Childhood Intervention
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
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
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, Mood and Anxiety Disorders Practicum Mary O'Brien
Discussion of current topics in psychopathology and treatment of anxiety disorders. Group supervision of therapy cases involving OCD, panic, social phobia.

PSYC 816, Practicum in Developmental Disabilities and Developmental Assessment Fred Volkmar
An introduction to approaches in developmental assessment in infants and young children (under age five years) with a range of developmental difficulties. Students observe and/or participate in developmental assessments. Students are exposed to a range of assessment instruments including developmental tests, speech-communication assessments, and psychiatric diagnostic instruments appropriate to this age group. Prerequisite: permission of the instructor.

PSYC 817, Other Clinical Practica
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 883, Practicum in Clinical Assessment Donald Quinlan
Supervised psychological assessment using measures of intellectual functioning, projective testing, and neuropsychological testing with patients.

PSYC 920, First-Year Research
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 DGS.

PSYC 930, Predissertation Research
By arrangement with faculty.

PUBLIC HEALTH

60 College Street, 203.785.6383
http://publichealth.yale.edu
M.S., M.Phil., Ph.D.

Dean
Paul Cleary

Deputy Dean
Brian Leaderer

Director of Graduate Studies
Christian Tschudi (203.785.6383)

Director of Medical Studies
Mayur Desai

Director of Medical Research
Elizabeth Claus

Professors Serap Aksoy, Michelle Bell (*Forestry & Environmental Studies*), Elizabeth Bradley, Richard Bucala (*Internal Medicine*), Susan Busch, Michael Cappello (*Pediatrics*), Elizabeth Claus, Paul Cleary, John Dovidio (*Psychology*), Robert Dubrow, David Fiellin (*Internal Medicine*), Erol Fikrig (*Internal Medicine*), Alison Galvani, Robert Heimer, Theodore Holford, Jeannette Ickovics (*on leave* [F]), Melinda Irwin, Amy Justice (*Internal Medicine*), Edward Kaplan (*School of Management*), Albert Ko, Harlan Krumholz (*Internal Medicine*), Brian Leaderer, Elan Lousis (*Neurology*), Robert Makuch, Lawrence Marks, Diane McMahon-Pratt, I. George Miller (*Pediatrics*), A. David Paltiel, Catherine Panter-Brick (*Anthropology*), Peter Peduzzi, Rafael Pérez-Escamilla, Jeffrey Powell (*Ecology & Evolutionary Biology*), Harvey Risch, Robert Rosenheck (*Psychiatry*), Peter Salovey (*Psychology*), Mark Schlesinger, Jody Sindelar, Mary Tinetti (*Internal Medicine*), Christian Tschudi, Vasilis Vasiliou, Daniel Zelterman, Heping Zhang (*on leave* [Sp]), Hongyu Zhao

Associate Professors Rene Almeling (*Sociology; on leave*), Ted Cohen, J. Lucian Davis, Mayur Desai, Andrew Dewan, Josephine Hoh, Trace Kershaw, Becca Levy, Judith Lichtman, Haiqun Lin, Shuangge Ma, Xiaomei Ma, Ingrid Nembhard, Linda Niccolai, John Pachankis (*on leave* [Sp]), Andrew Papachristos (*Sociology*), Melinda Pettigrew, Nina Stachenfeld (*Obstetrics, Gynecology & Reproductive Sciences*), Jeffrey Townsend, Marney White, Yawei Zhang, Yong Zhu (*on leave* [Sp])

Assistant Professors Xi Chen, Maria Ciarleglio, Zack Cooper, Forrest Crawford, Nicole Deziel, Abigail Friedman, Nicola Hawley, Caroline Johnson, Anne Marie Jukic, Michael Kane, Danya Keene, Joan Monin, Chima Ndumele, Sunil Parikh, Virginia Pitzer, Jason Schwartz, Fatma Shebl, Megan Smith (*Psychiatry*), Shiyi Wang, Zuoheng (Anita) Wang, Joshua Warren, Daniel Weinberger, Reza Yaesoubi

Fields of Study

Programs of study are offered in the areas of Biostatistics, Chronic Disease Epidemiology, Environmental Health Sciences, Health Policy and Management, and Epidemiology of Microbial Diseases. The Social and Behavioral Sciences Program (SBS), within the Chronic Disease Epidemiology department, offers students specialized instruction in the theory and methods of the social and behavioral sciences.

Special Admissions Requirements

Applicants should have a strong background in the biological and/or social sciences. Students pursuing a Biostatistics specialty should have a strong background in mathematics. The GRE General Test is required. The TOEFL is required of all applicants whose native language is not English. IELTS scores are also accepted in addition to or in lieu of TOEFL scores. This requirement is waived only for applicants who, prior to matriculation at Yale, will have received a baccalaureate degree or its foreign equivalent from a college or university where English is the primary language of instruction. Applicants must have studied in residence at the baccalaureate institution for at least three (3) years to receive the waiver. Applicants who do not qualify for a waiver but have taken the TOEFL within the past two years will need to have their TOEFL scores released to the Yale Graduate School of Arts and Sciences (code 3987).

Academic Requirements

Generally the first two years are devoted primarily to course work and rotations for students in some areas. All doctoral students are required to successfully complete a minimum of ten graduate-level courses and must satisfy the individual departmental requirements, detailed below. Courses such as Dissertation Research, Preparing for Qualifying Exams, Research Ethics and Responsibilities, or Seminar do not count toward the course requirements. However, students must register for these "courses" in order for them to appear on the transcript.

All first-year students must enroll in and complete training in Research Ethics and Responsibility (EPH 600b). This course will introduce and prepare students for responsible conduct in research, including data acquisition and management, mentor/trainee responsibilities, publication practices and authorship standards, scientific misconduct, and conflict of interest. Research Ethics and Responsibility is offered annually and is graded Satisfactory/Unsatisfactory.

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 full-term courses and are expected to achieve a High Pass average. (This applies to 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. See Course and Honors Requirements for more details.

Teaching and research experiences are regarded as an integral aspect of the graduate training program. All students are required to serve as teaching fellows (level 10) for four terms, typically during years two and three. With the permission of the director of graduate studies (DGS), the total teaching requirement beyond two terms may be reduced for

students who are awarded fellowships supported by outside funding or who are graduate research assistants in year three. Two terms of teaching are required of all students; four terms are required of students on YSPH-supported fellowships or training grants. During the first term of teaching, students must attend a training session conducted by the Graduate Teaching Center. First-year students are encouraged to focus their efforts on course work and in most instances are not permitted to serve as Teaching Fellows. First-year students may be allowed to serve as Teaching Fellows if they have been awarded advanced standing. Advanced standing is available only to students who have completed previous graduate study at Yale (e.g., the M.P.H. program); see Transfer Credit and Advanced Standing. If a student has been awarded one year of advanced standing, he/she will be allowed to teach both fall and spring terms of the first year. If a student has been awarded one term of advanced standing, he/she will be allowed to teach only during the spring term of the first year.

REQUIRED COURSE WORK

Biostatistics Ph.D. students in the Department of Biostatistics (BIS) must complete a minimum of fifteen courses (not including BIS 525, BIS 610b, BIS 695c, and EPH 600b). Course waivers must be recommended by the academic adviser and approved by the department chair and DGS.

Required courses are: BIS 525a and b, Seminar in Biostatistics and Journal Club; BIS 557a, Computational Statistics; BIS 567a, Bayesian Statistics; BIS 610b, Applied Area Readings for Qualifying Exams; BIS 628b, Longitudinal and Multilevel Data Analysis; BIS 643b, Theory of Survival Analysis; BIS 646b, Nonparametric Statistical Methods and Their Applications; BIS 678a, Statistical Consulting; BIS 691b, Theory of Generalized Linear Models; BIS 695c, Summer Internship in Biostatistical Research; CDE 508a, Principles of Epidemiology I; STAT 610a, Statistical Inference; STAT 612a, Linear Models; EPH 600b, Research Ethics and Responsibility; and EPH 608b, Frontiers of Public Health. Students entering the doctoral program with an M.P.H. are exempt from EPH 608b, Frontiers of Public Health. Students with prior graduate-level epidemiology courses may be exempt from CDE 508a, Principles of Epidemiology I.

In consultation with their academic adviser, students choose a minimum of four additional electives that will best prepare them for dissertation work.

Students funded by specific fellowships may be subject to additional requirements and should discuss this with their adviser.

Chronic Disease Epidemiology Ph.D. students in the Department of Chronic Disease Epidemiology (CDE) must complete a minimum of fifteen courses (not including CDE 610b and EPH 600b). Course waivers must be recommended by the academic adviser and approved by the department chair and DGS. Students must complete course work that introduces them to the breadth of public health (EPH 608b, Frontiers of Public Health). Students entering the doctoral program with an M.P.H. are exempt from EPH 608b, Frontiers of Public Health.

Students may choose the traditional Epidemiology concentration or the Social and Behavioral Sciences concentration as noted below. Students must declare their concentration by the end of the first year with approval from their academic adviser.

In the traditional *Epidemiology* concentration, required courses (or their equivalents) are: CDE 502b, Physiology for Public Health; CDE 508a, Principles of Epidemiology I; CDE 516b, Principles of Epidemiology II; CDE 523b, Measurement Issues in Chronic Disease Epidemiology; CDE 534b, Applied Analytic Methods in Epidemiology; CDE 610b, Applied Area Readings for Qualifying Exams; CDE 617b, Developing a Research Proposal*; CDE 619a, Advanced Epidemiologic Research Methods; CDE 634a, Advanced Applied Analytic Methods in Epidemiology and Public Health; and CDE 650a, Introduction to Evidence-Based Medicine and Health Care. In addition, in consultation with their dissertation adviser, students choose three 600-level course units in Biostatistics as well as three additional electives that will best prepare them for their dissertation research.

Social and Behavioral Sciences concentration course requirements differ from the traditional Epidemiology requirements as follows: CDE 574b, Developing a Health Promotion and Disease Prevention Intervention (taken instead of CDE 619a); CDE 573a, Social and Cultural Factors in Mental Health and Illness (taken instead of CDE 502b); and CDE 676b, Questionnaire Development (taken instead of CDE 523b).

Students supported by training grants may be subject to additional requirements and should discuss whether there are training-specific requirements with the principal investigator of the grant.

*CDE 617b is not required of students funded by the Interdisciplinary HIV Prevention Training Grant. Those students must take a fourth elective in order to the meet the fifteen-course requirement.

Environmental Health Sciences Ph.D. students in Environmental Health Sciences have a choice of two concentrations: Environmental Epidemiology and Exposure Science, and Environmental and Molecular Toxicology. For both concentrations, courses required in the first year are: BIS 505a, Statistical Thinking I; BIS 505b, Statistical Thinking II; CDE/EMD 508a, Principles of Epidemiology I; EHS 503b, Public Health Toxicology; EHS 510a, Principles of Environmental Health Sciences; EHS 525a and b, Seminar in Environmental Health; and EPH 600b, Research Ethics and Responsibility. Students must also complete course work that introduces them to the breadth of public health (EPH 608b, Frontiers of Public Health). Students entering the doctoral program with an M.P.H. are exempt from EPH 608b, Frontiers of Public Health. Ph.D. students enrolled in EHS 503b, EHS 510a, and EHS 525a/b may be assigned additional readings. Students who select specialization in *Environmental Epidemiology and Exposure Science* are required to take EHS 507a, Environmental Epidemiology; and EHS 508b, Assessing Exposures to Environmental Stressors. Students who select specialization in *Environmental and Molecular Toxicology* are required to take EHS 545b, Molecular Epidemiology; and the EHS course Developmental Origins of Health and Disease. In addition, all students are required to complete two research rotations during the first year: EHS 620a and EHS 620b (total of two units). At the end of the lab rotation students give a presentation and are graded based on their rotation work and presentation.

In the second year, students specializing in *Environmental Epidemiology and Exposure Science* must choose a minimum of three electives from the following: BIS 511a, GIS Applications in Epidemiology and Public Health; BIS 623a, Applied Regression Analysis; BIS 625a, Categorical Data Analysis; BIS 628b, Longitudinal and Multilevel Data Analysis; CDE 617b, Developing a Research Proposal; EHS 520b, Case-Based

Learning for Genetic and Environmental Diseases; EHS 545b, Molecular Epidemiology; and EHS 580b, Environmental Hormones and Human Health. Students specializing in *Environmental and Molecular Toxicology* must choose a minimum of three electives from the following: CDE/EHS 502b, Physiology for Public Health; CDE 617b, Developing a Research Proposal; EHS 508b, Assessing Exposures to Environmental Stressors; and EHS 520b, Case-Based Learning for Genetic and Environmental Diseases.

Epidemiology of Microbial Diseases Ph.D. students in the Department of Epidemiology of Microbial Diseases (EMD) must complete a minimum of ten courses (not including EPH 600b). Course waivers must be recommended by the academic adviser and approved by the department chair and DGS.

Courses in biostatistics, epidemiology, and microbiology are strongly recommended. The specific courses recommended depend on the background of individual students and their stated research interests. An individual program that includes courses, seminars, and research rotations is developed by the student and his or her academic adviser. All students are required to complete three distinct research rotations. These are done in the fall and spring terms and in the summer between the first and second years. Students will be asked to prepare a brief presentation at the end of each rotation. These research rotations (EMD 670) are graded and account for three of the required ten courses. Student progress is reviewed at the end of each academic year.

Students are required to complete course work in epidemiology (CDE/EMD 508a, Principles of Epidemiology I; or CDE 516b, Principles of Epidemiology II). In addition, students must complete course work that introduces them to the breadth of public health (EPH 608b, Frontiers of Public Health). Students entering the doctoral program with an M.P.H. are exempt from EPH 608b, Frontiers of Public Health. Students with prior graduate-level epidemiology courses may be exempt from course work in epidemiology.

The following courses are suggested as appropriate for Ph.D. students in EMD; however, other courses in Public Health or in other departments may also be appropriate: CBIO 602a, Molecular Cell Biology; CDE 516b, Principles of Epidemiology II; EMD 508a, Principles of Epidemiology I; EMD 538a, Quantitative Methods for Infectious Disease Epidemiology; EMD 539b, Introduction to Public Health Surveillance; EMD 543a, Global Aspects of Food and Nutrition; EMD 548b, Observing Earth from Space; EMD 550b/682b, Biology of Insect Disease Vectors; EMD 553b, Transmission Dynamic Models for Understanding Infectious Diseases; EMD 567a, Tackling the Big Three: Malaria, TB, and HIV in Resource-Limited Settings; EMD 680a, Advanced Topics in Tropical Parasitic Diseases; F&ES 500a, Landscape Ecology; HPM 570a, Cost-Effectiveness Analysis and Decision Making; and PATH 650b, Cellular and Molecular Biology of Cancer.

Health Policy and Management Ph.D. students in the Department of Health Policy and Management (HPM) are required to develop expertise in one of three disciplinary concentrations—Economics; Organizational Theory and Management; or Political and Policy Analysis—and then to apply this discipline to a more specialized area; the latter becomes their area of distinction.

Students are required to complete the course work detailed below, or the equivalent of the topic areas covered in these courses. The course listing represents a suggested program of study. The standard number of courses taken is eighteen, with the option of

obtaining credits for previous courses. With the approval of the academic adviser and DGS, alternative courses that better suit the needs of the student may satisfy the course work requirement. The departmental representative to the Graduate Student Executive Committee (GSEC), in conjunction with the student's adviser, is responsible for determining if core course requirements have been satisfied by previous course work or alternative courses. If so, the student should apply for a course waiver through the Graduate School. HPM students can only waive up to two of the eighteen courses.

Courses required of all students are: EPH 600b, Research Ethics and Responsibility (does not count toward the total number of required courses); HPM 617a and b, Colloquium in Health Services Research (does not count toward the total number of required courses); CDE 508a, Principles of Epidemiology I; and EPH 608b, Frontiers of Public Health. Students entering the program with an M.P.H. degree may be exempt from CDE 508a and EPH 608b.

HPM 610b, Applied Area Readings, is required of all second-year students. Students are also expected to attend the departmental research seminar for faculty and the doctoral research seminar.

In Methods and Statistics, a minimum of four courses are required from the following: BIS 623a, Applied Regression Analysis; BIS 625a, Categorical Data Analysis; BIS 628b, Longitudinal and Multilevel Data Analysis; CDE 580b, Qualitative Research Methods in Public Health; ECON 556, Topics in Empirical Economics and Public Policy; ECON 558a, Econometrics; HPM 583b, Methods in Health Services Research; PLSC 500a, Statistics; PLSC 503b, Quantitative Methods; PLSC 504a, Advanced Quantitative Methods; SOCY 580a, Introduction to Methods in Quantitative Sociology; SOCY 581b, Intermediate Methods in Quantitative Sociology; SOCY 582a, Statistics III: Advanced Quantitative Analysis for Social Scientists; STAT 660, Multivariate Statistical Methods for the Social Sciences; STAT 665, Data Mining and Machine Learning.

In Health Policy and Management, a minimum of four courses, all with Ph.D. readings, are required from the following: HPM 510a, Introduction to Health Policy and Health Systems; HPM 514b, Health Politics, Governance, and Policy; HPM 560b, Health Economics and U.S. Health Policy; HPM 561b, Managing Health Care Organizations; HPM 570a, Cost-Effectiveness Analysis and Decision Making; HPM 573b, Advanced Topics in Modeling Health Care Decisions; HPM 587a, Advanced Health Economics; HPM 590b, Addiction, Economics, and Public Policy; and HPM 597b, Capstone Course in Health Policy.

Disciplinary Concentrations

Students in HPM must complete a minimum of four courses, all with Ph.D. readings, in their chosen disciplinary concentration.

In *Economics,* required courses are: ECON 545a, Microeconomics; and ECON 558a, Econometrics (which may count as a Methods and Statistics class or as a disciplinary concentration class, but not both). In addition, students are required to take two field courses in a concentration area in which they plan to develop expertise. In *Behavioral Economics,* two courses from: MGMT 758b, Foundations of Behavioral Economics; and PSYC 553 and 554, Behavioral Decision Making. In *Industrial Organization:* ECON 600a, Industrial Organization I; and ECON 601b, Industrial Organization II. In *Labor Economics,* ECON

630a, Labor Economics I; and ECON 631b, Labor Economics II. In *Public Finance,* two courses from: ECON 556a, Topics in Empirical Economics and Public Policy; ECON 680a, Public Finance I; and ECON 681b, Public Finance II.

In *Organizational Theory and Management,* required courses are: MGMT 731, Organizations/Management II: Organizations and the Environment; MGMT 733, Theory Construction; MGMT 736, Organizations/Management I: Inside Organizations; and HPM 600, Directed Readings: Organizational Behavior and Theory in Health Care.

In *Political and Policy Analysis,* four courses are required, selected in consultation with the student's adviser. Suggested courses are: PLSC 617b, Deliberative Democracy and Beyond; PLSC 766a, Politics and Markets; PLSC 800a, Introduction to American Politics; PLSC 801a, Political Preferences and American Political Behavior; PLSC 802b, Collective Action and Choice; PLSC 803b, American Politics Institutions III; PSYC 647b, Social Science and Institutional Design; and SOCY 557b, Political Sociology.

HPM students take qualifying exams in each of three areas: (1) health policy and management; (2) empirical analysis and/or statistics; and (3) the student's disciplinary concentration. Typically these are taken in the summer after two years of course work.

Special Requirements for the Ph.D. Degree

At the end of years one and two, advisers will be asked to complete a progress report for each student evaluating his/her academic progress and describing his/her readiness for teaching and/or conducting research. This is then discussed with the student and reviewed by the DGS. Students who have not progressed adequately will be asked to meet with the DGS to address the situation.

The qualifying exam is typically taken by the end of the second full academic year. With the assistance of the faculty adviser, each student requests appropriate faculty members to join a dissertation advisory committee (DAC). The DAC reviews and approves the prospectus as developed by the student and submits it to the DGS and the Graduate Studies Executive Committee for approval. The dissertation prospectus must be approved by the end of the third year.

To be admitted to candidacy, students must: (1) satisfactorily complete the course requirements for their department as outlined above, achieve grades of Honors in at least two full-term courses, and achieve an overall High Pass average; (2) obtain an average grade of High Pass on the qualifying exam; and (3) have the dissertation prospectus approved by the Graduate Studies Executive Committee. Once a student is admitted to candidacy, he/she is required by the Graduate School to complete an annual Dissertation Progress Report.

Each DAC is expected to meet as a group at least twice each year, and more frequently if necessary. The student schedules meetings of the DAC. The chair/adviser of the DAC produces a summary evaluation of progress and plans for the next six months. This document is to be distributed to each committee member for comments, and the student and the DGS are to receive a copy of the final document. The DAC reviews the progress of the dissertation research and decides when the dissertation is ready to be submitted to the readers. This decision is based on a closed defense of the dissertation, which involves a formal oral presentation to the DAC and other invited faculty. Upon completion of the

closed defense, the chair/adviser of the DAC submits the recommendation to the Graduate Studies Executive Committee along with the names of three appropriate readers.

Doctoral dissertations originating in Public Health must also be presented in a public seminar. This presentation is scheduled after the submission of the dissertation to the readers and preferably prior to the receipt and consideration of the readers' reports. At least one member of the DAC supervising the dissertation and at least one member of the Graduate Studies Executive Committee are required to attend the presentation.

Master's Degrees

M.Phil. (en route to the Ph.D.) The M.Phil. is awarded to students who have advanced to candidacy. When students advance to candidacy, the registrar's office automatically submits a petition for the awarding of the M.Phil. degree.

Terminal Master's Degree Program The School offers a terminal master's degree program leading to an M.S. in Public Health in two specialty areas: Biostatistics (a two-year program) and Chronic Disease Epidemiology (a one-year program). All students must fulfill both the departmental and Graduate School requirements for a terminal M.S. degree.

Students must have an overall grade average of High Pass, including a grade of Honors in at least one full-term graduate course (for students enrolled in the one-year program in Chronic Disease Epidemiology) or in at least two full-term graduate courses (for students enrolled in the two-year program in Biostatistics). In order to maintain the minimum average of High Pass, each grade of Pass must be balanced by one grade of Honors. For more details, please see Course and Honors Requirements under Policies and Regulations.

A Biostatistics or Chronic Disease Epidemiology student who is withdrawing from the Ph.D. program, and has successfully completed all required course work for the terminal M.S. degree (described below), may apply and be recommended for the M.S. in Public Health. In other departments (Environmental Health Sciences, Epidemiology of Microbial Diseases, or Health Policy and Management) students must have successfully completed (prior to withdrawal) at least ten courses in the doctoral program and a capstone experience, achieving a minimum of two Honors grades and an overall High Pass average. Students who withdraw after qualifying for or receiving the M.Phil. are not eligible for an M.S. degree.

FIELDS OF STUDY

Terminal M.S. in Biostatistics

Faculty in the Biostatistics department of the School of Public Health offer a two-year terminal Master of Science degree. Fields include clinical trials, epidemiologic methodology, statistical genetics, and mathematical models for infectious diseases.

Requirements for M.S. in Biostatistics Applicants should have a strong background in quantitative sciences such as mathematics. In addition, it is recommended that applicants have undergraduate course work in the biological and social sciences. At a minimum, applicants would have taken one year of calculus and a course in linear algebra prior to enrolling in this program.

The GRE General Test is required. The TOEFL is required of all applicants whose native language is not English. This requirement is waived only for applicants who, prior to matriculation at Yale, will have received a baccalaureate degree or its foreign equivalent from a college or university where English is the primary language of instruction. If you do not qualify for a waiver but have taken the TOEFL within the past two years, you will need to have your TOEFL scores released to us (code 3987).

Course requirements The Biostatistics track requires the completion of the required courses plus a master's thesis. Required courses are: BIS 525a and b, Seminar in Biostatistics and Journal Club; BIS 540a, Fundamentals of Clinical Trials; BIS 623a, Applied Regression Analysis; BIS 625a, Categorical Data Analysis; BIS 628b, Longitudinal and Multilevel Data Analysis; BIS 630b, Applied Survival Analysis; BIS 678a, Statistical Consulting; BIS 679a, Advanced Statistical Programming in SAS and R; BIS 681b, Statistical Consulting Lab; BIS 695c, Summer Internship in Biostatistical Research; CDE 508a, Principles of Epidemiology I; EPH 600b, Research Ethics and Responsibility; STAT 541a, Probability Theory; and STAT 542b, Theory of Statistics.

In addition, students must complete two elective courses and a master's thesis. Students will also be required to attend a Professional Skills Seminar (details provided in the first term).

Biostatistics electives are to be selected from these courses: BIS 557a, Computational Statistics; BIS 561b, Advanced Topics and Case Studies in Multicenter Clinical Trials; BIS 567a, Bayesian Statistics; BIS 643b, Theory of Survival Analysis; BIS 646b, Nonparametric Statistical Methods and Their Applications; BIS 651b, Spatial Statistics in Public Health; and BIS 691b, Theory of Generalized Linear Models. Students demonstrating a mastery of topics covered by the required courses may replace them with more advanced courses but must receive written permission from the DGS prior to enrolling in the substitute courses.

Terminal M.S. in Chronic Disease Epidemiology

Faculty in the Chronic Disease Epidemiology department of the School of Public Health offer a one-year terminal Master of Science degree. This one-year program is designed for medical and health care professionals (e.g., M.D., Ph.D., D.V.M., D.D.S., D.M.D.) who seek the skills necessary to conduct epidemiological research in their professional practice.

Requirements for M.S. in Chronic Disease Epidemiology Applicants should have a basic understanding of quantitative science and statistics. It is recommended that candidates have strong science backgrounds and demonstrated competency in statistical analysis and logical thinking. Applicants from rigorous programs in the biological or social sciences will be given preference. At a minimum, applicants should have one year of course work in statistics or equivalent prior to enrolling in this program.

Applicants must submit scores from either the MCAT or the GRE General Test. Students whose native language is not English must take the TOEFL or IELTS examination.

Course requirements The M.S. track in Chronic Disease Epidemiology requires the completion of ten courses (excluding the Ethics course, EPH 600b; and Seminar, CDE 525), including a capstone course.* Required courses are: BIS 623a, Applied Regression

Analysis; BIS 625a, Categorical Data Analysis; BIS 630b, Applied Survival Analysis; CDE 508a, Principles of Epidemiology I; CDE 516b, Principles of Epidemiology II; CDE 523b, Measurement Issues in Chronic Disease Epidemiology; CDE 525a and b, Seminar in Chronic Disease Epidemiology and Social and Behavioral Sciences; CDE 617b, Developing a Research Proposal; and EPH 600b, Research Ethics and Responsibility.

In addition, students must complete three electives. Suggested electives are: BIS 540a, Fundamentals of Clinical Trials; BIS 561b, Advanced Topics and Case Studies in Multicenter Clinical Trials; BIS 643b, Theory of Survival Analysis; BIS 645b, Statistical Methods in Human Genetics; CDE 520b, Case-Based Learning for Genetic and Environmental Diseases; CDE 531a, Health and Aging; CDE 532b, Epidemiology of Cancer; CDE 533b, Topics in Perinatal Epidemiology; CDE 535b, Epidemiology of Heart Disease and Stroke; CDE 562a, Nutrition and Chronic Disease; CDE 597a, Genetic Concepts in Public Health; CDE 600a or b, Directed Readings; CDE 634a, Advanced Applied Analytical Methods in Epidemiology and Public Health; and CDE 650a, Introduction to Evidence-Based Medicine and Health Care.

*In the capstone course CDE 617b, the student is required to develop a grant application that is deemed reasonably competitive by the instructor. An alternative to this capstone course is an individualized tutorial (CDE 600) in which the student completes a manuscript that is suitable for submission for publication in a relevant journal.

M.D./Ph.D. Program Requirements for Public Health

All M.D./Ph.D. students must meet with the Director of Graduate Studies (DGS) in Public Health if they are considering affiliating with Public Health. Students in this program are expected to meet the guidelines listed below in the timeframe outlined. The DGS must approve any variations to these requirements.

TEACHING

One term of teaching is required. If students teach beyond this requirement, they can be compensated. If a student has served as a teaching fellow elsewhere on campus, this experience may be counted toward the requirement. DGS approval is required to waive the teaching requirement on the basis of previous Yale teaching experience.

ROTATIONS/INTERNSHIPS

Students should do two rotations/internships with potential advisers in Public Health. These short-term research projects will be with a specific Principal Investigator and can be in a lab, or field work, or analysis of an existing dataset. The purpose of these rotations/internships is to learn lab technique and/or to allow the student time to determine if the PI's research interests are compatible with his/her research interests. These rotations/internships are usually done during the summer between the first and second years of medical school course work. In some cases, students may need to defer this requirement until the summer after the second year after taking certain courses and/or completing readings so that he/she possesses the background necessary for a successful rotation/internship.

REQUIRED COURSE WORK

M.D./Ph.D. students are generally expected to take the same courses as traditional Ph.D. students. Departmental requirements may vary; therefore students should confer with the DGS and their Ph.D. adviser.

TIMELINE FOR QUALIFYING EXAM

Students generally will take medical school courses in years one and two. Students can take Public Health doctoral courses in years one and two before they affiliate if scheduling allows. Once affiliated with the Public Health program, students will complete all course requirements for the department. This generally takes a minimum of two terms but can take up to four terms after affiliating with Public Health. The qualifying exam is commonly completed after the fourth term of affiliation with the Ph.D. program in Public Health but can sometimes be done earlier with approval of the Ph.D. adviser and DGS.

PROSPECTUS TIMELINE

Following completion of the qualifying exam, students should focus on the prospectus, which has to be approved by the Public Health Graduate Studies Executive Committee (GSEC) before the end of their sixth term as an affiliated Ph.D. student in Public Health.

ADMISSION TO CANDIDACY

To be admitted to candidacy, students must: (1) satisfactorily complete the course requirements for their department as outlined above, achieve grades of Honors in at least two full-term courses, and achieve an overall High Pass average; (2) obtain an average grade of High Pass on the qualifying exam; and (3) have the dissertation prospectus approved by the Graduate Studies Executive Committee. All Ph.D. students must be admitted to candidacy before the start of their fourth year in the Ph.D. program (i.e., before the start of the seventh term).

Ph.D. or terminal M.S. degree program materials are available upon request to the Office of the Director of Graduate Studies (c/o M. Elliot), School of Public Health, Yale University, PO Box 208034, New Haven CT 06520-8034; 203.785.6383; e-mail, melanie.elliot@yale.edu.

Courses for all Public Health Graduate School Degrees

For course descriptions, see the School of Public Health Bulletin, available online in both html and pdf versions at www.yale.edu/bulletin.

BIOSTATISTICS

BIS 505a, Introduction to Statistical Thinking I
BIS 505b, Introduction to Statistical Thinking II
BIS 511b, GIS Applications in Epidemiology and Public Health
BIS 525a and b, Seminar in Biostatistics and Journal Club
[BIS 538b, Survey Sampling: Methods and Management]
BIS 540a, Fundamentals of Clinical Trials
BIS 557a, Computational Statistics
BIS 561b, Advanced Topics and Case Studies in Multicenter Clinical Trials

BIS 567a, Bayesian Statistics
BIS 575b, Introduction to Regulatory Affairs
BIS 600a,b, Independent Study or Directed Readings
BIS 610b, Applied Area Readings for Qualifying Exams
BIS 623a, Applied Regression Analysis
BIS 625a, Categorical Data Analysis
[BIS 626a, Gerontologic Biostatistics: Statistical Methods for Clinical Research with Older Study Participants and for Basic Aging Research]
BIS 628b, Longitudinal and Multilevel Data Analysis
BIS 630b, Applied Survival Analysis
[BIS 639b, Descriptive Analysis of Public Health Data]
BIS 643b, Theory of Survival Analysis
[BIS 645b/CB&B 647b/GENE 645b, Statistical Methods in Human Genetics]
[BIS 646b, Nonparametric Statistical Methods and Their Applications]
[BIS 648a, Statistical Methods for Sequence Data Analysis]
[BIS 651b, Spatial Statistics in Public Health]
BIS 678a, Statistical Consulting
BIS 679a, Advanced Statistical Programming in SAS and R
BIS 681b, Statistical Consulting Lab
[BIS 691b, Theory of Generalized Linear Models]
BIS 692b/CB&B 645b/STAT 645b, Statistical Methods in Genetics and Bioinformatics
BIS 695c, Summer Internship in Biostatistical Research

CHRONIC DISEASE EPIDEMIOLOGY

CDE 502b/EHS 502b, Physiology for Public Health
CDE 505a/PSYC 657a, Social and Behavioral Foundations of Health
CDE 508a/EMD 508a, Principles of Epidemiology I
CDE 516b, Principles of Epidemiology II
CDE 520b/EHS 520b, Case-Based Learning for Genetic and Environmental Diseases
CDE 523b, Measurement Issues in Chronic Disease Epidemiology
CDE 525a and b, Seminar in Chronic Disease Epidemiology and Social and Behavioral Sciences
CDE 531a/PSYC 664a, Health and Aging
CDE 532b, Epidemiology of Cancer
CDE 533b, Topics in Perinatal Epidemiology
CDE 534b, Applied Analytic Methods in Epidemiology
CDE 535b, Epidemiology of Heart Disease and Stroke
CDE 537b, Social and Interpersonal Influences on Health
CDE 541a, Community Health Program Evaluation
CDE 543a/EMD 543a/GLBL 567a, Global Aspects of Food and Nutrition
CDE 545b, Health Disparities by Race and Social Class: Application to Chronic Disease Epidemiology
CDE 547a, Climate Change and Public Health
CDE 551b, Global Noncommunicable Disease
CDE 562a, Nutrition and Chronic Disease

CDE 568b, Public Health Communications
CDE 572a, Obesity Prevention and Lifestyle Interventions
CDE 573a, Social and Cultural Factors in Mental Health and Illness
CDE 574b, Developing a Health Promotion and Disease Prevention Intervention
CDE 580b, Qualitative Research Methods in Public Health
CDE 581a, Stigma and Health
CDE 582a, Regulatory and Scientific Issues Relating to Tobacco Use
CDE 585a/GLBL 529a/LAW 20568, Sexuality, Gender, Health, and Human Rights
CDE 594a, Maternal-Child Public Health Nutrition
CDE 596b/LAW 30168, Global Health and Justice Practicum
CDE 597a, Genetic Concepts in Public Health
CDE 600a,b, Independent Study or Directed Readings
CDE 610b, Applied Area Readings for Qualifying Exams
CDE 617b, Developing a Research Proposal
CDE 619a, Advanced Epidemiologic Research Methods
CDE 634a, Advanced Applied Analytic Methods in Epidemiology and Public Health
CDE 650a, Introduction to Evidence-Based Medicine and Health Care
CDE 670a,b, Advanced Field Methods in Public Health
CDE 676b, Questionnaire Development

ENVIRONMENTAL HEALTH SCIENCES

EHS 502b/CDE 502b, Physiology for Public Health
EHS 503b/F&ES 896b, Public Health Toxicology
[EHS 505a, Occupational Exposure Assessment and Control]
[EHS 508b/F&ES 897b, Assessing Exposures to Environmental Stressors]
EHS 510a, Principles of Environmental Health
EHS 511b/F&ES 893b, Principles of Risk Assessment
EHS 520b/CDE 520b, Case-Based Learning for Genetic and Environmental Diseases
EHS 525a and b, Seminar and Journal Club in Environmental Health
EHS 537a/EMD 537a/GLBL 569a, Water, Sanitation, and Global Health
[EHS 545b, Molecular Epidemiology]
EHS 573b, Epidemiological Issues in Occupational and Environmental Medicine
EHS 575a, Introduction to Occupational and Environmental Medicine
[EHS 585a/F&ES 898a, The Environment and Human Health]
EHS 600a,b, Independent Study or Directed Readings
EHS 610b, Applied Area Readings for Qualifying Exams
EHS 620a and b, Research Rotation

EPIDEMIOLOGY AND PUBLIC HEALTH

EPH 600b, Research Ethics and Responsibility
EPH 608b, Frontiers of Public Health

EPIDEMIOLOGY OF MICROBIAL DISEASES

EMD 508a/CDE 508a, Principles of Epidemiology I
EMD 512a, Immunology for Epidemiologists
EMD 518a, Principles of Infectious Diseases I

EMD 518b, Principles of Infectious Diseases II
EMD 525a and b, Seminar in Epidemiology of Microbial Diseases
EMD 530b, Health Care Epidemiology: Improving Health Care Quality through Infection Protection
EMD 533a, Implementation Science
[EMD 536b, Investigation of Disease Outbreaks]
EMD 537a/EHS 537a/GLBL 569a, Water, Sanitation, and Global Health
EMD 538a, Quantitative Methods for Infectious Disease Epidemiology
EMD 539b, Introduction to Public Health Surveillance
EMD 540a, Responding to Violent Conflict: Epidemiologic Methods and Public Health Interventions
EMD 543a/CDE 543a/GLBL 567a, Global Aspects of Food and Nutrition
EMD 548b/ARCG 762b^{U}/F&ES 726b/G&G 562b^{U}, Observing Earth from Space
EMD 550b/682b, Biology of Insect Disease Vectors
EMD 553b, Transmission Dynamic Models for Understanding Infectious Diseases
EMD 563a or b, Laboratory and Field Studies in Infectious Diseases
EMD 566b/HPM 566b, Critical Issues in Global Health
EMD 567a, Tackling the Big Three: Malaria, TB, and HIV in Resource-Limited Settings
EMD 670a and b, Advanced Research Laboratories
EMD 680a/MBIO 680a, Advanced Topics in Tropical Parasitic Diseases
EMD 695a/E&EB 961a, Studies in Evolutionary Medicine II
EMD 695b/E&EB 960b, Studies in Evolutionary Medicine I

HEALTH POLICY AND MANAGEMENT

HPM 502a/MGT 502a, Foundations of Accounting and Valuation
HPM 510a, Introduction to Health Policy and Health Systems
HPM 514b, Health Politics, Governance, and Policy
HPM 542b, Health of Women and Children
HPM 545b, Health Disparities
[HPM 546a, Ethical Issues in Public Health]
HPM 560b, Health Economics and U.S. Health Policy
HPM 561b/MGT 630b, Managing Health Care Organizations
HPM 566b/EMD 566b, Critical Issues in Global Health
HPM 570a, Cost-Effectiveness Analysis and Decision Making
HPM 573b, Advanced Topics in Modeling Health Care Decisions
[HPM 575b/GLBL 821b, Making Policy Choices to Improve Health in Low-Income Settings]
HPM 576b, Comparative Health Care Systems
HPM 583b, Methods in Health Services Research
HPM 586a, Microeconomics for Health Policy and Health Management
[HPM 587a, Advanced Health Economics]
HPM 588a, Public Health Law
[HPM 589a, Leadership and Public Health]
HPM 590b, Addiction, Economics, and Public Policy

[HPM 592a, Strategic Thinking in Global Health]
HPM 597b, Capstone Course in Health Policy
HPM 600a,b, Independent Study or Directed Readings
HPM 601b/F&ES 862b/PSYC 601b, The Science of Science Communication
HPM 610b, Applied Area Readings
HPM 617a,b, Colloquium in Health Services Research
HPM 620a/b, Readings in Health Services Research
HPM 630b, Advanced Readings in Health Services Research
HPM 697, Health Policy Leadership Seminar
HPM 698b/MGT 698b, Health Care Policy, Finance, and Economics
HPM 699a,b/MGT 699a,b, Colloquium in Health Care Leadership

RELIGIOUS STUDIES

451 College Street, 203.432.0828
http://religiousstudies.yale.edu
M.A., M.Phil., Ph.D.

Chair
Kathryn Lofton

Director of Graduate Studies
Christine Hayes

Professors Harold Attridge (*Divinity*), Christopher Beeley (*Divinity*), Gerhard Böwering, John J. Collins (*Divinity*), Stephen Davis, Carlos Eire, Steven Fraade, Paul Franks, Bruce Gordon (*Divinity*), Philip Gorski (*Sociology*), Phyllis Granoff, Frank Griffel, John Hare (*Divinity*), Christine Hayes, Jennifer Herdt (*Divinity*), Kathryn Lofton, Ivan Marcus, Dale Martin (*on leave*), Andrew McGowan (*Divinity*), Sally Promey (*American Studies*), Gregory Sterling (*Divinity*), Harry Stout (*on leave* [Sp]), Kathryn Tanner (*Divinity*), Miroslav Volf (*Divinity*), Robert Wilson (*on leave* [F])

Associate Professors Zareena Grewal (*American Studies*), Andrew Quintman, Eliyahu Stern

Assistant Professors Maria Doerfler, Eric Greene (*on leave* [Sp]), Noreen Khawaja, Travis Zadeh

Senior Lecturer Nancy Levene

Lecturers Jimmy Daccache, Supriya Gandhi, John Grim (*Forestry & Environmental Studies*), Margaret Olin, Mary Evelyn Tucker (*Forestry & Environmental Studies*)

Fields of Study

Students must enroll in one of the following fields of study: American Religious History, Asian Religions, Hebrew Bible/Old Testament, History of Ancient Christianity, Islamic Studies, Judaic Studies, New Testament, Religious Ethics, Theology, and Philosophy of Religion.

Special Admissions Requirement

The department requires the scores of the GRE General Test; previous study in areas relevant to the chosen field of study, including ancient languages where applicable; and a writing sample of 20–30 pages, which will be evaluated for both content and style.

Special Requirements for the Ph.D. Degree

Twelve term courses must be completed, in which the Graduate School Honors requirement must be met. Proficiency in two modern scholarly languages, normally French and German, must be shown, one before the end of the first year, the other before the beginning of the third; this may be done by passing an examination administered by

the department, by accreditation from a Yale Summer School course designed for this purpose, or by a grade of A or B in one of Yale's intermediate language courses. Mastery of the languages needed in one's chosen field (e.g., Chinese, Hebrew, Greek, Japanese) is also required in certain fields of study. A set of four qualifying examinations is designed for each student, following guidelines and criteria set by each field of study; these are normally completed in the third year. The dissertation prospectus must be approved by a colloquium, and the completed dissertation by a committee of readers and the departmental faculty. Upon completion of all predissertation requirements, including the prospectus, students are admitted to candidacy for the Ph.D. This is expected before the seventh term in American Religious History, Philosophy of Religion, Religious Ethics, and Theology; before the eighth term in other fields. Students begin writing their dissertation in the fourth year and normally will have finished by the end of the sixth. There is no oral examination on the dissertation.

In the Department of Religious Studies, the faculty considers learning to teach to be an important and integral component of the professional training of its graduate students. Students are therefore required to teach as teaching fellows for at least two years during their graduate programs. Such teaching normally takes place during their third and fourth years, unless other arrangements are approved by the director of graduate studies.

A combined Ph.D. degree is available with African American Studies. Consult department for details.

Master's Degrees

M.Phil. and M.A. (both en route to the Ph.D.) See Degree Requirements under Policies and Regulations. Students in Religious Studies must take seven courses to be eligible for the M.A. degree. Additionally, students in Religious Studies are eligible to pursue a supplemental M.Phil. degree in Medieval Studies. 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 online at http://religiousstudies.yale.edu.

Courses

RLST 510a, Proseminar in the Study of Religion Noreen Khawaja
Introductory seminar in the study of religion. Fundamental concepts and open questions. Required of all first-year Ph.D. students in Religious Studies; open to others with permission of the instructor. W 7–8:50

RLST 535b[U], The Golden Age of Islam Gerhard Böwering
The development of Islamic civilization in the Middle East, North Africa, Spain, Iran, and India from Muhammad through the Mongol invasions to the rise of the Ottoman, Safavid, and Mughal empires (600–1500 C.E.). Emphasis on the intellectual and religious history of Islam in the age of the caliphates and during the rule of regional dynasties. TTH 2:30–3:45

RLST 545a, Chinese Buddhist Meditation: Texts and Contexts Eric Greene
An introduction to key Chinese texts pertaining to the practice of Buddhist meditation, including texts from the Chan, Tiantai, and Pure Land traditions. Some Daoist meditation texts are also examined for comparison, and secondary readings on the topics of mysticism and religious experience are assigned. All primary readings are in Chinese. TH 1:30–3:20

RLST 557b, Medieval Indian Texts Phyllis Granoff
An advanced reading course in Sanskrit texts. Depending on student interest we read literature or philosophy. Prerequisite: two years of Sanskrit. W 1:30–3:20

RLST 565b[U]/SAST 559b[U], Buddhist Traditions of Mind and Meditation Andrew Quintman
Buddhist meditation practices examined in the context of traditional theories of mind, perception, and cognition. Readings both from Buddhist canonical works and from secondary scholarship on cognitive science and ritual practice. Recommended preparation: a course in Asian religions. M 2:30–4:20

RLST 567a, Indian Ritual Texts Phyllis Granoff
In this course we read a selection of ritual texts from India's three classical religions, Buddhism, Jainism, and Hinduism. Prerequisite: a knowledge of Sanskrit. M 1:30–3:20

RLST 583a[U]/SAST 567a[U], Biography in Asian Religions Andrew Quintman
The significance of life writing in the religious traditions of Asia. Readings both from primary texts in translation and from theoretical works on biography and autobiography. T 1:30–3:20

RLST 601b/ARCG 601b, New Testament and Ancient Christianity: Early Christian Archaeology Stephen Davis
Required of doctoral students in New Testament studies and ancient Christianity. The topic and instructor change yearly. Topic for spring 2017 is early Christian archaeology. W 3:30–5:20

RLST 605a, Greco-Roman Proseminar Harold Attridge
The proseminar in Greco-Roman backgrounds is designed for doctoral students in the fields of New Testament and ancient Christianity. It familiarizes students with philosophical, literary, and religious texts from Greco-Roman antiquity, as well as evidence of material culture relevant to the study of early Christian literature. Master's-level students may be admitted by permission of the instructor.

RLST 608b, Christianity in Late Antiquity Stephen Davis
Required of doctoral students in ancient Christianity. Topics include the relation of church and state after Constantine; theological controversies and church councils; interfaith relations; pieties and practices; and material culture. M 1:30–3:20

RLST 640a, The Body in Early Christian Thought and Practice Maria Doerfler
Contemporary American society is frequently accused of being overly preoccupied with the human body. Yet other cultures were just as body-conscious, even if that consciousness took different forms. Christians during the first centuries of the Common Era spent

a great deal of time and text considering how to clothe or undress, feed or starve the body, whether to gender the body or to erase all markers of gender, how to kill or heal the body, as well as, not least of all, speculating about what the body would look and feel like in the resurrection. This course examines the different thematic dimensions of body-consciousness among early Christians from writings of the New Testament through the sixth century C.E. We consider the wide range of Christian attitudes to and beliefs about the body, as well as the social and ritual practices designed to inculcate or reinforce these views. In the process, we will also encounter a number of theoretical models that provide lenses through which to consider early Christian as well as contemporary attitudes to the human body. W 3:30–5:20

RLST 642b, Death and Dying in Late Antiquity Maria Doerfler
Death, in antiquity as in the present era, sat at the intersection of a wide range of discourses. Medical doctors, for example, sought to avert it, jurists to mitigate its impact upon family relations and the flow of capital, philosophers and theologians to prescribe approaches to it, and bishops and other religious professionals to create rituals by which to assist the departed one's transition into the afterlife and to channel the grief of surviving loved ones.

RLST 647a^{U}/JDST 682a^{U}, Medieval and Modern Jewish Biblical Commentaries Edward Breuer
This seminar surveys the classics of medieval and modern Jewish biblical commentaries, from the eleventh to the nineteenth century. The study of biblical commentaries, like the broader study of scriptural interpretation, offers a rich and expansive view of Jewish intellectual history. Using Hebrew sources (English translations are provided when available), we explore the diverging approaches to the Pentateuch in light of the different intellectual and cultural contexts in which Jewish scholarship thrived. We raise issues such as the impact of Arabic learning, attitudes toward rabbinic tradition, the rise of rationalism and mysticism, and the multiple challenges of modernity. TH 1:30–3:20

RLST 653b^{U}/EGYP 514b^{U}/REL 555b, Gnostic Texts in Coptic Harold Attridge
The course reads selected portions of important texts from the Nag Hammadi collection, including the Apocryphon of John, the Gospel of Thomas, the Gospel of Truth, Thunder, the Treatise on Resurrection, the Tripartite Tractate, as well as other noncanonical texts preserved in Coptic, including the Gospel of Mary and the Gospel of Judas. Prerequisite: EGYP 510b or equivalent. TTH 1:30–3

RLST 658a^{U}/EGYP 512a^{U}, Egyptian Monastic Literature in Coptic Stephen Davis
Readings in the early Egyptian classics of Christian ascetism in Sahidic Coptic, including the Desert Fathers and Shenoute. Prerequisite: EGYP 510b or equivalent. MW 9–10:15

RLST 665a, Christianity in the Second and Third Centuries Stephen Davis
Philological problems in the study of the second century and its aftermath. Required of doctoral students in New Testament studies and ancient Christianity. Open to other doctoral students with permission of the instructor. M 1:30–3:20

RLST 677b/HIST 578b, The Catholic Reformation Carlos Eire
Reading and discussion of scholarship on the Catholic Reformation and of key primary texts written between 1500 and 1600. W 3:30–5:20

RLST 681a/HIST 580a/REL 764a, Martin Luther and the Reformation
Carlos Eire, Bruce Gordon
Readings in key texts by Martin Luther and his contemporaries, as well as in classic and recent scholarship on his life, work, and legacy. M 3:30–5:20

RLST 684a[U]/JDST 775a[U], Jews at the Origins of Islam Liran Yadgar
The Jews: people of divine revelation or enemies of Muhammad? The narratives on the rise of Islam in seventh-century Arabia usually portray Muhammad's encounter with the Jewish community of Yathrib (Medina) as the most significant in the formation of his new religious movement. The Jews were perceived to be a model for the nascent Muslim community due to their holy scriptures, and Muslims are said to emulate Judaism in practicing fasting and directing their prayers to Jerusalem, before changing the direction to Mecca. However, Jews are also rejected in the Qur'an due to their distortion of the scriptures and their malevolent opposition to Muhammad and his followers. This class investigates the role of Jews in the formative period of Islam, from the beginning of Muhammad's call to prophethood around 610 C.E. to the early Abbasid Period (ca. 850 C.E.) in light of contemporary scholarship on the origins of Islam. T 9:25–11:15

RLST 688a/AFAM 558a/AMST 688a/HIST 577a/WGSS 695a, Historicizing Religion Kathryn Lofton
What does it mean to offer a history of religion? How is a history of religion distinct from, or overlapping with, the history of race or gender? This course takes as its central subject a key methodological problem of modernity, namely the task to offer material accounts for human perception, social organization, and epistemological vantage. We read new historical monographs and relevant classic theories that consider what religion is, how its categorization is like and unlike other concepts for human distinction, and why it became something in modernity requiring historical diagnosis. Included in our topical survey are examinations of secularization and disenchantment; myth and narrative; church history and hagiography; objectivity and positivism; world religions and comparative religions; Orientalism and colonialism; sectarianism and secularism. Works read include Elizabeth A. Clark, *History, Theory, Text: Historians and the Linguistic Turn;* Sylvester Johnson, *African American Religions, 1500–2000: Colonialism, Democracy, and Freedom;* and Suzanne Marchand, *German Orientalism in the Age of Empire: Religion, Race, and Scholarship.* M 9:25–11:15

RLST 699a/AMST 805a/HSAR 720a/REL 966a/WGSS 779a, Sensational Materialities: Sensory Cultures in History, Theory, and Method Sally Promey
This interdisciplinary seminar explores the sensory and material histories of (often religious) images, objects, buildings, and performances as well as the potential for the senses to spark contention in material practice. With a focus on American things and religions, the course also considers broader geographical and categorical parameters so as to invite intellectual engagement with the most challenging and decisive developments in relevant

fields, including recent literatures on material agencies. The goal is to investigate possibilities for scholarly examination of a robust human sensorium of sound, taste, touch, scent, and sight—and even "sixth senses"—the points where the senses meet material things (and vice versa) in life and practice. Topics include the cultural construction of the senses and sensory hierarchies; investigation of the sensory capacities of things; and specific episodes of sensory contention in and among various religious traditions. In addition, the course invites thinking beyond the "Western" five senses to other locations and historical possibilities for identifying the dynamics of sensing human bodies in religious practices, experience, and ideas. The Sensory Cultures of Religion Research Group meets at 7 p.m. on Tuesdays; class participants are strongly encouraged, but not required, to attend. Prerequisite: permission of the instructor; qualified undergraduates are welcome. M 3:30–5:20

RLST 703b/AMST 719b, Interrogating the Crisis of Islam Zareena Grewal
In official and unofficial discourses in the United States, diagnoses of Islam's various "crises" are ubiquitous, and Muslim "hearts and minds" are viewed as the "other" front in the War on Terror. Since 9/11, the U.S. State Department has made the reform of Islam an explicit national interest, pouring billions of dollars into USAID projects in Muslim-majority countries, initiating curriculum development programs for madrasas in South Asia, and establishing the Arabic Radio Sawa and the satellite TV station Al-Hurra to propagate the U.S. administration's political views as well as what it terms a "liberal" strain of Islam. Muslim Americans are also consumed by debates about the "crisis" of Islam, a crisis of religious authority in which the nature and rapidity of change in the measures of authority are felt to be too difficult to assimilate. This course maps out the various and deeply politically charged contemporary debates about the "crisis of Islam" and the question of Islamic reform through an examination of official U.S. policy, transnational pulp Islamic literature, fatwas and essays authored by internationally renowned Muslim jurists and scholars, and historical and ethnographic works that take up the category of crisis as an interpretive device. M 1:30–3:20

RLST 715a, The Theology and Philosophy of Fakhr al-Din al-Razi Frank Griffel
Recent research has shown that Fakhr al-Din al-Razi was the most influential Muslim theologian in the so-called postclassical period in Islam after 1100. In his works, Islamic theology and philosophy reached a mature state that brings together several intellectual traditions, among them that of classical Ash'arism, of Aristotelian philosophy (*falsafa*), of al-Ghazali's critique of *falsafa,* and of Sufism. The kind of synthesis that Fakhr al-Din al-Razi created dominated the education of Sunni theologians up to the mid-eighteenth century, when the confrontation with modernity created new priorities. This seminar takes a close look at this understudied thinker. The goal is to understand the most widespread kind of Islamic theology of the centuries between 1200 and 1750, a time that is not yet covered in textbooks on Islamic intellectual history. We read selections of Fakhr al-Din's work in the Arabic original. Prerequisites: a firm grounding in classical Arabic and permission of the instructor. TH 1:30–3:20

RLST 716b, Theories and Methods in Islamic Studies Travis Zadeh

RLST 717a[U], Islamic Theology and Philosophy Frank Griffel
Historical survey of major themes in Muslim theology and philosophy, from teachings of the Qur'an to contemporary Muslim thought. The systematic character of Muslim thought and of the arguments given by thinkers; reason vs. revelation; the emergence of Sunnism in the tenth through eleventh centuries; the reaction of Muslim theology (from 1800) to the challenges of the West; and contemporary Muslim thought. TTH 10:30–11:20, 1 HTBA

RLST 720a, The Qur'an and Its Interpretation Gerhard Böwering
Intensive study of the Qur'an with special emphasis on its biblical roots. Readings in Arabic commentaries on the Qur'an. Prerequisites: advanced knowledge of Arabic and permission of the instructor. T 4–6

RLST 723b[U], Salafiyya Movement in Islam Frank Griffel
Close study of the development of the Salafiyya movement, a widely spread modernist reform movement of Muslim intellectuals during the eighteenth and nineteenth centuries. Further development of the movement during the twentieth century; what "Salafism" means today. MW 2:30–3:45

RLST 728a/PLSC 776a[U], Islam and Democracy in the Modern Middle East Andrew March
This seminar studies the development of regimes of government in Muslim countries since the nineteenth century. The focus is on early constitutional movements, the rise of political Islam, the management of religion in various twentieth-century states, the Iranian revolution, and the growth of Salafi ideas, culminating in the ISIS "caliphate."

RLST 729b, Islamic Theology Seminar Frank Griffel
Close reading of Arabic sources on the historical development of Islamic theology, mostly from the genre of kalam, but also from 'aqida, fiqh, and others. Discussion of relevant secondary literature in Western languages. Prerequisites: strong command of classical Arabic and permission of the instructor. TH 1:30–3:20

RLST 733b, Seminar on Sufism Gerhard Böwering
A study of Islamic asceticism and mysticism with emphasis on the early development of Sufism. Readings in Arabic Sufi sources of the ninth to eleventh century. Prerequisites: reading knowledge of classical Arabic and permission of the instructor. T 4–6

RLST 739a/REL 738a, Life and Thought of Jonathan Edwards Harry Stout
This course offers students a comprehensive view into the life and thought of Jonathan Edwards. T 1:30–3:20

RLST 740b/JDST 734b, Rabbinic Texts Christine Hayes
A close study of classical rabbinic sources with attention to questions of both form and content, critical methods, and cultural and historical context. Designed for doctoral students in Ancient Judaism. Prerequisite: ability to read Talmudic texts in the original languages. T 2:30–4:30

RLST 746a^{U}/JDST 736a^{U}/NELC 701a^{U}, Midrash Seminar: The Revelation at Sinai Steven Fraade

The giving of the Torah to Israel as seen through rabbinic eyes. Close readings of midrashic texts. Views of revelation, tradition, interpretation, law, and commandment in their literary and historical contexts. Interpretations and interpretive strategies compared and contrasted with those of other ancient biblical exegetes (Jewish and non-Jewish). Prerequisite: reading fluency in ancient Hebrew. TH 9:25–11:15

RLST 751b^{U}/JDST 721b^{U}/NELC 703b^{U}, Introduction to Judaism in the Ancient World: From Temple to Talmud Steven Fraade

The emergence of classical Judaism in its historical setting. Jews and Hellenization; varieties of early Judaism; apocalyptic and postapocalyptic responses to suffering and catastrophe; worship and atonement without sacrificial cult; interpretations of scriptures; law and life; the rabbi; the synagogue; faith in reason; Sabbath and festivals; history and its redemption. MW 11:35–12:50

RLST 752a^{U}/JDST 727a^{U}/NELC 702a^{U}, Mishnah Seminar: Tractate Ta'anit on Fasting Steven Fraade

Close study of a section of the Mishnah, the earliest digest of Jewish law, treating procedures for public fasts in response to drought and other forms of collective adversity. Particular attention to the textual practices of rabbinic legal discourse in relation to its social function, and to the interplay of law and narrative. Prerequisite: reading fluency in ancient Hebrew. W 9:25–11:15

RLST 757b^{U}/JDST 725b^{U}/NELC 704b^{U}, The Dead Sea Scrolls and the History of Ancient Judaism: The Damascus Document Steven Fraade

Study of one of the most important of the Dead Sea Scrolls, the Damascus Document. Attention to its place in the history of biblical interpretation and ancient Jewish law; the nature and rhetorical function of its textual practices, both narrative and legal; and its ideological formulations, literary history, and relation to the central sectarian writings of the Qumran community. Prerequisite: reading fluency in ancient Hebrew. TH 9:25–11:15

RLST 762a^{U}/CPLT 690a^{U}/JDST 838a^{U}, Politics of Modern Hebrew Literature Hannan Hever

An overview of the poetics, culture, history, and political dynamics of modern Hebrew literature over the past 250 years. No background in Jewish literature and Jewish culture is required. All readings in English. T 2:30–4:20

RLST 763a/JDST 701a^{U}, The Bible Christine Hayes

This course introduces students to the writings common to both Jewish and Christian scripture (the twenty-four books of the Hebrew Bible or Tanakh found in all Bibles) and examines these writings as diverse and often conflicting expressions of the religious life and thought of ancient Israel as well as a foundational element of Western civilization. Special emphasis on the writings' cultural and historical setting in the ancient Near East; close reading of selected passages; the interpretive history of selected passages influential in Western culture. Students are also introduced to a wide range of critical and literary approaches to biblical studies, including source criticism, tradition criticism,

redaction criticism, and contemporary literary criticism. Students view course lectures, which survey the entire Bible, online; class time focuses on comparative materials, close readings, and the interpretation of specific biblical passages in Jewish and Christian culture. MW 11:35–12:50

RLST 771b/HIST 598b/JDST 846b, Jewish Emancipation in the Twentieth Century David Sorkin

Conventional wisdom has it that the process of "Jewish emancipation," or the acquisition of citizenship and equality, culminated with the Russian Revolution of 1917 or the minority rights treaties of the early 1920s. In fact, emancipation did not cease. In the 1930s and 1940s right-wing, fascist, and Nazi governments across Europe abrogated Jews' citizenship. Postwar governments restored citizenship, sometimes reluctantly, sometimes belatedly, sometimes inconsistently. The controversies over reparations and the restoration of property that continue today belong to this process as well. The establishment of Israel with its own specific concept of citizenship was yet another aspect. Finally, the laws that prohibited discrimination in schools, housing, employment, and secondary associations in the 1950s–1970s were an installment in creating equality for Jews in the United States. This seminar casts its nets broadly to study the extant scholarship on "Jewish emancipation" in the twentieth century. TH 3:30–5:20

RLST 773a[U]/HIST 596a[U]/JDST 761a[U], Jewish History and Thought to Early Modern Times Ivan Marcus

A broad introduction to the history of the Jews from biblical beginnings until the European Reformation and the Ottoman Empire. Focus on the formative period of classical rabbinic Judaism and on the symbiotic relationships among Jews, Christians, and Muslims. Jewish society and culture in its biblical, rabbinic, and medieval settings. TTH 11:35–12:50

RLST 776b/HIST 601b/JDST 790b, Jewish History, Thought, and Narratives in Medieval Societies Ivan Marcus

Research seminar that focuses on the two medieval Jewish subcultures of Ashkenaz (northern Christian Europe) and Sefarad (mainly Muslim and Christian Spain). TH 9:25–11:15

RLST 777b[U]/HIST 590b[U]/JDST 764b[U], Jews in Muslim Lands from the Seventh through the Sixteenth Century Ivan Marcus

Introduction to Jewish culture and society in Muslim lands from the Prophet Muhammad to Suleiman the Magnificent. Topics include Islam and Judaism; Jerusalem as a holy site; rabbinic leadership and literature in Baghdad; Jewish courtiers, poets, and philosophers in Muslim Spain; and the Jews in the Ottoman Empire. TTH 11:35–12:50

RLST 788b/AMST 692b/HSAR 730b/JDST 799b/REL 967b, Religion and the Performance of Space Sally Promey, Margaret Olin

This interdisciplinary seminar explores categories, interpretations, and strategic articulations of space in a range of religious traditions. In conversation with the work of major theorists of space, this seminar examines spatial practices of religion in the United States during the modern era, including the conception, construction, and enactment of

religious spaces. It is structured around theoretical issues, including historical deployments of secularity as a framing mechanism, ideas about space and place, geography and gender, and relations between property and spirituality. Examples of case studies treated in class include the enactment of rituals within museums, the marking of religious boundaries such as the Jewish "eruv," and the assignment of "spiritual" ownership in Hawai'i Volcanoes National Park. The seminar coordinates with several campus events, including research group presentations and an exhibition of work by Thomas Wilfred at the Yale University Art Gallery. Prerequisite: permission of the instructors; qualified undergraduates are welcome. M 3:30–5:20

RLST 799b[U]/HIST 587b[U]/JDST 793b[U], Introduction to Modern Jewish Thought
Eliyahu Stern
An overview of Jewish philosophical trends, movements, and thinkers from the seventeenth to the twenty-first century. Topics include enlightenment, historicism, socialism, secularism, religious radicalism, and Zionism. MW 2:30–3:20, 1 HTBA

RLST 801b, Hebrew Bible Seminar: Prophetic Stories in Kings Robert Wilson
A close reading of the Hebrew text of the prophetic stories in the Books of Kings, with particular attention to their possible oral origin and present literary function. The sociological and religious perspective of the stories is also considered. Prerequisite: two years of Biblical Hebrew or the equivalent. M 1:30–3:20

RLST 802b, Apocalyptic Religion in Cross-Cultural Perspective Robert Wilson
An examination of millennial and "end-time" beliefs in a variety of cultures around the world. Attention is given to Jewish and Christian texts as well as Native American traditions; African, Middle Eastern, and Asian religious movements; and modern manifestations such as Jonestown, Heaven's Gate, Waco, the Oklahoma City bombing, and ISIS violence. The course includes a general consideration of religious violence in apocalyptic movements, as well as an exploration of how groups react to the failure of the apocalypse to occur. TH 1:30–3:20

RLST 803b/ANTH 531b/ARCG 531b/CLSS 815b/CPLT 547b/HIST 502b/JDST 653b/NELC 533b, Fakes, Forgeries, and the Making of Antiquity Eckart Frahm, Irene Peirano Garrison
A comparative exploration of notions of forgery and authenticity in the ancient and premodern world, in a variety of civilizations (ancient Greece, Mesopotamia, Egypt, Israel, China, India, etc.) and different political, religious, literary, and artistic contexts. Emphasis is also placed on the pivotal role played by the "authentic" in the modern era in disciplines such as philology and aesthetics, the manipulative uses of ancient history for purposes of modern nation building and identity formation, copies and reconstructions of ancient artifacts, and the role of forgeries in today's antiquities trade. TH 2:30–4:30

RLST 821a[U]/JDST 730a[U], Law and Narrative, Gender and Sexuality in the Talmud
Noah Bickart
For rabbis in the late antique settings of the eastern Roman empire and Sassanian Babylonia, the marriage ceremony was not a single ritual. Rather, marriages had two phases: the first, called *Kiddushin* (lit. betrothals), was a ceremony during which a man ritually

set his bride-to-be apart from all other potential suitors. Approximately one year later, the couple had a second ceremony, called *Nissuin* (lit. nuptuals), after which they began life together as a married couple. M 3:30–5:20

RLST 823a[U]/CPLT 687a[U]/ JDST 849a[U], Ethnicity, Religion, and Nationality in Modern Jewish Culture Hannan Hever, Eliyahu Stern
This course explores the nature of identity politics in modern Europe, the Middle East, and America through the idea of the Jew. It introduces students to scholarly texts focused on the nature of identity politics as well as short stories, novels, and films addressing the fluidity of identity as it pertain to Jews in the modern period. W 3:30–5:30

RLST 826a,b, Introduction to Syriac Language Jimmy Daccache
Syriac was an Aramaic dialect that developed its own written tradition in the city of Edessa in classical antiquity. This class provides students with a basic working knowledge of the three principal scripts (Estrangela, Serṭo, and "Nestorian"), verbal morphology, and fundamental rules of syntax. Extracts of several Syriac texts are studied for purposes of application.

RLST 835b/SMTC 545b, Northwest Semitic Inscriptions (Phoenician, Aramaic, Moabite, and Hebrew) Jimmy Daccache
This introduction to Semitic epigraphy is designed to lay the groundwork for the study of Phoenician, Hebrew, and Aramaic grammar, illustrated through a wide variety of inscriptions stretching from the early centuries of the first millennium B.C.E. to the Roman period.

RLST 840a,b, Ugaritic I and II Jimmy Daccache
The Ugaritic alphabet was used in Ras Shamra-Ugarit in the thirteenth century B.C.E. on the Syrian coast. This course is an initiation into the linguistic system of the Ugaritic language, written in a cuneiform script, and into the Ugaritic civilization.

RLST 865a[U], Moral, Religious, and Social Issues in Bioethics Stephen Latham
A selective survey of issues in biomedical ethics. Comparison of different points of view about biomedical issues, including religious vs. secular and liberal vs. conservative. Special attention to issues in research and at the beginning and end of life. MW 9–10:15

RLST 895a, The Body and Land: Explorations in Theological Anthropology Willie Jennings
This course considers the relationship between the body and land, between bodily awareness and awareness of place, space, geography, and animals. The questions it seeks to answer are: What is the status of the geographic in the Christian imaginary? How do land and animal figure into contours of consciousness, theological vision, and life? How do ideas of private property, land enclosure, and spatial and racial segregation inform theories and theologies of the built environment? The goal is to construct a cognitive map that integrates a theology of connectivity of body and land to a theology of relationality of peoples to each other, to the material world, and to God. Such a map might enable the formation of a moral geography that informs the creation of more just, inclusive, and nondestructive living spaces.

[RLST 900b^{U}, Existentialism]

RLST 961, Directed Readings: American Religious History

RLST 962, Directed Readings: Ancient Christianity

RLST 963, Directed Readings: Asian Religions

RLST 964, Directed Readings: Ethics

RLST 965, Directed Readings: Judaic Studies

RLST 966, Directed Readings: Islamic Studies

RLST 967, Directed Readings: New Testament

RLST 968, Directed Readings: Old Testament/Hebrew Bible

RLST 969, Directed Readings: Philosophy of Religion

RLST 970, Directed Readings: Theology

RENAISSANCE STUDIES

53 Wall Street, Rm. 310, 203.432.0672
http://renaissance.yale.edu
M.A., M.Phil., Ph.D.

Chair and Director of Graduate Studies
Carlos Eire

Executive Committee Rolena Adorno, Edwin Duval, Carlos Eire, Roberto González Echevarría, Bruce Gordon, David Scott Kastan, Christina Kraus, Lawrence Manley, Giuseppe Mazzotta (*on leave*), Robert Nelson (*on leave* [F]), David Quint, John Rogers, Francesca Trivellato (*on leave*), Keith Wrightson

Faculty associated with the program Rolena Adorno, Emily Bakemeier, Leslie Brisman, Paul Bushkovitch, Susan Byrne, Judith Colton (*Emerita*), Edwin Duval, Carlos Eire, Roberta Frank, Paul Freedman, Roberto González Echevarría, Bruce Gordon, Emily Greenwood (*on leave* [Sp]), Karsten Harries, K. David Jackson, Maija Jansson, David Scott Kastan, Christina Kraus, Lawrence Manley, Giuseppe Mazzotta (*on leave*), Mary Miller, Alastair Minnis (*on leave* [Sp]), Robert Nelson (*on leave* [F]), Catherine Nicholson, Steven Pincus, David Quint, John Rogers, Christopher Semk, Francesca Trivellato (*on leave*), Keith Wrightson

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, French, 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. As detailed below, requirements for the combined degree 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. (1) 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. (2) 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. (3) 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.

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

The scheduling of the oral examination and the dissertation prospectus follows the practice of the primary department, but in every case the two requirements must be completed not later than September of the fourth year. The oral examination, varying in length from two hours to two hours and fifteen minutes, will include questions on 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.

CLASSICS

Course work Students are required to complete sixteen term courses. Eight of these will be courses in Classics and will include at least four courses in Greek and Latin literature, a course in historical or comparative grammar, and at least three seminars. The eight remaining courses making up the Renaissance Studies portion of the degree will be distributed as follows: two terms of the Renaissance Studies Core Course, six additional term courses to be taken in at least two disciplines (such as literature, history, history of art, music, religious studies, etc.). One of these courses should respect the spirit of the ordinary Classics requirement of a course in classical art or archaeology (a course on the classical origins of Renaissance architecture, for example, will satisfy this requirement).

Languages Students are expected to pass the normal Greek and Latin competency exams upon entrance to the program. Italian, as set by Renaissance Studies—one hour on sixteenth-century Italian prose, and another one-hour exam on modern Italian scholarship—and a second language, normally German or French.

Examinations Students are expected to pass the Greek and Latin translation exams, based on the Classics and Renaissance Studies Ph.D. reading lists, by the beginning of the fifth term in residence; the oral exams in Greek and Latin literature, based on the Classics

and Renaissance Studies Ph.D. reading lists, by the end of the fifth term in residence; and the oral exams on special fields appropriate to both disciplines, as described below, by the end of the sixth term in residence.

Orals Classics portion: seventy-five minutes on three or four topics in classical Greek and Latin literature. Renaissance Studies portion: forty-five minutes, three fifteen-minute questions on Renaissance topics to be divided between at least two disciplines, i.e., literature, history, history of art, etc.

Prospectus and dissertation The prospectus must be completed by the end of the seventh term in residence. Procedures regarding the dissertation will follow departmental practice, although the board of readers will normally include at least one member of the Renaissance Studies Executive Committee.

COMPARATIVE LITERATURE

Course work Students are required to complete sixteen term courses, at least seven of these (including the Comparative Literature proseminar) in the Department of Comparative Literature. Students must take at least ten courses in the field of Renaissance Studies (offered in several departments), including two terms of the Renaissance Studies Core Course and three courses in two disciplines other than literature (such as history, history of art, or religious studies). At least three of a student's overall list of courses must be in literary theory, criticism, or methodology; at least one course each in poetry, narrative fiction, and drama; and at least one course each in ancient or medieval literature and Enlightenment or modern literature. At least two courses must be completed with the grade of Honors. In general, students should take a wide range of courses with a focus on one or two national or language-based literatures.

Languages Latin and Italian, as set by Renaissance Studies—one hour of Renaissance Latin prose; one hour of sixteenth-century Italian prose, one of modern Italian scholarship—and two additional languages, at least one of them European.

Orals The joint oral examination will consist of seven twenty-minute questions (two topics in Renaissance literature from a comparative perspective; three on non-Renaissance literature, including at least one theoretical or critical question; and two questions on Renaissance topics in nonliterary disciplines). Orals should be completed no later than the end of the sixth term.

Prospectus and dissertation The prospectus should be completed in September of the fourth year. Procedures regarding the dissertation will follow departmental practice, although the final readers will normally include at least one member of the Renaissance Studies Executive Committee.

ENGLISH

Course work Students are required to complete sixteen term courses. Eleven of these will be courses in English, of which five (including those normally cross-listed, such as Comparative Literature courses and the Renaissance Studies Core Course) will be in Renaissance literature. An additional five courses in Renaissance topics will be non-cross-listed courses from other departments. Course work must be completed by the end of the fifth term.

Languages Latin, Italian, and a second modern language, to be tested by the Renaissance Studies program.

Orals Five twenty-minute questions, including two Renaissance topics. An additional thirty-minute portion, consisting of two fifteen-minute questions in Renaissance Studies, on nonliterary disciplines.

Prospectus and dissertation The prospectus must be completed by the beginning (i.e., September) of the seventh term. Procedures regarding the dissertation will follow departmental practice, with at least one reader from the Renaissance Studies Executive Committee.

FRENCH

Course work Sixteen term courses at the graduate level are required. Nine correspond to the requirements of the French department, seven to the requirements of the Renaissance Studies program. Of the nine courses taken in French, one must be French 610 (Introduction to Old French), two others must fall within the medieval and early modern periods (eleventh through seventeenth century). The six remaining courses in French must cover as broad a spectrum as possible of the various periods and subfields of French and francophone literature. Of the seven courses taken in Renaissance Studies, two must be the Renaissance Studies Core Course, two must be in a literature or literatures other than French, and three must be taken in other departments (e.g., History, History of Art, Music, Religious Studies, Philosophy, etc.).

Languages Latin and Italian, as required and examined by Renaissance Studies, and a third language relevant to the student's specialization (Greek, Hebrew, Spanish, Portuguese, German), in addition to French. A written examination in Latin will consist of a passage of humanist Latin prose (one hour). A written examination in Italian will consist of a literary passage from the Italian Renaissance (one hour) and a passage of modern Italian scholarship (one hour). Written examinations in the third language will consist of passages appropriate to the language and the discipline, or may be satisfied by a graduate seminar taken in the language or literature in question.

Orals An oral qualifying examination must take place as early as possible in the third year of study, before spring recess at the latest. The examination will consist of seven topics: four in French and three in Renaissance Studies. Of the four topics in French, one must center on Renaissance literature, two on other areas of French and francophone literature; the fourth will consist of the textual analysis of a poem or prose passage in French, provided to the candidate twenty-four hours before the examination. Of the three topics in Renaissance Studies, one or two must center on a Renaissance literature other than French, the remainder on an area or areas of Renaissance Studies other than literature. The French part of the examination will be conducted in French; the Renaissance Studies part will be conducted in English.

Prospectus and dissertation A formal prospectus defense must take place no later than two weeks before the end of the sixth term (third year) of study. The prospectus committee will consist of three faculty members, including the dissertation director(s) and at least one member of the Renaissance Studies Executive Committee. Once approved by

the committee, the prospectus will be submitted to the graduate faculty of the Department of French for a vote on final approval and advancement to candidacy. More than one dissertation adviser is permitted and indeed encouraged, but the principal adviser will normally be in the Department of French. The official readers of the finished dissertation need not be members of the original prospectus committee, but will include at least one member of the Department of French and at least one member of the Renaissance Studies Executive Committee.

HISTORY

Course work Students are required to complete sixteen term courses. Ten of these will be courses in History; of these, a minimum of four will be in Renaissance/early modern topics from the fourteenth through the seventeenth century. The six remaining courses making up the Renaissance Studies portion of the degree will be distributed as follows: two terms of the Renaissance Studies Core Course, four additional term courses to be taken in at least two disciplines outside of history (such as Classics, modern literatures, history of art, music, etc.). The normal History department requirements of three research seminars and a prospectus tutorial apply to combined-degree students.

Languages Latin and Italian, as set by Renaissance Studies—one hour of Renaissance Latin prose; two hours of Italian, one of sixteenth-century Italian prose, one of modern Italian scholarship—and a third language chosen by the student.

Orals History portion: seventy-five minutes in all, including forty-five minutes on the student's major Renaissance/Reformation/early modern field, which may, but need not be, shared with more than one examiner, and thirty minutes on a minor field outside the specialization (and preferably outside of European history). Renaissance Studies portion: forty-five minutes, three fifteen-minute questions to be divided between at least two disciplines outside of history narrowly conceived (i.e., in literature, history of art, etc.). Students are expected to complete the oral examination no later than September of the fourth year.

Prospectus and dissertation Students are expected to complete the prospectus by March of the third year. Procedures regarding the dissertation will follow departmental practice, although the board of readers will normally include at least one member of the Renaissance Studies Executive Committee.

HISTORY OF ART

Course work Students are required to complete fifteen term courses. Ten of these will be courses in History of Art; of these, a minimum of four will be in Renaissance art from fourteenth-century Italy through the baroque. The five remaining courses making up the Renaissance Studies portion of the degree will be distributed as follows: two terms of the Renaissance Studies Core Course, three additional term courses taken in at least two disciplines outside of history of art (such as literature, history, music, religious studies, etc.). Students will normally take seven courses in the first year, six in the second year (the credit for first-time teaching will be included in this number), and a final course in the fall of the third year.

Qualifying paper Normally during January of the second year, students submit a qualifying paper that should demonstrate the candidate's ability to complete a Ph.D. dissertation successfully.

Languages Latin and Italian, as set by Renaissance Studies — one hour of Renaissance Latin prose; two hours of Italian, one of sixteenth-century Italian prose, one of modern Italian scholarship. A third language (in most cases German) at the discretion of the History of Art department.

Orals The comprehensive oral examination will normally take place toward the end of the first term of the third year and must be completed no later than September of the fourth year. It will consist of a three-hour written examination based on the candidate's major field and an oral examination as follows: History of Art: seventy-five minutes, including examination on at least one field noncontiguous with the Renaissance; Renaissance Studies: forty-five minutes, three fifteen-minute questions to be divided between at least two disciplines outside the history of art.

Prospectus and dissertation Students are expected to complete the prospectus and colloquium by March of the third year. Procedures for the submission and evaluation of dissertations will be those followed in History of Art, although the board of readers will normally include a member of the Renaissance Studies Executive Committee.

ITALIAN

Course work Of the combined degree program's total of sixteen term courses, seven are in Renaissance Studies and nine are in the Department of Italian. Of the nine courses in Italian, at least three must be devoted to the period from Dante to the earlier seventeenth century. The seven courses making up the Renaissance Studies portion of the degree will be distributed as follows: two terms of the Renaissance Studies Core Course; two courses in Renaissance literatures other than Italian, and three courses divided between at least two nonliterary disciplines (e.g., history, history of art, religious studies, etc.).

Languages Latin, as set by Renaissance Studies (one hour of Renaissance Latin prose), a second romance language, and a non-romance language, tested in a two-hour examination (one hour of Renaissance prose, one hour of modern scholarship). Latin to be passed by the end of the first year (and preferably upon entrance); all languages to be passed before the oral examination.

Orals The qualifying examination, which must be completed by the end of the third year, will include an oral examination in which sixty minutes will be devoted to Italian literature, including the Renaissance, and forty-five minutes will be devoted to three fifteen-minute questions on a topic in Renaissance literature outside of Italy and two topics in nonliterary areas of the Renaissance (such as history or history of art). The portion of the examination devoted to Italian literature will also include a written component following departmental guidelines.

Prospectus and dissertation The dissertation (a prospectus of which must be completed by the beginning of the fourth year) will normally be directed within the Department of Italian, but at least one of the readers will normally be a member of the Renaissance Studies Executive Committee.

MUSIC

Course work Students are required to complete sixteen term courses. Ten of these will be courses in Music, including four in early music, i.e., from the later Middle Ages through the baroque. The six remaining courses making up the Renaissance Studies portion of the degree will be distributed as follows: two terms of the Renaissance Studies Core Course, four additional term courses taken in at least two disciplines outside of music (such as literature, history, history of art, religious studies, etc.).

Languages Latin and Italian, as set by Renaissance Studies—one hour of Renaissance Latin prose; two hours of Italian, one of sixteenth-century Italian prose, one of modern Italian scholarship. A third language (normally French or German) at the discretion of the Department of Music.

Comprehensive examinations Music: three ninety-minute essays (including one on early music), followed by an oral examination of ninety minutes. Renaissance Studies: one ninety-minute essay on an interdisciplinary Renaissance topic (e.g., art and literature of a particular country, or comparison of the culture of two or three princely courts, or the history of the Reformation or Counter-Reformation), followed by a thirty-minute oral examination on the essay topic. Students take the comprehensive exam in Music at the beginning of the third year and the Renaissance Studies comprehensive exam in the spring of the third year.

Prospectus and dissertation Students enroll in the third-year prospectus/dissertation seminar in Music and must complete the prospectus no later than September of the fourth year. Dissertations will be approved in the Department of Music, with at least one reader to come from the Renaissance Studies Executive Committee.

SPANISH AND PORTUGUESE

Course work A total of sixteen term courses at the graduate level is required. Nine correspond to the requirements of the Spanish and Portuguese department, seven to the requirements of the Renaissance Studies program. Of the nine courses taken in Spanish and Portuguese, two are required: Spanish 790, Methodologies of Modern Foreign Language Teaching, and Spanish 500, History of the Spanish Language. Of the remaining seven, three or four will be in Spanish and/or Portuguese literature from the medieval period through the seventeenth century, and the balance will be in the literature of Spain's and/or Portugal's ultramarine possessions. The student doing the combined degree program may elect to devote his or her departmental course work to either Hispanic or Luso-Brazilian literatures or do a combination of both in a distribution to be determined by the student in consultation with his or her departmental adviser(s). Of the seven courses taken in Renaissance Studies, two must be the Renaissance Studies Core Course, two must be in a literature or literatures other than Spanish and/or Portuguese, and three must be taken in other departments (e.g., History, History of Art, Religious Studies, Philosophy, etc.).

Languages Students are expected to have a strong command of Spanish and/or Portuguese as well as English. In addition, the following requirements must be met: (1) Latin, as set by the Renaissance Studies program (passing a one-hour translation examination in Renaissance Latin prose); (2) Italian, as set by the Renaissance Studies program

(successful completion of a one-hour translation exam in sixteenth-century Italian prose and a one-hour translation exam in modern Italian scholarship); (3) demonstration of reading/translation proficiency in one of the following languages: French, German, Greek, Portuguese (available to students doing departmental course work exclusively in Spanish), Spanish (available to students doing departmental course work exclusively in Portuguese), or another language relevant to the student's specialization. Students doing their departmental course work in a combination of Spanish-language and Portuguese-language courses will be understood to have satisfied this third reading knowledge requirement so long as the courses are taught and the readings done in the relevant Romance language. If the course work in either Hispanic or Luso-Brazilian literatures is done in English, then the student will be expected to demonstrate proficiency by taking a one-hour translation exam in the sixteenth-century prose of the relevant language.

One language requirement must be satisfied by the end of the first year of study, if not upon entrance into the program (preferably Latin or Italian); the remaining requirement (for students doing both Spanish- and Portuguese-language literatures) or requirements (for the student working exclusively in either Spanish or Portuguese) must be satisfied by the end of the second year.

Qualifying examination Written component: (1) a two-hour examination in peninsular Spanish and/or Portuguese literatures, and (2) a two-hour exam in the ultramarine literatures of Spain and/or Portugal. Oral component: eight fifteen-minute questions, distributed as follows: four in Spanish/Portuguese peninsular/ultramarine literatures (medieval period through the seventeenth century), and three in Renaissance Studies (one question on a non-Spanish/Portuguese literature, and two questions from extra-literary fields such as history, history of art, religious studies, etc.).

Prospectus The dissertation project should be carefully planned with faculty members from the relevant departments specializing in the respective areas. The prospectus should meet the approval of the student's adviser in the Department of Spanish and Portuguese and the Renaissance Studies program member advising the student. The prospectus must include a presentation of the topic to be investigated, an explanation of the reasons for its significance, and a description of the theoretical and methodological framework to be employed. The prospectus must be submitted to the director of graduate studies in the Department of Spanish and Portuguese, who will circulate it to the departmental faculty for their review and approval; the prospectus will likewise be submitted to the Renaissance Studies program for review and approval by the faculty member(s) working with the student. The prospectus must be submitted and approved by the faculty by the beginning of the seventh term of enrollment. Failure to meet this deadline will result in suspension of registration privileges by the Graduate School. The deadline for the submission of the dissertation prospectus in either term is the Monday of the final week of classes.

Dissertation The dissertation is to achieve a strong disciplinary (i.e., Spanish, Portuguese, or Spanish/Portuguese) identity while at the same time projecting a clear Renaissance Studies profile. The dissertation normally will be directed from within the Department of Spanish and Portuguese, and there will be at least one reader from the Renaissance Studies Executive Committee.

Master's Degrees

M.Phil. The combined M.Phil. degree may be requested after all requirements but the dissertation are met.

M.A. (en route to the Ph.D.) The M.A. degree is awarded upon completion of eight term courses, taken in at least three disciplines, and with at least three grades of Honors. The examination in Latin or Italian must have been passed.

Program materials are available upon request to the Chair, Renaissance Studies Program, Yale University, PO Box 208298, New Haven CT 06520-8298.

Courses

RNST 900a,b, Directed Reading
By arrangement with faculty.

SLAVIC LANGUAGES AND LITERATURES

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Director of Graduate Studies
Marijeta Bozovic (marijeta.bozovic@yale.edu)

Professors Vladimir Alexandrov, Katerina Clark, Harvey Goldblatt, John MacKay (*on leave* [F])

Associate Professors Molly Brunson, Bella Grigoryan

Assistant Professor Marijeta Bozovic

Senior Lectors II Irina Dolgova, Constantine Muravnik

Senior Lectors I Krystyna Illakowicz, Julia Titus, Karen von Kunes

Fields of Study

The department offers the Ph.D. in Russian literature and culture and, by special arrangement, in medieval Slavic literature and philology.

Special Admissions Requirements

An advanced-level command of the Russian language is required. A ten- to twenty-page writing sample, written in English, should be submitted with the application.

Special Requirements for the Ph.D. Degree

All graduate students are required to take four courses. RUSS 607, Topics in Russian Literature from Its Origins to the Eighteenth Century, is coordinated with the department's graduate reading list of required works in Russian literature of the period. All students will take an examination in RUSS 607 that will also double as the medieval Russian literature examination for the doctorate (for more on examinations, see below). RUSS 608, Eighteenth-Century Russian Literature, follows the same pattern as RUSS 607. Its readings are also coordinated with the department's graduate reading list of required works in Russian literature. All students will take an examination in RUSS 608 that will also double as the eighteenth-century Russian literature examination for the doctorate. The other required courses are SLAV 754, Old Church Slavonic, and RUSS 834, Aspects of Russian Grammar and Teaching Methodologies, which combines pedagogy with the structure of Russian. If possible, SLAV 754 should be taken before RUSS 607. RUSS 834 should be taken concurrently with or before a graduate student's first term of teaching Russian language, typically during the seventh term of study.

The minimum number of graduate courses for the Ph.D. is sixteen, counting the above four required courses. Of the remaining twelve, at least two must be taken in

nineteenth-century Russian literature and at least two in twentieth-century Russian literature, including poetry and prose or dramatic works.

Graduate students in their second year may also spend a term studying at the Russian State University for the Humanities in Moscow; those who complete an approved program successfully will receive up to four course credits toward the Ph.D.

Students who have done graduate work elsewhere may petition the department for up to four course credits toward their degree after one year's residence at Yale.

A special curriculum may be arranged for students wishing to specialize in medieval Slavic literature and philology.

Minor field As part of their program of study, students will also be responsible for developing a minor field of specialization in one of the following: (1) a Western or non-Western literature; (2) film studies; (3) a topic in intellectual history; (4) one of the other arts; (5) another Slavic literature; (6) Slavic linguistics; (7) another discipline relevant to their primary interests in Russian literature. The student's minor field of specialization will be determined in consultation with the director of graduate studies (DGS). The minor field can be developed most readily through reading courses in the Slavic department or by taking graduate courses in another department. Up to two graduate courses in other departments will count toward the sixteen for the doctorate if they are relevant to a student's program of study. The successful completion of a course or courses in the student's minor field taken in another department may double as the departmental examination in the minor.

Examinations The Ph.D. qualifying examinations comprise eight parts and will be completed during the third year of study: (1) medieval Russian literature; (2) Russian literature of the eighteenth century; (3) minor field; (4) nineteenth-century Russian prose and drama; (5) nineteenth-century Russian poetry; (6) twentieth-century Russian prose and drama; (7) twentieth-century Russian poetry; (8) pre-prospectus examination.

The first two examinations are taken in conjunction with courses offered during the first two years of course work, RUSS 607 and RUSS 608. Early in the fifth term of study, students will take (3), a forty-minute oral exam in their chosen minor field, administered by the DGS and relevant faculty within and/or outside the department; this examination will be waived if the student has successfully completed one or two relevant graduate courses in another department. In October of the third year of study (typically during the second week), students will take two written examinations, (4) and (5), of two hours each, the first on Monday of the given week, the second on Friday. Each exam will consist of two or three passages drawn from well-known works of literature that will be identified and that are designated as required on the department's reading list (which also includes additional works that are recommended but not required). Students will be expected to choose one passage and write an essay in which they analyze the text from as many of the following points of view as possible: versification (if relevant), style, structure, narrative point of view, themes, genre, period, place in the author's oeuvre and in literary history, comparative context, and critical reception. Two additional written examinations, (6) and (7), which will follow the same format, will be held during one week at the end of the student's fifth term of study (typically the first week of December), again on Monday and Friday. Each of these four written exams will be compiled and

graded by two faculty members with expertise in the given century and genres. After each exam, students will be informed as to how they performed.

After the final written exam, all students will have a one-hour oral pre-prospectus exam on a date to be specified by the department near the beginning of the sixth term (typically, during the first week of February). This examination will explore issues pertaining to the student's future dissertation prospectus. Normally, preparation for the exam will entail a more focused reading of the departmental reading list. For example, a student who proposes to work on Pasternak would read not only the required and recommended works by Pasternak, but also the required and recommended works by other writers of the twentieth century. Students will also be expected to explore secondary and theoretical sources outside the reading list that are relevant to their chosen topic. Preparation for the examination will be done in consultation with two faculty advisers (see below), and students will be required to prepare in advance a 7–10 page text outlining their future dissertation topic, including a discussion of existing scholarship and the way they propose to structure their work. An annotated bibliography of primary and secondary works pertaining to their dissertation topic should also be appended. The pre-prospectus text will be distributed to all departmental faculty one week prior to the exam, and all faculty will attend the exam. The aim of this exam is for the student to take an intermediate step toward developing a dissertation prospectus and also to provide the student with feedback from the faculty about the project.

The departmental reading list is available on the department's Web site.

Article in lieu of examination As a possible alternative to one of the four written examinations on the nineteenth and twentieth centuries, students may choose to write an article that they will submit for publication to a scholarly journal. The work will be carried out in consultation with a faculty adviser and will focus on a work or works in either poetry or prose (or drama) of the given century. This article will be due on the date that the exam on the given genre is normally scheduled. It is expected that the article will be ambitious in its overview and in its conceptualization of the issue(s) being addressed. The faculty adviser will evaluate the work and will advise the student on publication.

Combined Ph.D. Program with Film and Media Studies

The Department of Slavic Languages and Literatures also offers, in conjunction with the Film and Media Studies Program, a combined Ph.D. in Slavic Languages and Literatures and Film and Media Studies. For further details, see Film and Media Studies and the department's Web site. Applicants to the combined program must indicate on their application that they are applying both to Film and Media Studies and to Slavic Languages and Literatures. All documentation within the application should include this information.

Master's Degrees

M.Phil. See Degree Requirements under Policies and Regulations. Additionally, students in Slavic Languages and Literatures are eligible to pursue a supplemental M.Phil. degree in Medieval Studies. For further details, see Medieval Studies.

M.A. The Department of Slavic Languages and Literatures does not admit students for the terminal M.A. degree, nor does it award an M.A. en route to the Ph.D. degree. If,

however, a student admitted for the Ph.D. leaves the program prior to completion of the doctoral degree, he or she may be eligible to receive a terminal master's degree. He or she must have completed at least fifteen term courses in Russian literature and linguistics, chosen in consultation with the director of graduate studies. A grade of Honors in at least two term courses and an average of High Pass in the remaining courses must be attained. A reading knowledge of French or German is required, and candidates must pass departmental proficiency examinations in Russian.

More information is available on the department's Web site, http://slavic.yale.edu.

Courses

RUSS 607b[U], Topics in Russian Literature from Its Origins to the Eighteenth Century Harvey Goldblatt

Representative works, mostly selected from "old" Russian "bookish writing," but also from the "new" Russian literature of the seventeenth and first half of the eighteenth century, are examined against a broad comparative background to illustrate the development of various literary types and writing techniques. Special attention is devoted to diverse historiographic and methodological approaches; traditional and innovative theories of literary expression; and the connections between writing activity and ideological trends. T 9:25–11:15

[**RUSS 608a, Eighteenth-Century Russian Literature**]

RUSS 644b, Dostoevsky, Tolstoy, and the Novel Molly Brunson

An examination of the place of Dostoevsky and Tolstoy in the history and theory of the novel. Topics include modernity and the rise of the novelistic genre; narrative and description, time and space; novelistic form and discourse; psychological interiority and the elaboration of the self; the Realist novel, the *Bildungsroman,* and the epic; limits of novelistic representation. Alongside a selection of novels and contemporaneous critical and theoretical texts, we read the central works of twentieth-century novel theory by Bakhtin, Lukács, and others. TH 2:30–4:20

RUSS 671b/HSAR 671b, The Arts in Russia from Reform to Revolution Tim Barringer, Molly Brunson

During the second half of the long nineteenth century, Russia experienced an unprecedented flourishing of the arts, evolving rapidly from a country with a relatively young literary tradition and few cultural institutions to one that witnessed the likes of Tolstoy and Dostoevsky, the Mighty Five, the Peredvizhniki, and the Ballets Russes. Imperial Russian culture, and especially from the era of reform to the revolution (1855–1917), has served as the foundation for a national canon and a global artistic reputation, its legacy felt in the Russian avant-garde and official Soviet culture alike, and even in the recent recasting of a twenty-first-century national identity. This seminar considers Russian literature, visual arts, music, and drama in their social, historical, and political contexts, and also across a broad historical scope and alongside criticism with a range of disciplinary perspectives. Russia's conflicted position between East and West, as both part of and apart from Western culture, motivates a number of the course's driving questions. How does Russia's particular experience of modernity impact cultural forms and institutions,

and what distinguishes Russia's national manifestations of realism, modernism, and symbolism? How do the arts balance a commitment to pan-European culture with the often self-conscious project of developing a robust national tradition? How is Russian culture introduced to the West, and to what end? How do the various arts experience the transition from the *fin de siècle* to the Soviet period, and how is this transition represented in Soviet and Western historiography? What constitutes the legacy of "the Russians" in the twentieth century and today? Special attention is also given to questions of aesthetics, form, and genre, as well as to the uneven development and different roles of literature, long considered the dominant art in Russia, and the nonverbal arts. The course concludes with a study trip to Russia after the end of the term. Enrollment limited. Prerequisites: HSAR 221a/RUSS 220a and permission of the instructors. T 1:30–3:20

RUSS 690a, Avant-Gardes and Émigrés: Digital Humanities Lab Marijeta Bozovic
This highly collaborative experimental seminar open to graduate students and advanced undergraduates has two primary objectives: to familiarize students with the work of some of the most influential Russian artists, writers, and thinkers of the twentieth century; and to introduce students to new ways of conducting and presenting research, using digital tools. The flow of persons, texts, and ideas from the Soviet Union influenced the dynamics of American culture during the Cold War, through institutions, academic practices, theoretical approaches and methodologies, and cultural forums—from the Harvard Slavic Department to the *New Yorker.* In this course, we foreground the continuity of Russian formalism, structuralism, semiotics, and discourse theory with digital humanities work entering critical discussions today. We explore the close relationship between avant-garde aesthetics and formalist theory, and the dissemination and evolution of interpretive practices through emigration. How have these networks shaped our own education, training, tastes, and biases as scholars, as well as those of communities outside of academia? How do they shift over time? And how might all of the above be reimagined—indeed, how are they already being reshaped—in the digital age, given the technological, socioeconomic, and political present? The seminar frequently meets in the Beinecke archives and in the DH Lab in Sterling Library. All assignments for the course, including final written work, are designed to contribute to a collectively built course Web site. TTH 11:35–12:50

RUSS 696a/FILM 775a, Post-Stalin Literature and Film Katerina Clark
The main developments in Russian and Soviet literature and film from Stalin's death in 1953 to the present. W 1:30–3:20

RUSS 776a[U]/CPLT 841a[U], The Danube River in Literature and Film
Marijeta Bozovic
The Danube is Europe's second longest river: it flows through or borders ten countries, while its watershed covers four more. From ancient Rome to the present, the Danube has served both as a connector and a contested terrain: from its beginnings in the German Black Forest to the Romanian and Ukrainian shores of the Black Sea, the Danube flows through a region that has emerged black and blue from imperial aspirations of domination, hostilities in the wake of the Cold War, and civil war. The southeastern portion of the river constitutes Europe's Other—the "Barbaropa" within the continent's own

geographic boundaries—and faces the expansion of another super-political entity in the European Union. This seminar turns to the physical, historical, and metaphoric uses of the great river. At a time of tenuous unification in Europe, "Danube studies" seek to remap the region by focusing on the river's peoples and their cultural imaginaries and interactions from antiquity to the present, exposing the Danube as a quintessential site of cross-cultural engagement. We study the region's geography and history, engage theoretical paradigms for understanding cultural differences and their negotiation, draw on film theory and cultural studies, and examine transnational cinema, artwork and literary texts from various Danubian cultural traditions. Through a focus on works of creative and imaginative culture—primarily, on literature and film—the course foregrounds the aesthetic mediation of actual and possible communities, in search of utopian promise even amidst and in the wake of historical atrocities. TTH 2:30–3:45

[RUSS 834a, Aspects of Russian Grammar and Teaching Methodologies]

SLAV 754a[U], Old Church Slavonic Harvey Goldblatt
The study of OCS and its place in the history of Church Slavonic. The main features and the grammar of OCS. The Glagolitic and Cyrillic writing systems. Close readings from the "canon" of OCS literary monuments. OCS in relation to modern Slavic language (especially Russian). T 9:25–11:15

SLAV 805b, Topics in the Russian Literary Language from the Time of Troubles to the Post-Soviet Period Harvey Goldblatt
Examination of the different types of "Russian literary language" (RLL) employed, from the Time of Troubles at the beginning of the seventeenth century to the age of Vladimir Putin in the early twenty-first century. Particular attention is placed on the nexus between literary language and cultural history, the significance of interpretive traditions and fundamental language beliefs that conditioned the formation of the modern RLL, the links between literary codification and stylistic techniques, and the relations between RLL and other modern Slavic literary languages (especially Ukrainian and Belarusian). TH 9:25–11:15

SLAV 900, Directed Reading
By arrangement with faculty.

SOCIOLOGY

493 College Street, 203.432.3323
http://sociology.yale.edu
M.A., M.Phil., Ph.D.

Chair
Philip Smith

Director of Graduate Studies
Ron Eyerman

Professors Julia Adams, Jeffrey Alexander, Elijah Anderson (*on leave* [Sp]), Scott Boorman, Nicholas Christakis, Deborah Davis, Ron Eyerman, Philip Gorski, Philip Smith, Frederick Wherry

Associate Professors Rene Almeling (*on leave*), Emily Erikson (*on leave*), Andrew Papachristos, Jonathan Wyrtzen (*on leave*)

Assistant Professors Lloyd Grieger, Joscha Legewie

Fields of Study

Fields include comparative sociology/macrosociology; cultural and historical sociology; economic sociology; life course/social stratification; mathematical sociology; medical sociology; methodology (qualitative and quantitative approaches); networks; political sociology; race/gender/ethnic/minority relations; social change; social demography; social movements; theory (general, critical, hermeneutic); urban sociology.

Special Requirements for the Ph.D. Degree

Qualification for admission to candidacy for the Ph.D. will take place during the student's first three years of study at Yale. A student who has not been admitted to candidacy will not be permitted to register for the seventh term of study. To qualify for candidacy the student must take twelve seminars to be completed in years one and two, four required courses (SOCY 542a, 578a, 580a, 581b), and eight electives, including at least one workshop. After completion of courses, students prepare a research paper and one field exam and defend a dissertation prospectus.

Teaching is an important part of the professional preparation of graduate students in Sociology. Students teach therefore in the third and fourth years of study.

Combined Ph.D. Degree in Sociology and African American Studies

The Department of Sociology offers, in conjunction with the Department of African American Studies, a combined Ph.D. degree in Sociology and African American Studies.

Students accepted to the combined Ph.D. program must meet all of the requirements of the Ph.D. in Sociology with the exception that, excluding the courses required, a research paper, and a field exam, combined-degree students may substitute African American Studies courses for six of the twelve term courses required to qualify for the Ph.D. in Sociology. For further details see African American Studies.

Master's Degrees

M.Phil. See Degree Requirements under Policies and Regulations.

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/sociology.

Courses

[**SOCY 502a, Contemporary Sociological Theory: Durkheimian Sociology**]

[**SOCY 505a, Durkheim and the Durkheimian Tradition**]

SOCY 508b/PLSC 505b, Qualitative Field Research Jason Stearns
In this seminar we discuss and practice qualitative field research methods. The course covers the basic techniques for collecting, interpreting, and analyzing ethnographic data, with an emphasis on the core ethnographic techniques of participant observation and in-depth interviewing. All participants carry out a local research project. Open to undergraduates with permission of the instructor.

[**SOCY 509b^{U}/LAW 21020, Guns in the United States**]

[**SOCY 510a^{U}, Religious Nationalism**]

[**SOCY 511b^{U}, Social Interaction: Modeling the Emergence of Social Structure**]

[**SOCY 512a^{U}, Sociology of Islam**]

[**SOCY 515a^{U}, Urban Poverty and Policy**]

SOCY 519a, The Sociology of Pierre Bourdieu Philip Gorski
Pierre Bourdieu (1930–2002) was arguably the greatest sociologist since the classical generation of Max Weber and Emile Durkheim. This seminar provides an intensive and critical introduction to Bourdieu's work and to Bourdieusian research. Through an intensive and extensive reading of Bourdieu's own works, empirical applications of his approach by other scholars, and critical consideration of the approach from other viewpoints, students learn what distinguishes Bourdieu's approach from other classical and contemporary versions of sociology and social science; develop a firm and nuanced grasp of his trademark concepts ("habitus," "capital," and "field"); and observe how Bourdieu and others have applied them to the analysis of various social fields (class, gender, the state, politics, art and culture), and how his approach might be deepened. M 1:30–3:20

[**SOCY 520b, Revolutions in a Comparative Perspective**]

[**SOCY 523b/WGSS 623b, Sociology of Sex and Gender**]

[**SOCY 534a^{U}, Cultural Sociology**]

[**SOCY 536a, Fundamentals of Cultural Sociology**]

SOCY 542a, Sociological Theory Julia Adams
The course seeks to give students the conceptual tools for a constructive engagement with sociological theory and theorizing. We trace the genealogies of dominant theoretical approaches and explore the ways in which theorists contend with these approaches when confronting the central questions of both modernity and the discipline. M 3:30–5:20

[**SOCY 543b[U]/WGSS 629b, Demography, Gender, and Health**]

[**SOCY 545a[U], Sociology of Markets**]

[**SOCY 547a[U], Gender, Race, and Genetic Testing**]

[**SOCY 548b[U]/AFST 548b[U], Islamic Social Movements**]

[**SOCY 550a, A Secular Age?**]

SOCY 551b, Comparative and Historical Methods Philip Gorski
The course provides a hands-on introduction to the craft of comparative and historical analysis. Through a series of small-scale, individual, and group projects, students learn how to frame researchable problems, how to use comparisons to address them, how to work with different types of primary sources, how to transform them into "data," and how to manage this data. In order to create a substantive focus for the course, and to exploit the strengths of Yale's libraries and archives, the readings and assignments are centered on English history and historiography. The course is designed for graduate students in history and the social sciences but is also open to undergraduates with a strong interest in research. M 1:30–3:20

[**SOCY 552a[U]/LAW 20583, Punishment and Inequality**]

SOCY 554a/b, Research Topics on Human Nature and Social Networks Nicholas Christakis
This full-year seminar focuses on ongoing research projects in human nature, behavior genetics, social interactions, and social networks. TH 12:30–2

[**SOCY 555b[U], Social Dimensions of Medicine and Health**]

[**SOCY 557b, Political Sociology**]

[**SOCY 558b, Topics in Social Stratification**]

[**SOCY 559a[U]/AFST 582a[U], Comparative Nationalism in North Africa and the Middle East**]

SOCY 560a,b/PLSC 734a,b, Comparative Research Workshop Julia Adams, Philip Gorski
This weekly workshop is dedicated to group discussion of work-in-progress by visiting scholars, Yale graduate students, and in-house faculty from Sociology and affiliated disciplines. Papers are distributed a week ahead of time and also posted on the Web site of the Center for Comparative Research (http://ccr.yale.edu). Students who take the course for a letter grade are expected to present a paper-in-progress the term that they are enrolled for credit. T 11:50–1:20

[SOCY 561b[U], Civil Society in China]

[SOCY 562a, Topics in Cultural Sociology]

[SOCY 563b[U]/AFST 573b[U], Imperialism, Insurgency, and State Building in the Middle East and North Africa]

[SOCY 564a, Relationalism and Formalism in Contemporary Social Theory]

[SOCY 565, Advanced Seminar in Cultural Sociology]

[SOCY 567a, Postcolonial Social Theory]

SOCY 570b, Social Theory: Trauma and Memory Ron Eyerman
Exploration of sociological approaches to memory and trauma. A central theme is how cultural trauma has influenced the development of social theory, as well as literature and the arts generally. While aimed at graduate students in the social sciences and humanities, the seminar is open to advanced undergraduate students after consultation with the instructor. M 9:25–11:15

[SOCY 573b, Social Capital and Small Group Processes]

SOCY 576a[U], Civil Sphere and Democracy Jeffrey Alexander
In dialogue with normative and empirical approaches to civil society (Habermas, Putnam), this course introduces "civil sphere theory," starting from Alexander's *The Civil Sphere* (2006) and its critics. The sacred and profane binaries that animate the civil sphere are examined, as are such civil sphere organizations as polls, mass media, electoral systems, law and office. We read works about U.S. presidential elections, immigration and its controversies, the civil rights movements, the crisis of contemporary journalism, and recent controversies over church pedophilia, the financial system, and telephone hacking. We consider the challenge of deprovincializing civil sphere theory, looking at civil spheres in Latin America and East Asia. Regarding the possibility of a cosmopolitan or global civil society, we examine the struggle against apartheid in South Africa. T 3:30–5:20

SOCY 578a, Logic of Empirical Social Research Matthew Mahler
The seminar is an intensive introduction into the methodology of the social sciences. It covers such topics as concepts and indicators, propositions and theory, explanation and understanding, observation and measurement, methods of data collection, types of data, units of analysis and levels of variables, research design inference, description and causal modeling, verification and falsification. The course involves both the study of selected texts and the analysis and evaluation of recent research papers. TH 3:30–5:20

SOCY 580a[U], Introduction to Methods in Quantitative Sociology Lloyd Grieger
Introduction to methods in quantitative sociological research. Covers data description; graphical approaches; elementary probability theory; bivariate and multivariate linear regression; regression diagnostics. Includes hands-on data analysis using Stata. T 1:30–3:20, 1 HTBA

SOCY 581b, Intermediate Methods in Quantitative Sociology Joscha Legewie
Second part of a two-term introduction to statistical analysis for quantitative social science research. Covers review of linear regression; introduction to models for categorical

and count data, the analysis of time data, and longitudinal data; overview of missing data and weighting; and discussion of data that are complicated by issues of nonrandom design. Prerequisite: SOCY 580a. T 1:30–3:20

[**SOCY 582a, Statistics III: Advanced Quantitative Analysis for Social Scientists**]

[**SOCY 583b, Ethnography of the African American Community**]

SOCY 584a/AFAM 584a, Inequality, Race, and the City Elijah Anderson
Urban inequality in America. The racial iconography of the city is explored and represented, and the dominant cultural narrative of civic pluralism is considered. Topics of concern include urban poverty, race relations, ethnicity, class, privilege, education, social networks, social deviance, and crime. M 11:30–1:20

[**SOCY 585a, Sociology of the Life Course**]

[**SOCY 589b[U], Classical Social Theory: The Marx-Weber Debate**]

SOCY 591a[U], Sociology of the Arts and Popular Culture Ron Eyerman
An advanced introduction to sociological perspectives on the arts and popular culture. Emphasis on the conceptualization of culture within social theory, with the aim of interpreting cultural expressions and artifacts—artworks, music, television, film, and literature. W 1:30–3:20

SOCY 595a,b, Inequality and Life Course Workshop Lloyd Grieger, Andrew Papachristos
In this workshop we present and discuss ongoing research work, primarily but not exclusively quantitative analyses. In addition, we address theoretical and methodological issues in the areas of the life course (education, training, labor markets, aging, as well as family demography), social inequality (class structures, stratification, and social mobility), and related topics. TH 12–1:20

SOCY 597a,b, Special Topics in Sociology
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. When students register for the course online, the dropdown menu should be completed.

[**SOCY 602b[U], Poverty and Social Welfare Policy in the United States**]

[**SOCY 610b[U]/WGSS 745b[U], Race, Gender, and the African American Experience**]

[**SOCY 612b, Agency and Action**]

[**SOCY 614b, Sociology of the Family and Kinship**]

[**SOCY 616a, Urban Ethnography**]

SOCY 620a[U], Material Culture and the Iconic Consciousness Jeffrey Alexander
How and why do contemporary societies continue to symbolize sacred and profane meanings, investing these meanings with materiality and shaping them aesthetically? Initially exploring such "iconic consciousness" in theoretical terms (philosophy, sociology, semiotics), the course then takes up a series of compelling empirical studies about food and bodies, nature, fashion, celebrities, popular culture, art, architecture, branding, and politics. TH 2:30–4:20

SOCY 625a, Analysis of Social Structure Scott Boorman
Emphasizing analytically integrated viewpoints, the course develops a variety of major contemporary approaches to the study of social structure and social organization. Building in part on research viewpoints articulated by Kenneth J. Arrow in *The Limits of Organization* (1974), by János Kornai in an address at the Hungarian Academy of Sciences published in 1984, and by Harrison C. White in *Identity and Control* (2nd ed., 2008), four major species of social organization are identified as focal: (1) social networks, (2) competitive markets, (3) hierarchies/bureaucracy, and (4) collective choice/legislation. This lecture course uses mathematical and computational models — and comparisons of their scientific styles and contributions — as analytical vehicles in coordinated development of the four species. M 9:25–11:15

SOCY 628a,b, Workshop in Cultural Sociology Jeffrey Alexander, Philip Smith, Frederick Wherry [Sp]
This workshop is designed to be a continuous part of the graduate curriculum. Meeting weekly throughout both the fall and spring terms, it constitutes an ongoing, informal seminar to explore areas of mutual interest among students and faculty, both visiting and permanent. The core concern of the workshop is social meaning and its forms and processes of institutionalization. Meaning is approached as both structure and performance, drawing not only on the burgeoning area of cultural sociology but on the humanities, philosophy, and other social sciences. Discussions range widely among methodological, theoretical, empirical, and normative issues. Sessions alternate between presentations by students of their own work and by visitors. Contents of the workshop vary from term to term, and from year to year. Enrollment is open to auditors who fully participate and for credit to students who submit written work. F 11–1

[**SOCY 629b[U], Politics of Reproduction**]

[**SOCY 630a,b/AFAM 773a,b, Workshop in Urban Ethnography**]

[**SOCY 631a, Sociology of Work**]

[**SOCY 632b, Social Network Analysis**]

[**SOCY 636b/E&EB 636b, Biosocial Science**]

[**SOCY 647b, Social Processes**]

[**SOCY 653a, Workshop in Advanced Sociological Writing and Research**]

SOCY 656a, Professional Seminar Ron Eyerman
This required seminar aims at introducing incoming sociology graduate students to the department and the profession. Yale Sociology faculty members are invited to discuss their research. There are minimum requirements, such as writing a book review. No grades are given; students should take for Audit. Held biweekly. F 9:15–10:45

[**SOCY 658a, Qualitative Research Design**]

SPANISH AND PORTUGUESE

82-90 Wall Street, 203.432.5439, 203.432.1151
http://span-port.yale.edu
M.A., M.Phil., Ph.D.

Chair
Rolena Adorno

Director of Graduate Studies
Edward Kamens

Professors Rolena Adorno, Roberto González Echevarría, Aníbal González-Pérez, K. David Jackson, Noël Valis

Associate Professor Susan Byrne

Assistant Professor Leslie Harkema

Senior Lector Ame Cividanes

Fields of Study

Fields include Spanish Peninsular literature, Spanish American literature, Portuguese and Brazilian literatures.

The doctoral program offers: (1) a concentration in Spanish specializing in a single field of study (medieval, Renaissance/Golden Age, modern Spanish Peninsular, colonial Spanish American, contemporary Spanish American); (2) a joint concentration 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 Department of African American Studies 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, are required.

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, a grade of Honors in at least two of these courses each year, and a minimum grade average of High Pass. Course work includes two required courses, SPAN 500, History of the Spanish Language, and SPAN 790, Methodologies of Modern Language Teaching, and two courses taken outside the department. Also required are a reading knowledge of Latin

and a second language, as well as a third language-literature minor. In the third year, the student is expected to pass the qualifying examination (written and oral components) and submit and receive approval of the dissertation prospectus. Upon completion of all predissertation requirements, including the dissertation prospectus, students are admitted to candidacy for the Ph.D.

Participation in the department's teaching and pedagogy program is a degree requirement. It consists of taking the required course SPAN 790 in the second year and teaching one section per term of a course in the beginning language sequence during the third and fourth years of study. Viewed as an integral part of the course of study for the doctorate, this program includes supervision by the director of the language program and course directors.

Combined Ph.D. Programs

SPANISH AND PORTUGUESE AND AFRICAN AMERICAN STUDIES

The Department of Spanish and Portuguese also offers, in conjunction with the Department of African American Studies, 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 Degree Requirements under Policies and Regulations. Additionally, students in Spanish and Portuguese are eligible to pursue a supplemental M.Phil. degree in Medieval Studies. 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 991a, Tutorial
By arrangement with faculty.

PORT 991b, Tutorial
By arrangement with faculty.

[**SPAN 500, History of the Spanish Language**]

[**SPAN 790, Methodologies of Modern Language Teaching**]

SPAN 991a, Tutorial
By arrangement with faculty.

SPAN 991b, Tutorial
By arrangement with faculty.

STATISTICS

24 Hillhouse Avenue, 203.432.0666
http://statistics.yale.edu
M.A., Ph.D.

Chair
Harrison Zhou

Directors of Graduate Studies
John Emerson (24 Hlh, john.emerson@yale.edu)
David Pollard (24 Hlh, david.pollard@yale.edu)

Professors Donald Andrews (*Economics*), Andrew Barron, Joseph Chang, John Hartigan (*Emeritus*), Theodore Holford (*Public Health; Biostatistics*), Peter Phillips (*Economics*), David Pollard, Heping Zhang (*Public Health; Biostatistics; on leave* [Sp]), Hongyu Zhao (*Public Health; Biostatistics*), Harrison Zhou

Associate Professors John Emerson (*Adjunct*), Sekhar Tatikonda (*Electrical Engineering*)

Assistant Professors Jessi Cisewski, Sahand Negahban, Yihong Wu

Senior Lecturer Jonathan Reuning-Scherer

Lecturer Susan Wang

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, bioinformatics and genetics, classification, statistical computing, and graphical methods.

Special Admissions Requirements

GRE scores for the General Test and for the Subject Test in the area closest to the undergraduate major should accompany an application; for the Ph.D. program, the Math Subject Test is strongly recommended. 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. This requirement is waived only for applicants who, prior to matriculation at Yale, will have received a baccalaureate degree or its international equivalent with three years of residency from a college or university where English is the primary language of instruction.

Special Requirements for the Ph.D. Degree

There is no foreign language requirement. Students take at least twelve courses, usually during the first two years. The department strongly recommends that students take STAT 551 (Stochastic Processes), STAT 600 (Advanced Probability), STAT 610 (Statistical Inference), STAT 612 (Linear Models), STAT 625 (Case Studies), and STAT 661 (Data Analysis), and requires that students take STAT 626 (Practical Work). Substitutions are possible with the permission of the DGS. For further details, see the departmental Web site. 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 examinations are taken as scheduled by the department, 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. Students are expected to attend weekly departmental seminars.

Students normally serve as teaching fellows (at level 20 or the equivalent) during four terms to acquire professional training. Although this may be completed during the third and fourth years, some students elect to satisfy part of this requirement in the earlier years of study, with approval of the DGS and their adviser, in areas contributing to their professional development.

Master's Degree

M.A. (en route to the Ph.D.) This degree may be awarded upon completion of eight term courses in Statistics with an average grade of HP or higher, and two terms of residence.

Terminal 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 an approved program of eight term courses in Statistics with an average grade of HP or higher, chosen in consultation with the director of graduate studies (DGS). Full-time students must take a minimum of four courses per term. Part-time students are also accepted into the master's degree program. See Terminal M.A./M.S. Degrees, under Policies and Regulations.

Program information is available online at http://statistics.yale.edu.

Courses

STAT 500b[U], Introductory Statistics Jessi Cisewski
An introduction to statistical reasoning. Topics include numerical and graphical summaries of data, data acquisition and experimental design, probability, hypothesis testing, confidence intervals, correlation and regression. Application of statistical concepts to data; analysis of real-world problems. MWF 10:30–11:20

STAT 501–506, Introduction to Statistics Jonathan Reuning-Scherer
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 first seven weeks are attended by all students in STAT 501–506 together as general concepts and methods of statistics are developed. The course separates for the last six and a half weeks, 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]/E&EB 510a[U], Introduction to Statistics: Life Sciences Walter Jetz
Statistical and probabilistic analysis of biological problems, presented with a unified foundation in basic statistical theory. Problems are drawn from genetics, ecology, epidemiology, and bioinformatics. TTH 1–2:15

STAT 502a[U], Introduction to Statistics: Political Science Kelly Rader
Statistical analysis of politics, elections, and political psychology. Problems presented with reference to a wide array of examples: public opinion, campaign finance, racially motivated crime, and public policy. TTH 1–2:15

STAT 503a[U], Introduction to Statistics: Social Sciences Jonathan Reuning-Scherer
Descriptive and inferential statistics applied to analysis of data from the social sciences. Introduction of concepts and skills for understanding and conducting quantitative research. TTH 1–2:15

STAT 505a[U], Introduction to Statistics: Medicine Jonathan Reuning-Scherer
Statistical methods relied upon in medicine and medical research. Practice in reading medical literature competently and critically, as well as practical experience performing statistical analysis of medical data. TTH 1–2:15

[**STAT 506a[U], Introduction to Statistics: Data Analysis**]

STAT 530a,b[U], Introductory Data Analysis John Emerson [F], Susan Wang [Sp]
Survey of statistical methods: plots, transformations, regression, analysis of variance, clustering, principal components, contingency tables, and time series analysis. The R computing language and Web data sources are used. Prerequisite: STAT 500b or 501a or the equivalent, or permission of the instructor.

STAT 538a[U], Probability and Statistics Joseph Chang, Susan Wang
Fundamental principles and techniques of probabilistic thinking, statistical modeling, and data analysis. Essentials of probability: conditional probability, random variables, distributions, law of large numbers, central limit theorem, Markov chains. Statistical inference with emphasis on the Bayesian approach: parameter estimation, likelihood, prior and posterior distributions, Bayesian inference using Markov chain Monte Carlo. Introduction to regression and linear models. Computers are used throughout for calculations, simulations, and analysis of data. Prerequisite: differential calculus of several variables; some acquaintance with matrix algebra and computing is assumed. TTH 1–2:15

STAT 541a[U], Probability Theory Yihong Wu
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. Prerequisite: calculus of functions of several variables. MWF 9:25–10:15

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. Prerequisite: STAT 541a. MWF 9:25–10:15

STAT 551b[U], Stochastic Processes Sahand Negahban
Introduction to the study of random processes, including Markov chains, Markov random fields, martingales, random walks, Brownian motion, and diffusions. Techniques in probability such as coupling and large deviations. Applications chosen from image reconstruction, Bayesian statistics, finance, probabilistic analysis of algorithms, genetics, and evolution. MW 1–2:15

STAT 600b[U], Advanced Probability David Pollard
Measure theoretic probability, conditioning, laws of large numbers, convergence in distribution, characteristic functions, central limit theorems, martingales. Some knowledge of real analysis is assumed. TTH 2:30–3:45

STAT 610a, Statistical Inference Harrison Zhou
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. Knowledge of probability theory at the level of STAT 541a is assumed. TTH 10:30–11:45

STAT 611b, Decision Theory Harrison Zhou
A detailed study of some topics in statistical decision theory, including admissibility and minimaxity; the James-Stein estimator; Stein's unbiased estimator of risk; empirical Bayes estimators; hierarchical Bayes methods and random effects; complete class theorems; asymptotic minimaxity for nonparametric estimation; sparsity models. Prerequisite: STAT 610a. M 10–12:30

STAT 612a[U], Linear Models David Pollard
The geometry of least squares; distribution theory for normal errors; regression, analysis of variance, and designed experiments; numerical algorithms (with particular reference to the R statistical language); alternatives to least squares. Prerequisites: linear algebra and some acquaintance with statistics. MW 11:35–12:50

STAT 625a, Case Studies John Emerson, Susan Wang
Statistical analysis of a variety of statistical problems using real data. Emphasis on methods of choosing data, acquiring data, assessing data quality, and the issues posed by extremely large data sets. Extensive computations using R.

STAT 626b, Practical Work John Emerson
Individual one-term projects, with students working on studies outside the department, under the guidance of a statistician.

STAT 627a and b, Statistical Consulting John Emerson
Statistical consulting and collaborative research projects often require statisticians to explore new topics outside their area of expertise. This course exposes students to real problems, requiring them to draw on their expertise in probability, statistics, and data analysis. Students complete the course with individual projects supervised jointly by faculty outside the department and by one of the instructors. Students enroll for both terms and receive one credit at the end of the year. F 2:30–4:30

STAT 645b/BIS 692b/CB&B 645b, Statistical Methods in Genetics and Bioinformatics Hongyu Zhao
Introduction to problems, algorithms, and data analysis approaches in computational biology and bioinformatics; stochastic modeling and statistical methods applied to problems such as mapping disease-associated genes, analyzing gene expression microarray data, sequence alignment, and SNP analysis. Statistical methods include maximum likelihood, EM, Bayesian inference, Markov chain Monte Carlo, and some methods of classification and clustering; models include hidden Markov models, Bayesian networks, and the coalescent. The limitations of current models, and the future opportunities for model building, are critically addressed. Prerequisite: STAT 538a, 542b, or 661a. Prior knowledge of biology is not required, but some interest in the subject and a willingness to carry out calculations using R is assumed. TH 1–2:50

STAT 660b[U], Multivariate Statistical Methods for the Social Sciences Jonathan Reuning-Scherer
An introduction to the analysis of multivariate data. Topics include principal components analysis, factor analysis, cluster analysis (hierarchical clustering, k-means), discriminant analysis, multidimensional scaling, and structural equations modeling. Emphasis is placed on practical application of multivariate techniques to a variety of examples in the social sciences. Students complete extensive computer work using either SAS or SPSS. Prerequisites: knowledge of basic inferential procedures, experience with linear models (regression and ANOVA). Experience with some statistical package and/or familiarity with matrix notation is helpful but not required. Requirements: regular assignments and a final project. TTH 1–2:15

STAT 661b[U], Data Analysis Jessi Cisewski
By analyzing data sets using the R 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. Prerequisite: after or concurrent with STAT 542b.

STAT 662b, Statistical Computing John Emerson
Topics in the practice of data analysis and statistical computing, with particular attention to problems involving massive data sets or large, complex simulations and computations. Programming with R, C/C++, and Perl/Python, computational efficiency, memory management, interactive and dynamic graphics, and parallel computing.

STAT 664b^{U}/ENAS 954b^{U}, Information Theory Yihong Wu
Foundations of information theory in communications, statistical inference, statistical mechanics, probability, and algorithmic complexity. Quantities of information and their properties: entropy, conditional entropy, divergence, redundancy, mutual information, channel capacity. Basic theorems of data compression, data summarization, and channel coding. Applications in statistics. TTH 9–10:15

STAT 665b^{U}, Data Mining and Machine Learning Sahand Negahban
Techniques for data mining and machine learning are covered from both a statistical and a computational perspective, including support vector machines, bagging, boosting, neural networks, and other nonlinear and nonparametric regression methods. The course gives the basic ideas and intuition behind these methods, a more formal understanding of how and why they work, and opportunities to experiment with machine-learning algorithms and apply them to data. Prerequisite: after or concurrent with STAT 542b. MW 2:30–3:45

STAT 667a/AMTH 605a/ENAS 503a, Probabilistic Networks, Algorithms, and Applications Sekhar Tatikonda
This course examines probabilistic and computational methods for the statistical modeling of complex data. The emphasis is on the unifying framework provided by graphical models, a formalism that merges aspects of graph theory and probability theory. Graphical models: Markov random fields, Bayesian networks, and factor graphs. Algorithms: filtering, smoothing, belief-propagation, sum-product, and junction tree. Variational techniques: mean-field and convex relaxations. Markov processes on graphs: MCMC, factored HMMs, and Glauber dynamics. Some statistical physics techniques: cavity and replica methods. Applications to error-correcting codes, computer vision, bio-informatics, and combinatorial optimization.

STAT 674b/F&ES 781b, Applied Spatial Statistics Jonathan Reuning-Scherer
An introduction to spatial statistical techniques with computer applications. Topics include modeling spatially correlated data, quantifying spatial association and autocorrelation, interpolation methods, variograms, kriging, and spatial point patterns. Examples are drawn from ecology, sociology, public health, and subjects proposed by students. Four to five lab/homework assignments and a final project. The class makes extensive use of the R programming language as well as ArcGIS.

[**STAT 679a, High-Dimensional Statistical Estimation**]

[**STAT 680a, Nonparametric Statistics**]

[**STAT 682a, High-Dimensional Function Estimation**]

STAT 690a or b, Independent Study
By arrangement with faculty. Approval of DGS required.

Non-Degree-Granting Programs, Councils, and Research Institutes

ATMOSPHERIC SCIENCE

Advisory Committee Sarbani Basu (*Astronomy*), Michelle Bell (*Forestry & Environmental Studies*), William Boos (*Geology & Geophysics*), Alexey Fedorov (*Geology & Geophysics*), Debra Fischer (*Astronomy*), Gary Haller (*Emeritus, Chemical & Environmental Engineering*), Xuhui Lee (*Forestry & Environmental Studies*), Mark Pagani (*Geology & Geophysics*), Ronald Smith (*Geology & Geophysics*), Mitchell Smooke (*Mechanical Engineering & Materials Science; Applied Physics*), Trude Storelvmo (*Geology & Geophysics*), Mary-Louise Timmermans (*Geology & Geophysics*), John Wettlaufer (*Applied Mathematics; Geology & Geophysics; Physics*)

A number of departments of the Graduate School offer courses dealing with the physics, dynamics, and chemistry of the atmosphere, and the interactions of the atmosphere with the biosphere, oceans, and cryosphere, including all biogeochemical cycles. The mathematical and physical science basis for these phenomena is developed in course work and research foci across a range of departments. 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, computational fluid dynamics, 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, with allied methods and approaches in the Program on Applied Mathematics. The departments of Applied Physics, Public Health, and Engineering & Applied Science (which includes the programs of Biomedical Engineering, Chemical & Environmental Engineering, Electrical Engineering, and Mechanical Engineering & Materials Science) 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 bulletin).

COMBINED PROGRAM IN THE BIOLOGICAL AND BIOMEDICAL SCIENCES (BBS)

Sterling Hall of Medicine L-203A, 203.785.5663
http://bbs.yale.edu

Director
Anthony Koleske

Fields of Study

The Yale Combined Program in the Biological and Biomedical Sciences (BBS) offers unprecedented access to Yale's extensive array of bioscience resources, encompassing everything the University has to offer in one comprehensive, interdisciplinary graduate program. BBS has no boundaries, either departmental or geographical. Students therefore have access to courses, seminars, and faculty labs in every department. Moreover, students can participate in research activities anywhere – on the main University campus, West Campus, or the School of Medicine.

Within BBS there are approximately 350 participating faculty, several dozen courses, and a great many seminars from which to choose. BBS is currently divided into eight interest-based "tracks":

Biochemistry, Biophysics, and Structural Biology
Computational Biology and Bioinformatics
Immunology
Microbiology
Molecular Cell Biology, Genetics, and Development
Molecular Medicine, Pharmacology, and Physiology
Neuroscience
Plant Molecular Biology

Students apply to and, upon matriculation, affiliate with one of these eight tracks. It is important to note that, regardless of a student's home track, all courses, faculty, and research opportunities at the University remain available.

Year 1 Each track has a faculty director who helps first-year students select courses and find suitable lab rotations. Students typically take two to three courses per term and conduct two to four lab rotations over the course of the year.

Year 2 Just prior to the start of the second year, students select a thesis adviser in whose lab they will conduct their doctoral research. They also then leave their BBS track and formally join one of twelve Ph.D.-granting programs:

Cell Biology
Cellular and Molecular Physiology
Computational Biology and Bioinformatics
Experimental Pathology
Genetics
Immunobiology

Interdepartmental Neuroscience Program
Microbiology
Molecular Biophysics and Biochemistry
Molecular, Cellular, and Developmental Biology
Neuroscience
Pharmacology

Students in year 2 complete the course requirements for the graduate program they have joined, take a qualifying exam, act as teaching assistants in lecture or lab courses, and begin thesis research.

Year 3 and beyond Students focus primarily on thesis research, publishing their results, and presenting their work at scientific meetings.

The average time to degree is 5.5 years.

For the duration of their studies all students receive a stipend, full tuition, and health coverage. Financial support comes from university fellowships, National Institutes of Health (NIH) training grants, and grants from foundations and companies.

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.

BIOCHEMISTRY, BIOPHYSICS, AND STRUCTURAL BIOLOGY

All applicants are expected to meet general BBS requirements for entrance. Successful applicants will have a firm foundation in the sciences. Desirable courses include biology; biochemistry; general, organic, and physical chemistry; physics; and math. A pertinent GRE Subject Test is strongly recommended.

COMPUTATIONAL BIOLOGY AND BIOINFORMATICS

All applicants are expected to meet general BBS requirements for entrance. In addition, successful applicants will have a strong foundation in the basic sciences such as biology, chemistry, and mathematics. Training in computing/informatics is also essential and should include significant computer programming experience. The GRE Subject Test in cellular and molecular biology, biology, biochemistry, chemistry, computer science, or other relevant discipline is recommended. The MCAT is also accepted.

IMMUNOLOGY

All applicants are expected to meet general BBS requirements for entrance. In addition, successful applicants are expected to have a firm foundation in the biological and physical sciences. It is preferred that students have taken courses in biology, organic chemistry, biochemistry, genetics, cell biology, physics, and mathematics. Actual course requirements are not fixed, however, and students with outstanding records in any area

of the biological sciences may qualify for admission. There are no specific grade requirements for prior course work, but a strong performance in basic science courses is of great importance for admission. In special cases the Medical College Admission Test (MCAT) may be substituted.

MICROBIOLOGY

No additional requirements or recommendations.

MOLECULAR CELL BIOLOGY, GENETICS, AND DEVELOPMENT

In addition to general BBS requirements, the GRE Subject Test in Biochemistry, Cell and Molecular Biology, Biology, or Chemistry is recommended.

MOLECULAR MEDICINE, PHARMACOLOGY, AND PHYSIOLOGY

All applicants are expected to meet general BBS requirements for entrance. Successful applicants should have a strong background in the biological, chemical, and/or physical sciences. For example, an undergraduate major/degree in biology, biochemistry, physiology, genetics, chemistry, physics, mathematics, engineering, or computer science could be appropriate. Courses in biology, biochemistry, organic and physical chemistry, and mathematics through elementary calculus are strongly recommended.

NEUROSCIENCE

All applicants are expected to meet general BBS requirements for entrance. Successful applicants will have a firm foundation in the sciences. The Neuroscience track will accept the Medical College Admission Test (MCAT) in lieu of the Graduate Record Examination (GRE) General Test.

PLANT MOLECULAR BIOLOGY

All applicants are expected to meet general BBS requirements for entrance.

Integrated Graduate Program in Physical and Engineering Biology (PEB)

Students applying to the Computational Biology and Bioinformatics track, the Molecular Cell Biology, Genetics, and Development track, the Neuroscience track, or the Biochemistry, Biophysics, and Structural Biology track of the BBS program may also apply to be part of the PEB program. See the description under Non-Degree-Granting Programs, Councils, and Research Institutes for course requirements, and http://peb.yale.edu for more information about the benefits of this program and application instructions.

Medical Research Scholars Program (MRSP)

The Medical Research Scholars Program bridges barriers between traditional predoctoral and medical training by providing both medically oriented course work and a mentored clinical experience to select BBS students. The course work provides a grounding in biomedicine, and the clinical experience enables students to interact with patients to learn firsthand about disease symptoms, treatment options, and the limitations of current therapies. This combination of medical knowledge and face-to-face interaction with

patients and their doctors provides a new perspective to Ph.D. students and enhances the training in basic science already provided within the BBS program. Upon completion of their training, MRSP graduates will be capable of working much more closely with physicians and physician-scientists and will be better prepared to conduct clinically relevant basic research.

The MRSP is open only to students who have already been accepted into the BBS program, and a separate application is required. Five or six incoming students are admitted into the program each year. They remain in their BBS tracks but will participate in the additional MRSP curriculum. For more information see http://bbs.yale.edu/training/nihprograms/mrsp.aspx.

Program materials are available upon request to Bonnie Ellis, Assistant Administrative Director, BBS Program, Yale University, PO Box 208084, New Haven CT 06520-8084; telephone 203.785.5663; fax 203.785.3734; e-mail, bbs@yale.edu; Web site, http://bbs.yale.edu.

Courses

B&BS 503b, RCR Refresher for Senior BBS Students Anthony Koleske
This course meets the NIH requirement that students receive training in the responsible conduct of research at least every four years. The course has two components: (1) one large-group session is held for all fourth-year BBS students; the main topics are scientific misconduct and authorship; and (2) each Ph.D. program will subsequently host one or two additional sessions just for fourth-year students in its program. Attendance is taken, and students who attend both components of the course receive a grade of Satisfactory. The course is graded Satisfactory/Unsatisfactory.

B&BS 640a/PATH 640a, Developing and Writing a Scientific Research Proposal
Katerina Politi, Nicole Calabro
The course covers the intricacies of scientific writing and guides students in the development of a scientific research proposal on the topic of their research. All elements of an NIH fellowship application are covered, and eligible students submit their applications for funding. Enrollment limited to fifteen. T 2–4

B&BS 681a/PATH 681a, Advanced Topics in Cancer Biology Qin Yan
This advanced course focuses on readings and discussion on three or four major topics in cancer biology, such as targeted therapy, tumor immunology, tumor metabolism, and genomic evolution of cancer. For each topic, the class starts with an interactive lecture, followed by critical analysis of primary research literature. Recent research articles are assigned, and a student leads discussions with input from faculty who are experts in the topic area. Prerequisite: PATH 650b or permission of the instructor. Open to all Ph.D., M.D./Ph.D., and M.P.H. students and to advanced undergraduates at the discretion of the instructor. F 2–4

THE COWLES FOUNDATION

30 Hillhouse Avenue, 203.432.3702
http://cowles.econ.yale.edu

Director
Larry Samuelson

The Cowles Foundation for Research in Economics at Yale University has as its purpose the conduct and encouragement of research in economics. The Cowles Foundation seeks to foster the development and application of rigorous logical, mathematical, and statistical methods of analysis. Members of the Cowles research staff are faculty members with appointments and teaching responsibilities in the Department of Economics and other departments. Among its activities, the Cowles Foundation provides financial support for research, visiting faculty, postdoctoral fellowships, workshops, and graduate students. Cowles regularly sponsors conferences and publishes a working paper series and research monographs.

THE ECONOMIC GROWTH CENTER

27 Hillhouse Avenue, 203.432.3610
www.econ.yale.edu/~egcenter

Director
Mark Rosenzweig

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, economic growth and development. The research program emphasizes the search for regularities in the process of growth and changes in economic structure. In recent years the center has also undertaken new and continuing long-term panel studies and is carrying out randomized field experiments in a number of countries to provide new information on and analyses of the consequences and mechanisms of development. An increasing share of the research involves historical analysis of long-term processes as part of the Economic History Program that is housed in the Economic Growth Center. Current projects in the center include research on technology adoption; microfinance and credit markets; formal insurance; household consumption; investment and demographic behavior; the role of networks; agricultural research and productivity growth; labor markets and the returns to education of women and men; entrepreneurship; income distribution; domestic and international migration; the relationship between trade and development; and international political economy. The center's research faculty hold appointments in the Department of Economics and other departments and schools at Yale, and accordingly have teaching as well as research responsibilities.

The center sponsors a number of activities, including a regular series of workshops on development, trade, and economic history, and provides competitive research grants to graduate students and faculty as well as graduate student fellowships.

The Economic Growth Center Collection, housed in a separate facility at the Center for Science and Social Science Information, is a special collection focused on the statistical, economic, and planning documents of developing countries, including government documents.

The center administers, jointly with the Department of Economics, the Yale master's degree training program in International and Development Economics.

GRADUATE SCHOOL OF ARTS AND SCIENCES (GSAS) SUMMER PROGRAMS

http://gsas.yale.edu

Dean
Lynn Cooley

The Graduate School offers two courses, GSAS 901c and GSAS 902c, to support summer training through practical internships. For the summer of 2017, students will register for these courses as part of the internship approval process and not through the typical online or paper registration processes.

Courses

GSAS 901c, Pre-candidacy Applied Research Experience Richard Sleight
The purpose of this course is to provide students with the opportunity of gaining practical experience in research. This experience provides a basis for developing a dissertation thesis prospectus that addresses significant research questions. Students work with a faculty mentor to select a suitable placement for the summer internship. A one-page description of the student's research plan will be submitted to the DGS at least three weeks prior to starting the program, for approval within two weeks. Upon completion of the internship, a written report of the work must be submitted to the DGS no later than October 1. Prerequisites: completion of one year of the Ph.D. or M.S. program; and approval of the DGS. 1 credit; graded Satisfactory/Unsatisfactory.

GSAS 902c, Post-candidacy Applied Research Experience Richard Sleight
The purpose of this course is to provide students with the opportunity to perform dissertation research or to gain practical experience using the methodology or results of their dissertation research. Students work with a faculty mentor to select a suitable placement for the summer internship. A one-page description of the student's research plan will be submitted to the student's dissertation adviser and DGS at least three weeks prior to starting the program, for approval within two weeks. Upon completion of the internship, a written report of the work must be submitted to the adviser and DGS no later than October 1. Prerequisites: completion of one year of the Ph.D. program and admission to candidacy; and approval of the dissertation adviser and DGS. 1 credit; graded Satisfactory/Unsatisfactory.

INSTITUTION FOR SOCIAL AND POLICY STUDIES

77 Prospect Street, 203.432.3234
http://isps.yale.edu

Director
Jacob Hacker

Executive Committee Nicholas Christakis, John Dovidio, Heather Gerken, James Levinsohn, Ian Shapiro, Jody Sindelar, Ebonya Washington

The Institution for Social and Policy Studies (ISPS) facilitates interdisciplinary social science inquiry on important public policy subjects in order to advance research, shape policy, and educate the next generation of policy thinkers and leaders.

Recognizing that important social problems cannot be studied adequately by a single discipline, the Yale Corporation established ISPS in 1968 to stimulate interdisciplinary collaboration within the University, both across the social sciences and between the social sciences and other disciplines. Today, ISPS hosts a number of major programs, including the Center for the Study of American Politics, the Center for the Study of Inequality, and ISPS Health—a University-wide health policy center. ISPS also supports the Program in Ethics, Politics, and Economics and the Yale Interdisciplinary Center for Bioethics. Through these and other programs, ISPS sponsors high-level conferences, interdisciplinary faculty seminars, targeted research projects on key policy issues, graduate and undergraduate fellowship programs, and postdoctoral appointments.

As the hub for problem-oriented interdisciplinary research at Yale, ISPS provides intellectual leadership in the social sciences; fosters sound and creative research on public policies of local, state, and national significance; and informs both teaching at Yale and academic and public debates beyond Yale.

INTERNATIONAL SECURITY STUDIES

31 Hillhouse Avenue, 203.432.6242
http://iss.yale.edu

Director
Paul Kennedy

International Security Studies (ISS) at Yale was founded in 1988 and is supported by the Smith Richardson Foundation and the Friends of ISS. The Brady-Johnson Program in Grand Strategy, directed by Elizabeth Bradley, works closely with ISS.

Although ISS is not a degree-granting program, its faculty members, fellows, and affiliates write and teach about numerous aspects of international history and world affairs. Their interests range from high politics and economic change to cultural transfer and nongovernmental activism. ISS strives to understand the genealogy of the present through diverse historical and methodological approaches, and to develop and apply holistic insights into the most pressing concerns of global life.

ISS organizes an array of extracurricular activities each academic year. It hosts lectures, dinner debates, conferences, colloquia, and discussion groups. In addition to hosting a running graduate and faculty forum on the historical roots of contemporary issues, ISS provides competitive summer grants to support language training and archival research for Yale students. Postdoctoral fellowships and predoctoral fellowships are available to scholars from other universities. ISS also provides academic fellowships and visiting affiliations to serving members of the U.S. Armed Forces.

Inquiries should be directed to iss@yale.edu or to International Security Studies, Yale University, PO Box 208353, New Haven CT 06520-8353. Further information on ISS can be found at http://iss.yale.edu.

JACKSON INSTITUTE FOR GLOBAL AFFAIRS

Horchow Hall, 203.432.6253
http://jackson.yale.edu

Director
James Levinsohn (*Global Affairs; School of Management*)

Faculty
For faculty listings, see the section on Global Affairs under Degree-Granting Departments and Programs in this bulletin.

The Jackson Institute for Global Affairs promotes education and scholarship on global affairs at Yale. The institute serves the entire University through courses and core teaching programs in global affairs, career counseling, and public lectures. The institute's mission is to inspire and prepare Yale students for global leadership and service.

Jackson's academic programs are interdisciplinary, embedded in Yale, and designed to help students gain a comprehensive understanding of global affairs. Jackson Institute faculty study, teach, and research global affairs across disciplines ranging from diplomacy to public health and from international finance to law. For a full list of faculty affiliated with Jackson, see http://jackson.yale.edu/faculty.

Each year the Jackson Institute hosts Senior Fellows, leading practitioners in government, business, international organizations, the NGO community, and other global affairs fields. Senior Fellows spend a term or full academic year at Yale, teaching classes and mentoring students. For a full list of Senior Fellows, see http://jackson.yale.edu/senior-fellows.

Jackson's Career Services Office provides career counseling services to all Yale students interested in careers in public service and other areas of international affairs.

As of 2015, the Jackson Institute is also home to Yale's World Fellows program and the Global Health Initiative.

For more information, visit http://jackson.yale.edu, e-mail jackson.institute@yale.edu, or call 203.432.6253.

JUDAIC STUDIES

451 College Street, 203.432.0843
http://judaicstudies.yale.edu

Chair and Director of Graduate Studies
Steven Fraade

Professors Joel Baden (*Divinity*), Edward Breuer (*Visiting, Religious Studies*), Marc Caplan (*Visiting, German*), John J. Collins (*Divinity; Religious Studies*), Steven Fraade (*Religious Studies*), Paul Franks (*Philosophy*), Christine Hayes (*Religious Studies*), Hannan Hever (*Comparative Literature*), Jeffrey Macy (*Visiting, Humanities*), Ivan Marcus (*History; Religious Studies*), Paul North (*German*), Maurice Samuels (*French*), David Sorkin (*History*), Francesca Trivellato (*History; on leave*), Laura Wexler (*Women's, Gender & Sexuality Studies; American Studies*), Robert Wilson (*Divinity; Religious Studies; on leave* [F])

Associate Professor Eliyahu Stern (*Religious Studies; History*)

Senior Research Scholar Margaret Olin (*Divinity; History of Art; Religious Studies*)

Senior Lecturer Peter Cole (*Comparative Literature*)

Lecturers Asaf Angermann (*Philosophy*), Noah Bickart, Shaun Halper (*History*), Liran Yadgar (*History*)

Senior Lector II Shiri Goren (*Near Eastern Languages & Civilizations*)

Senior Lector I Dina Roginsky (*Near Eastern Languages & Civilizations*)

Judaic Studies offers an interdisciplinary approach to the critical study of the culture, history, languages, literature, religion, and thought of the Jews. Jewish institutions, philosophies, societies, and texts are studied critically and in comparative historical perspective in relation to the surrounding societies and cultures.

Graduate-level programs are available through the following departments: Comparative Literature (Hebrew and Comparative Literature), History (Ancient, Medieval, and Modern Jewish History), Religious Studies (History and Literature of Ancient Judaism, Medieval and Modern Jewish History, Philosophy of Religion), Near Eastern Languages and Civilizations (Northwest Semitic, Hebrew Language and Literature), and Philosophy. 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.

Additional information is available on request to the director of graduate studies of the department of intended specialization, or to the Chair, Program of Judaic Studies, Yale University, PO Box 208282, New Haven CT 06520-8282, and at http://judaicstudies.yale.edu.

Courses

JDST 653b/ANTH 531b/ARCG 531b/CLSS 815b/CPLT 547b/HIST 502b/NELC 533b/RLST 803b, Fakes, Forgeries, and the Making of Antiquity Eckart Frahm, Irene Peirano Garrison

A comparative exploration of notions of forgery and authenticity in the ancient and premodern world, in a variety of civilizations (ancient Greece, Mesopotamia, Egypt, Israel, China, India, etc.) and different political, religious, literary, and artistic contexts. Emphasis is also placed on the pivotal role played by the "authentic" in the modern era in disciplines such as philology and aesthetics, the manipulative uses of ancient history for purposes of modern nation building and identity formation, copies and reconstructions of ancient artifacts, and the role of forgeries in today's antiquities trade. TH 2:30–4:30

JDST 678b[U]/AFAM 660b[U]/AFST 678b[U]/CPLT 678b[U]/ENGL 938b[U], The Literatures of Blacks and Jews in the Twentieth Century Marc Kaplan

This seminar compares representative writings by African, Caribbean, and African American authors of the past one hundred years, together with European, American, and South African Jewish authors writing in Yiddish, Hebrew, French, and English. This comparison examines the paradoxically central role played by minority, "marginal" groups in the creation of modern literature and the articulation of the modern experience. TH 1:30–3:20

JDST 682a[U]/RLST 647a[U], Medieval and Modern Jewish Biblical Commentaries Edward Breuer

This seminar surveys the classics of medieval and modern Jewish biblical commentaries, from the eleventh to the nineteenth century. The study of biblical commentaries, like the broader study of scriptural interpretation, offers a rich and expansive view of Jewish intellectual history. Using Hebrew sources (English translations are provided when available), we explore the diverging approaches to the Pentateuch in light of the different intellectual and cultural contexts in which Jewish scholarship thrived. We raise issues such as the impact of Arabic learning, attitudes toward rabbinic tradition, the rise of rationalism and mysticism, and the multiple challenges of modernity. TH 1:30–3:20

JDST 701a[U]/RLST 763a, The Bible Christine Hayes

This course introduces students to the writings common to both Jewish and Christian scripture (the twenty-four books of the Hebrew Bible or Tanakh found in all Bibles) and examines these writings as diverse and often conflicting expressions of the religious life and thought of ancient Israel as well as a foundational element of Western civilization. Special emphasis on the writings' cultural and historical setting in the ancient Near East; close reading of selected passages; the interpretive history of selected passages influential in Western culture. Students are also introduced to a wide range of critical and literary approaches to biblical studies, including source criticism, tradition criticism, redaction criticism, and contemporary literary criticism. Students view course lectures, which survey the entire Bible, online; class time focuses on comparative materials, close readings, and the interpretation of specific biblical passages in Jewish and Christian culture. MW 11:35–12:50

JDST 721b[U]/NELC 703b[U]/RLST 751b[U], Introduction to Judaism in the Ancient World: From Temple to Talmud Steven Fraade

The emergence of classical Judaism in its historical setting. Jews and Hellenization; varieties of early Judaism; apocalyptic and postapocalyptic responses to suffering and catastrophe; worship and atonement without sacrificial cult; interpretations of scriptures; law and life; the rabbi; the synagogue; faith in reason; Sabbath and festivals; history and its redemption. MW 11:35–12:50

JDST 725b[U]/NELC 704b[U]/RLST 757b[U], The Dead Sea Scrolls and the History of Ancient Judaism: The Damascus Document Steven Fraade

Study of one of the most important of the Dead Sea Scrolls, the Damascus Document. Attention to its place in the history of biblical interpretation and ancient Jewish law; the nature and rhetorical function of its textual practices, both narrative and legal; and its ideological formulations, literary history, and relation to the central sectarian writings of the Qumran community. Prerequisite: reading fluency in ancient Hebrew. TH 9:25–11:15

JDST 727a[U]/NELC 702a[U]/RLST 752a[U], Mishnah Seminar: Tractate Ta'anit on Fasting Steven Fraade

Close study of a section of the Mishnah, the earliest digest of Jewish law, treating procedures for public fasts in response to drought and other forms of collective adversity. Particular attention to the textual practices of rabbinic legal discourse in relation to its social function, and to the interplay of law and narrative. Prerequisite: reading fluency in ancient Hebrew. W 9:25–11:15

JDST 730a[U]/RLST 821a[U], Law and Narrative, Gender and Sexuality in the Talmud Noah Bickart

For rabbis in the late antique settings of the eastern Roman empire and Sassanian Babylonia, the marriage ceremony was not a single ritual. Rather, marriages had two phases: the first, called *Kiddushin* (lit. betrothals), was a ceremony during which a man ritually set his bride-to-be apart from all other potential suitors. Approximately one year later, the couple had a second ceremony, called *Nissuin* (lit. nuptuals), after which they began life together as a married couple. M 3:30–5:20

JDST 734b/RLST 740b, Rabbinic Texts Christine Hayes

A close study of classical rabbinic sources with attention to questions of both form and content, critical methods, and cultural and historical context. Designed for doctoral students in Ancient Judaism. Prerequisite: ability to read Talmudic texts in the original languages. T 2:30–4:30

JDST 736a[U]/NELC 701a[U]/RLST 746a[U], Midrash Seminar: The Revelation at Sinai Steven Fraade

The giving of the Torah to Israel as seen through rabbinic eyes. Close readings of midrashic texts. Views of revelation, tradition, interpretation, law, and commandment in their literary and historical contexts. Interpretations and interpretive strategies compared and contrasted with those of other ancient biblical exegetes (Jewish and non-Jewish). Prerequisite: reading fluency in ancient Hebrew. TH 9:25–11:15

JDST 761a[U]/HIST 596a[U]/RLST 773a[U], Jewish History and Thought to Early Modern Times Ivan Marcus
A broad introduction to the history of the Jews from biblical beginnings until the European Reformation and the Ottoman Empire. Focus on the formative period of classical rabbinic Judaism and on the symbiotic relationships among Jews, Christians, and Muslims. Jewish society and culture in its biblical, rabbinic, and medieval settings. TTH 11:35–12:50

JDST 764b[U]/HIST 590b[U]/RLST 777b[U], Jews in Muslim Lands from the Seventh through the Sixteenth Century Ivan Marcus
Introduction to Jewish culture and society in Muslim lands from the Prophet Muhammad to Suleiman the Magnificent. Topics include Islam and Judaism; Jerusalem as a holy site; rabbinic leadership and literature in Baghdad; Jewish courtiers, poets, and philosophers in Muslim Spain; and the Jews in the Ottoman Empire. TTH 11:35–12:50

JDST 775a[U]/RLST 684a[U], Jews at the Origins of Islam Liran Yadgar
The Jews: people of divine revelation or enemies of Muhammad? The narratives on the rise of Islam in seventh-century Arabia usually portray Muhammad's encounter with the Jewish community of Yathrib (Medina) as the most significant in the formation of his new religious movement. The Jews were perceived to be a model for the nascent Muslim community due to their holy scriptures, and Muslims are said to emulate Judaism in practicing fasting and directing their prayers to Jerusalem, before changing the direction to Mecca. However, Jews are also rejected in the Qur'an due to their distortion of the scriptures and their malevolent opposition to Muhammad and his followers. This class investigates the role of Jews in the formative period of Islam, from the beginning of Muhammad's call to prophethood around 610 C.E. to the early Abbasid Period (ca. 850 C.E.) in light of contemporary scholarship on the origins of Islam. T 9:25–11:15

JDST 785b[U]/NELC 592b[U], State and Society in Israel Dina Roginsky
The interplay between state and society in Israel; current Israeli discourse on controversial issues such as civil rights in a Jewish-democratic state, Jewish-Arab relations, right and left politics, orthodoxy, military service, globalization, and multiculturalism. Sociopolitical changes that have taken place in Israel since the establishment of the state led to the reshaping of Israeli Zionist ideology. Conducted in English. TTH 1–2:15

JDST 790b/HIST 601b/RLST 776b, Jewish History, Thought, and Narratives in Medieval Societies Ivan Marcus
Research seminar that focuses on the two medieval Jewish subcultures of Ashkenaz (northern Christian Europe) and Sefarad (mainly Muslim and Christian Spain). TH 9:25–11:15

JDST 793b[U]/HIST 587b[U]/RLST 799b[U], Introduction to Modern Jewish Thought Eliyahu Stern
An overview of Jewish philosophical trends, movements, and thinkers from the seventeenth to the twenty-first century. Topics include enlightenment, historicism, socialism, secularism, religious radicalism, and Zionism. MW 2:30–3:20, 1 HTBA

JDST 799b/AMST 692b/HSAR 730b/REL 967b/RLST 788b, Religion and the Performance of Space Sally Promey, Margaret Olin

This interdisciplinary seminar explores categories, interpretations, and strategic articulations of space in a range of religious traditions. In conversation with the work of major theorists of space, this seminar examines spatial practices of religion in the United States during the modern era, including the conception, construction, and enactment of religious spaces. It is structured around theoretical issues, including historical deployments of secularity as a framing mechanism, ideas about space and place, geography and gender, and relations between property and spirituality. Examples of case studies treated in class include the enactment of rituals within museums, the marking of religious boundaries such as the Jewish "eruv," and the assignment of "spiritual" ownership in Hawai'i Volcanoes National Park. The seminar coordinates with several campus events, including research group presentations and an exhibition of work by Thomas Wilfred at the Yale University Art Gallery. Prerequisite: permission of the instructors; qualified undergraduates are welcome. M 3:30–5:20

JDST 838a[U]/CPLT 690a[U]/RLST 762a[U], Politics of Modern Hebrew Literature Hannan Hever

An overview of the poetics, culture, history, and political dynamics of modern Hebrew literature over the past 250 years. No background in Jewish literature and Jewish culture is required. All readings in English. T 2:30–4:20

JDST 843b/CPLT 930b/FILM 624b/ITAL 785b, The Holocaust in Italian Literature and Film Millicent Marcus

Though Italy was among the Nazi-occupied countries with the highest survival rate of its Jewish population, the Holocaust has continued to haunt the Italian literary and cinematic imagination in ways that warrant close critical scrutiny. The aesthetic and moral problem of how to represent this event in art gains special urgency in the Italian context, where a realist tradition dating back to Dante and Giotto joins forces with a postwar neorealist impulse to create a series of compelling literary treatments (Primo Levi's above all), as well as cinematic works. In keeping with the Holocaust's invitation to interdisciplinary study, the course examines the intersection of a number of discourses—historical, literary, cinematic—viewed from a variety of perspectives—feminist, generic, philosophical, theological, and historiographic. Since several of the authors are women, the question of the "voce femminile" and its creation of an alternative, or anti-history, is also raised. W 3:30–5:20, screenings M 7:30

JDST 849a[U]/CPLT 687a[U]/RLST 823a[U], Ethnicity, Religion, and Nationality in Modern Jewish Culture Hannan Hever, Eliyahu Stern

This course explores the nature of identity politics in modern Europe, the Middle East, and America through the idea of the Jew. It introduces students to scholarly texts focused on the nature of identity politics as well as short stories, novels, and films addressing the fluidity of identity as it pertain to Jews in the modern period. W 3:30–5:30

JDST 846b/HIST 598b/RLST 771b, Jewish Emancipation in the Twentieth Century
David Sorkin
Conventional wisdom has it that the process of "Jewish emancipation," or the acquisition of citizenship and equality, culminated with the Russian Revolution of 1917 or the minority rights treaties of the early 1920s. In fact, emancipation did not cease. In the 1930s and 1940s right-wing, fascist, and Nazi governments across Europe abrogated Jews' citizenship. Postwar governments restored citizenship, sometimes reluctantly, sometimes belatedly, sometimes inconsistently. The controversies over reparations and the restoration of property that continue today belong to this process as well. The establishment of Israel with its own specific concept of citizenship was yet another aspect. Finally, the laws that prohibited discrimination in schools, housing, employment, and secondary associations in the 1950s–1970s were an installment in creating equality for Jews in the United States. This seminar casts its nets broadly to study the extant scholarship on "Jewish emancipation" in the twentieth century. TH 3:30–5:20

JDST 850b[U]/CPLT 685b[U]/NELC 853b[U], Literature at the Limit: Palestine and Israel
Hannan Hever, Robyn Creswell
Readings and films from post-1948 Palestine and Israel, with special attention to historical and political contexts. This course focuses on Hebrew- and Arabic-language culture produced in Palestine and Israel since the year of the Palestinian Haqba and the Jewish War of Independence. These poems, novels, and films consistently probe the figure of the limit—in the geographical sense of borders and checkpoints, as well as in the existential sense of extremity and trauma. What are the limits of one's political and linguistic community? What is the role of culture in defining, deconstructing, or bridging those borders? The course is intended to serve as an introduction to canonical texts of both national traditions, as well as the methods of comparative literature. Readings include works by Darwish, Yehoshua, Kanafani, Oz, Habibi, Ballas, and Shammas. All readings in English. W 2:30–4:20

JDST 851b[U]/CPLT 682b[U]/NELC 854b[U], Cultural Critique and Israel Hannan Hever
An overview of the poetics, culture, history, and political dynamics of modern Hebrew literature as a national literature over the past three hundred years. No background in Jewish literature and Jewish culture is required. All readings in English. T 1:30–3:20

For course offerings in the Hebrew language and in Israeli society and culture, see Near Eastern Languages and Civilizations.

THE WHITNEY AND BETTY MACMILLAN CENTER FOR INTERNATIONAL AND AREA STUDIES AT YALE

Luce Hall, 203.432.0694
http://macmillan.yale.edu

Director
Ian Shapiro (*Political Science*)

For more than half a century the Whitney and Betty MacMillan Center for International and Area Studies at Yale has been the University's principal institution for encouraging and coordinating teaching and research on all aspects of international affairs, societies, and cultures around the world. The MacMillan Center seeks to make understanding the world outside the borders of the United States an integral part of liberal education and professional training at the University. It brings together scholars from all relevant schools and departments to provide insightful interdisciplinary, comparative, and problem-oriented teaching and research on regional, international, and global issues.

The MacMillan Center administers nine degree programs. The six undergraduate majors include African Studies; East Asian Studies; Latin American Studies; Modern Middle East Studies; Russian and East European Studies; and South Asian Studies. The three graduate degree programs award master's degrees in African Studies, East Asian Studies, and European and Russian Studies. There are joint-degree graduate programs with the schools of Forestry & Environmental Studies, Law, Management, and Public Health. Additionally, the programs offer four graduate certificates of concentration: in African Studies, European Studies, Latin American and Iberian Studies, and Modern Middle East Studies.

The many councils, committees, and programs at the MacMillan Center support research and teaching across departments and professions, support doctoral training, advise students at all levels, and provide extracurricular learning opportunities, as well as funding resources for student and faculty research related to their regions and subject areas. Regional studies programs include African Studies, Arab Governance and Local Development Program, Arabic Program, Baltic Studies, British Historical Studies, Canadian Studies, East Asian Studies, European Studies, Stavros Niarchos Foundation Center for Hellenic Studies, Himalaya Initiative, Iranian Studies Program, Japan at the Crossroads Project, Latin American and Iberian Studies, Middle East Studies, Religious Freedom and Society in Africa Project, Russian Studies Project, South Asian Studies, and Southeast Asia Studies. Comparative and international programs include Agrarian Studies; Center for the Study of Globalization; Center for the Study of Representative Institutions; Conflict, Resilience, and Health Program; Program on Democracy; European Union Studies; Genocide Studies; Gilder Lehrman Center for the Study of Slavery, Resistance, and Abolition; Global Justice; Center for Historical Enquiry & the Social Sciences; InterAsia Initiative; Georg Leitner Program in International and Comparative Political Economy; Program on Order, Conflict, and Violence; and Political Violence FieldLab.

The MacMillan Center's regional councils regularly teach all levels of eight foreign languages (Modern Greek, Hindi, Indonesian, Sanskrit, Swahili, Vietnamese, Yorùbá, Zulu). Additionally, the MacMillan Center collaborates with the Center for Language Study (CLS) in supporting Directed Independent Language Study of another sixty-four languages for undergraduate, graduate, and professional school students. Regional councils and language faculty participate actively in the Cornell, Columbia, and Yale shared course initiative led by CLS, using distance learning technology for Bengali, Modern Greek, Romanian, Tamil, Yorùbá, and Zulu.

The MacMillan Center provides opportunities for scholarly research and intellectual innovation; awards nearly 500 fellowships and grants each year to students and faculty; encourages faculty/student interchange; sponsors some 800 lectures, conferences, workshops, seminars, and films each year (most of which are free and open to the public); produces a range of working papers and other academic publications; and contributes to library collections comprising 1.4 million volumes in the languages of various areas. The MacMillan Center is home to the Fox International Fellowship, a graduate student exchange program between Yale University and seventeen world-renowned academic partners. Through the Programs in International Educational Resources (PIER), the MacMillan Center brings international education and training to educators, K–12 students, and the community at large. The MacMillan Center supports *The MacMillan Report,* an online show that features Yale faculty in international and area studies and their research in a one-on-one interview format. Webisodes can be viewed at http://macmillanreport.yale.edu. The MacMillan Center is also home to *Yale Global Online*.

For details on degrees, programs, and faculty leadership, please consult http://macmillan.yale.edu.

Graduate Certificates of Concentration in Area Studies

GENERAL GUIDELINES — PROGRAM DESCRIPTION

The Whitney and Betty MacMillan Center for International and Area Studies at Yale, through the regional councils on African Studies, European Studies, Latin American and Iberian Studies, and Middle East Studies, sponsors graduate certificates of concentration that students may pursue in conjunction with graduate-degree programs in the Graduate School of Arts and Sciences and the professional schools. The certificate is intended for students seeking to demonstrate substantial preparation in the study of one of four areas of concentration: Africa, Europe, Latin America, and the Middle East.

Candidates for the certificate must demonstrate expertise in the area of concentration through their major graduate or professional field, as well as show command of the diverse interdisciplinary, geographic, and cultural-linguistic approaches associated with expertise in the area of concentration. Admission to the graduate certificate is contingent on the candidate's acceptance into a Yale graduate-degree program. Award of the graduate certificate, beyond fulfilling the relevant requirements, is contingent on the successful completion of the candidate's Yale University degree program.

Application Procedure

Specific requirements of each council are reflected in its application, monitoring, and award procedures. Application forms can be picked up at the relevant council or downloaded from its Web site. Prospective students should submit a completed application form to the relevant council.

Applications may be submitted by students admitted to a graduate program at Yale or during their program of study but no later than the beginning of the penultimate term of study. Each council may set limits on the number of candidates for its program in any given year. For further information, see the council administrator.

Summary of General Requirements

While the general requirements are consistent across all councils of the MacMillan Center, the specific requirements of each council may vary according to the different expertise required for its area of concentration. In addition to the specific requirements, students pursuing the certificate are expected to be actively engaged in the relevant council's intellectual community and to be regular participants at its events, speaker series, and other activities. Serious study, research, and/or work experience overseas in the relevant region is highly valued. The requirements:

1. Six courses in the area of concentration (in at least two different fields).
2. Language proficiency in at least one language relevant to the area of concentration beyond proficiency in English. For some councils and for some individual circumstances, proficiency in two languages beyond English is required.
3. Interdisciplinary research paper focused on the area of concentration.

Further Details on General Requirements

1. Course work
   Students must complete a total of six courses focused on the area from at least two different fields including a Foundations Course if designated by the council. Of the remaining five courses only two may be "directed readings" or "independent study." Please note:
   - No more than four courses may count from any one discipline or school.
   - Courses from the home field of the student are eligible. Courses may count toward the student's degree as well as toward the certificate.
   - Literature courses at the graduate level may count toward the six-course requirement, but elementary or intermediate language courses may not. At the discretion of the faculty adviser, an advanced language course at the graduate level may be counted if it is taught with substantial use of field materials such as literature, history, or social science texts and journals relevant to the area.
   - Course work must demonstrate broad comparative knowledge of the region rather than focus on a specific country.
   - Course work must demonstrate a grasp of the larger thematic concerns affecting the region, such as environment, migration, or global financial movements.
   - Only those courses listed on the Graduate Course Listings provided by the area council may be used to fulfill course requirements. For courses not listed there,

please consult the certificate adviser. Non-listed courses may only be counted with prior approval of the council adviser, not after the fact.
- A minimum grade of HP must be obtained or the course will not be counted toward the certificate.
- Only course work taken during the degree program at Yale may be counted toward the certificate.

2. Language proficiency
In the major-area language targeted for meeting the proficiency requirement, students must demonstrate the equivalent ability of two years of language study at Yale with a grade of B+ or better. Language proficiency must encompass reading, writing, speaking, and listening skills plus grammar. Students may demonstrate proficiency by completing course work, by testing at Yale, or by other means as approved by the council adviser. When a second major language of the region beyond English is required, the relevant council will specify the target level. The typical departmental graduate reading exam is not sufficient for certifying the four-skill language requirement of the certificate.

   Normally, when the candidate is a native speaker of one of the area's major languages, he/she will be expected to develop language proficiency in a second major area language.

3. Interdisciplinary research paper
A qualifying research paper is required to demonstrate field-specific research ability focused on the area of concentration. After they have completed substantial course work in the area of concentration, students must seek approval from the council faculty adviser for the research project they propose as the qualifying paper. Normally, the student will submit the request no later than the fourth week of the term in which he or she plans to submit the qualifying paper.

   The interdisciplinary research paper may be the result of original research conducted under the supervision of a faculty member in a graduate seminar or independent readings course or in field research related to the student's studies. An M.A. thesis, Ph.D. prospectus, or dissertation may also be acceptable if it is interdisciplinary as well as focused on the area of concentration. The qualifying paper should examine questions concerning the area of concentration in a comparative and/or interdisciplinary context. It should also use relevant international and area-focused resource materials from a relevant region and/or resource materials in the language(s) of a relevant region or regions. Normally the paper should incorporate at least two of the following elements:
   - Address more than one country relevant to the area of concentration
   - Draw on more than one disciplinary field for questions or analytic approaches
   - Address a transregional or transnational theme relevant to the area of concentration

   The paper will be read by two faculty members selected in agreement with the council adviser. The readers will be evaluating the paper for the quality of research, knowledge of the relevant literature, and depth of analysis of the topic. The qualifying paper must be fully footnoted and have a complete bibliography. The council adviser may call for a third reader as circumstances warrant.

Progress Reports and Filing for the Award of the Certificate/Qualification

Students should submit a progress report along with a copy of their unofficial transcript to the council faculty adviser at the end of each term. Ideally, this will include a brief narrative describing the student's engagement in the relevant council's intellectual community and participation in its events, speaker series, and the like, as well as any planned or newly completed experience overseas.

A student who intends to file for the final award of the certificate should contact the council no later than the end of the term prior to award. By the fourth week of the term of the expected award at the latest, the candidate should demonstrate how he/she has or will have completed all the requirements on time.

At the end of the term as grades are finalized, the council will confirm that the candidate is cleared to receive the home degree and has fulfilled all the requirements of the certificate. The final award will require review and clearance by the deputy director of the MacMillan Center.

Pursuit of Two Certificates by a Single Student

No courses may overlap between the two certificates. Any application for two certificates by a single student must robustly fulfill all of the requirements for each of the two certificates. Each certificate must be approved independently by each respective council's certificate adviser.

In addition to the approval of both council advisers, any award of two certificates will require review and approval by the deputy director of the MacMillan Center.

COUNCIL ON AFRICAN STUDIES

The MacMillan Center
309 Luce Hall, 203.432.9903
http://african.macmillan.yale.edu
Graduate Certificate of Concentration in African Studies

Chair
Michael Cappello (*Pediatrics; Microbial Pathogenesis; Public Health*)

Faculty
For faculty listings, see the section on African Studies under Degree-Granting Departments and Programs in this bulletin.

Special Requirements for the Graduate Certificate of Concentration in African Studies

The Graduate Certificate of Concentration in African Studies enables graduate and professional school students in fields other than African Studies to demonstrate interdisciplinary area expertise, language proficiency, and research competence in African Studies. The certificate program is intended to complement existing fields of studies in other M.A. and Ph.D. programs and to provide the equivalent of such specialization for students in departments and schools without Africa-related fields of study. The certificate program is designed to be completed within the time span of a normal Ph.D. residence. Professional school students and M.A. students in the Graduate School may require an additional term of registration to complete the certificate requirements depending on the requirements of specific programs.

The certificate program includes interdisciplinary course work, language study, and research components. The specific requirements are:

1. Successful completion of at least six courses in African Studies from at least two departments or schools, one of which is a core course in African Studies (AFST 764b, Topics in African Studies, or AFST 501a, Research Methods in African Studies).
2. Demonstration of proficiency in an African language.
3. Evidence of research expertise in African Studies. Research expertise may be demonstrated by completion of an interdisciplinary thesis, dissertation prospectus, or dissertation or by completion of a substantive research seminar paper or the equivalent as approved by the faculty adviser.

The certificate courses and research work should be planned to demonstrate clearly fulfillment of the goals of the certificate. Certificate candidates should design their course schedules in consultation with the director of graduate studies for African Studies. Ideally, students should declare their intention to complete the certificate requirements early in their program at Yale. Graduate and professional school students who intend to complete the certificate program must declare their intention to do so no later than during their penultimate term of enrollment.

For course listings, see African Studies under Degree-Granting Departments and Programs in this bulletin.

COUNCIL ON EAST ASIAN STUDIES

The MacMillan Center
320 Luce Hall, 203.432.3426
http://ceas.yale.edu

Chair
Jing Tsu (*East Asian Languages & Literatures; Comparative Literature*)

Faculty
For faculty listings, see the section on East Asian Studies, under Degree-Granting Departments in this bulletin.

The Council on East Asian Studies (CEAS) was founded in 1961 and continues a long tradition of East Asian Studies at Yale. CEAS provides an important forum for academic exploration and support related to the study of China, Japan, and Korea. Its mission is to facilitate the training of undergraduate and graduate students and to foster outstanding education, research, and intellectual exchange about East Asia. For fifty-five years, it has promoted education about East Asia both in the Yale curriculum and through lectures, workshops, conferences, film series, cultural events, and other educational activities open to students, faculty, K–16 educators, and the general public. With nearly thirty core faculty and more than twenty language instructors spanning thirteen departments on campus, East Asian Studies remains one of Yale's most extensive area studies programs. Its interdisciplinary emphasis encourages collaborative linkages across fields and departments and contributes to diversity across the curriculum and in the classroom. Approximately one hundred fifty courses on East Asia in the humanities and social sciences are offered each year.

CEAS administers Bachelor of Arts (B.A.) and Master of Arts (M.A.) programs. While the B.A. program focuses on the study of either a country or an area within East Asia, the M.A. program focuses on the study of China, Japan, or a transnational region in East Asia. Graduates of the East Asian Studies B.A. and M.A. programs have gone on to distinguished careers in the fields of academia, business, nonprofit organizations, and government service. For details on the M.A. program, see the section on East Asian Studies, under Degree-Granting Departments in this bulletin.

Every year, CEAS welcomes domestic and international scholars to campus as guest lecturers, visiting fellows, research scholars, and professors. The CEAS Postdoctoral Associates Program brings talented individuals into the community of scholars at Yale to conduct research and teach advanced undergraduate seminars. East Asian Studies endowments make it possible for CEAS to offer grants and fellowships for Yale students conducting East Asian-related research and language study, as well as to support student organization programming.

Study and research in East Asian Studies at Yale are supported by one of the finest library collections in the country. The Chinese-, Japanese-, and Korean-language print resources in the East Asia Library at Sterling Memorial Library constitute one of the oldest and largest collections found outside of East Asia. The Asian art collection at the Yale University Art Gallery also supports classroom instruction, faculty research, and community outreach activities.

CEAS is committed to providing leadership in the study and understanding of East Asia on campus and in the region through support of educational and outreach activities with emphasis on joint endeavors across institutions both regionally and internationally.

EUROPEAN STUDIES COUNCIL

The MacMillan Center
332 Luce Hall, 203.432.3423
http://europeanstudies.macmillan.yale.edu
Graduate Certificate of Concentration in European Studies

Chair
Francesca Trivellato (*History; on leave*)

Acting Chair
Philip Gorski (*Sociology*)

Faculty and Participating Staff
For faculty listings, see the section on European and Russian Studies under Degree-Granting Departments and Programs in this bulletin.

The European Studies Council promotes research programs on European politics, culture, economy, society, and history. The geographical scope of the council's activities extends from Ireland to Italy, and from Portugal to the lands of the former Soviet Union. The council's definition of Europe transcends conventional divisions between Western, Central, and Eastern Europe, and includes the Balkans and Russia. The U.S. Department of Education has repeatedly designated the council a National Resource Center and a FLAS Center under its HEA Title VI program.

The European Studies Council builds on existing programmatic strengths at Yale while serving 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 and research specialties in the area. Such departments as Comparative Literature, Economics, English, History, History of Art, Political Science, Slavic Languages and Literatures, and Sociology regularly offer courses with a European focus. These are complemented by the rich offerings and faculty strength of the French, German, Italian, Slavic, and Spanish and Portuguese language and literature departments, as well as the European resources available in the professional schools and other programs, such as Film and Media Studies. By coordinating Yale's existing resources, including those in the professional schools, encouraging individual and group research, and promoting an integrated comparative curriculum and degree programs, the council strongly supports the disciplinary and interdisciplinary study of European regions and their interactions. The council is also home to special programs in European Union Studies, Baltic Studies, Russian Studies, and Hellenic Studies; a Polish cultural initiative; and the Center for Historical Enquiry and the Social Sciences (CHESS).

In addition to the M.A. degree program, the council offers students in the University's doctoral and other professional degree programs the chance to obtain a Graduate Certificate of Concentration in European Studies by fulfilling a supplementary curriculum. The undergraduate major in Russian and East European Studies is administered by the Department of Slavic Languages and Literatures.

The benefits provided to the Yale community by the European Studies Council include its affiliation with interuniversity and international organizations that can offer

specialized training programs and research grants for graduate students (see http://studentgrants.yale.edu), support conferences among European and North American scholars, and subsidize European visitors to Yale. The Fox International Fellowship Program, for example, offers generous fellowship support to qualified students who undertake research at specified institutions in the United Kingdom, Germany, France, and Russia; and the Geneva Exchange supports Yale doctoral students who wish to study at the Graduate Institute of International and Development Studies in Geneva, Switzerland. Furthermore, the council supplements the regular Yale curriculum with film series, lectures, and seminars by eminent scholars, artists, diplomats, and political officials. The European Studies Council constantly expands its formal connections with a variety of European institutions and regularly hosts a European Union Fellow sponsored by the European Commission.

Fields of Study

European and Slavic languages and literatures; economics; history; music; political science; law; sociology and other social sciences.

Graduate Certificate of Concentration in European Studies

Yale graduate students may pursue the Graduate Certificate of Concentration in European Studies in conjunction with graduate-degree programs in the Graduate School of Arts and Sciences and the professional schools. Candidates will choose to focus on one of two areas of concentration, either (1) Russia and Eastern Europe or (2) Central and Western Europe. Admission is contingent on the candidate's acceptance and matriculation into a Yale graduate-degree program. To complete the certificate, candidates must demonstrate expertise in the area through their major graduate or professional field, as well as show command of the diverse interdisciplinary, geographic, and cultural-linguistic approaches associated with expertise in the area of concentration. In order to be awarded the certificate, a candidate needs to fulfill all requirements detailed below, as well as complete his or her Yale University graduate degree program.

Certificate candidates must comply with the general requirements for all MacMillan Center graduate certificates, as described at http://macmillan.yale.edu/academic-programs/graduate-certificate-concentration.

ADDITIONAL REQUIREMENTS SPECIFIC TO EUROPEAN STUDIES

1. Minimum L4 language proficiency in two modern European languages, in addition to English. Students wishing to focus on Russia and Eastern Europe must demonstrate knowledge of Russian or an Eastern European language; those focusing on Central and Western Europe must demonstrate knowledge of one of the appropriate languages. Students must demonstrate proficiency in oral (speaking/listening), reading, and writing skills.
2. Six courses in the area of concentration, of which:
   a. three courses must offer transnational approaches to Europe-related issues, and
   b. of the remaining three courses, students focusing on Russia and Eastern Europe must take at least one course concerning the nations of Central and Western

Europe. For those focusing on Central and Western Europe, at least one course must concern Russia and Eastern Europe.

3. Interdisciplinary research qualifying paper written either in the context of one of the six courses in the area of concentration, or as independent work under faculty supervision. The paper is required to demonstrate field-specific research ability in the area of concentration. After they have completed substantial course work in the area, students must seek approval from the council faculty adviser for the research project they propose as the qualifying paper. Normally, students will submit their proposals no later than the fourth week of the term in which they plan to submit the qualifying paper.

For course listings, see European and Russian Studies under Degree-Granting Departments and Programs in this bulletin.

For more information, write to European Studies Council, Yale University, PO Box 208206, New Haven CT 06520-8206; or call 203.432.3423.

COUNCIL ON LATIN AMERICAN AND IBERIAN STUDIES

The MacMillan Center
232 Luce Hall, 203.432.3422
http://clais.macmillan.yale.edu
Graduate Certificate of Concentration in Latin American and Iberian Studies

Chair
Susan Stokes (*Political Science*)

Professors Rolena Adorno (*Spanish & Portuguese*), Ned Blackhawk (*History; American Studies*), Richard Burger (*Anthropology; on leave* [Sp]), Hazel Carby (*African American Studies; American Studies*), Carlos Eire (*History; Religious Studies*), Eduardo Fernandez-Duque (*Anthropology*), Paul Freedman (*History*), Roberto González Echevarría (*Spanish & Portuguese*), Aníbal González-Pérez (*Spanish & Portuguese*), K. David Jackson (*Spanish & Portuguese*), Gilbert Joseph (*History; on leave* [Sp]), Efstathios Kalyvas (*Political Science*), Daniel Markovits (*Law*), Mary Miller (*History of Art*), Stephen Pitti (*History*), Susan Rose-Ackerman (*Law; Political Science*), Alicia Schmidt Camacho (*American Studies*), Stuart Schwartz (*History*), Susan Stokes (*Political Science*), Robert Thompson (*Emeritus, History of Art*), Noël Valis (*Spanish & Portuguese*), Frederick Wherry (*Sociology*), Elisabeth Wood (*Political Science*)

Associate Professors Susan Byrne (*Spanish & Portuguese*), Rodrigo Canales (*Management*), Ana De La O Torres (*Political Science*), Moira Fradinger (*Comparative Literature*)

Assistant Professors Ryan Bennett (*Linguistics*), Oswaldo Chinchilla (*Anthropology*), Marcela Echeverri (*History*), Anne Eller (*History*), Leslie Harkema (*Spanish & Portuguese*), Seth Jacobowitz (*East Asian Languages & Literatures; on leave*), Erica James (*History of Art; African American Studies*), Albert Laguna (*American Studies*), Dixa Ramirez (*American Studies; on leave*)

Senior Lectors and Lectors (Spanish & Portuguese) Sybil Alexandrov, Marta Almeida, Maria Pilar Asensio-Manrique, Mercedes Carreras, Ame Cividanes, Fabiana DePaula, Sebastián Díaz, Maria de La Paz García, Oscar González-Barreto, María Jordán, Rosamaría León, Juliana Ramos-Ruano, Lissette Reymundi, Lourdes Sabé, Barbara Safille, Terry Seymour, Margherita Tortora, Sonia Valle, Selma Vital

Others Jane Edwards (*Associate Dean, Yale College*), Jana Krentz (*Curator, Latin American Collection, Library*), Florencia Montagnini (*Senior Research Scientist, Forestry & Environmental Studies*), Nancy Ruther (*Lecturer, Political Science*)

A variety of Latin American Studies options are available for graduate students in history and other humanities disciplines, the social sciences, and the professional schools. Latin American area course offerings are available in twenty-five disciplines with distinct strengths in Anthropology, History, Political Science, and Spanish and Portuguese. Latin Americanist faculty specialize in the Andes (Burger), Brazil (Jackson, Jacobowitz, Schwartz), the Caribbean (Carby, Echeverri, Eller, Thompson), Central America (Chinchilla, Joseph, Miller, Wood), Colombia (Echeverri), Costa Rica (Wherry), Cuba

(Laguna), Mexico (Canales, De La O Torres, Joseph, Miller, Pitti, Schmidt Camacho), and the Southern Cone (Fradinger, Stokes). F&ES faculty (Ashton, Bell, Berlyn, Clark, Dove, Geballe, Gentry, Mendelsohn, Montagnini) have tropical research interests or participate in educational exchanges with Argentina, Brazil, Chile, Costa Rica, Dominica, Ecuador, Haiti, Honduras, Mexico, Nicaragua, Panama, Peru, and Venezuela. Latin American content courses are also offered in the Schools of Law, Management, and Public Health.

Students may pursue the Graduate Certificate of Concentration in Latin American and Iberian Studies in conjunction with graduate degree programs in the Graduate School of Arts and Sciences and the professional schools. To complete the certificate, candidates must demonstrate expertise in the area through their major graduate or professional field, as well as show command of the diverse interdisciplinary, geographic, cultural, and linguistic approaches associated with expertise in Latin America or Iberia.

Admission is contingent on the candidate's acceptance into a Yale graduate degree program, and award of the certificate, beyond fulfilling the relevant requirements, requires the successful completion of the candidate's Yale University degree program. Active participation in the council's extracurricular and research programs and seminars is also strongly encouraged.

Limited financial resources, such as the LAIS Summer Research grants and Tinker Field Research grants, are available to graduate and professional school students for summer research. Information on grants is available at http://studentgrants.yale.edu.

Specific Requirements for the Graduate Certificate of Concentration

Language proficiency The equivalent of two years' study of one language and one year of the other, normally Spanish and Portuguese. Less frequently taught languages, such as Nahuatl, Quechua, or Haitian Creole, may also be considered for meeting this requirement.

Course work Six graduate courses in at least two different disciplines. No more than four courses may count in any one discipline.

Geographical and disciplinary coverage At least two countries and two languages must be included in the course work or thesis.

Research A major graduate course research paper or thesis that demonstrates the ability to use field resources, ideally in one or more languages of the region, normally with a focus on a comparative or regional topic rather than a single country.

The certificate adviser of the Council on Latin American and Iberian Studies will assist graduate students in designing a balanced and coordinated curriculum. The council will provide course lists and other useful materials.

Academic Resources of the Council

The council supplements the graduate curriculum with annual lecture and film series, special seminars, and conferences that bring visiting scholars and experts to campus. The council also serves as a communications and information center for a vast variety of enriching events in Latin American studies sponsored by the other departments, schools,

and independent groups at Yale. It is a link between Yale and Latin American centers in other universities, and between Yale and educational programs in Latin America and Iberia.

The Latin American Collection of the University library has approximately 556,000 volumes printed in Latin America, plus newspapers and microfilms, CD-ROMs, films, sound recordings, and maps. 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.

Information about the Graduate Certificate of Concentration in Latin American Studies may be requested from the Council on Latin American and Iberian Studies, Yale University, PO Box 208206, New Haven CT 06520-8206; or call 203.432.3422.

COUNCIL ON MIDDLE EAST STUDIES

The MacMillan Center
346 Rosenkranz Hall, 203.436.2553
http://cmes.macmillan.yale.edu
Graduate Certificate of Concentration in Modern Middle East Studies

Chair
Frank Griffel (*Religious Studies*)

Professors Abbas Amanat (*History*), Harold Attridge (*Divinity*), Gerhard Böwering (*Religious Studies*), Adela Yarbro Collins (*Emerita, Divinity*), John J. Collins (*Divinity*), John Darnell (*Near Eastern Languages & Civilizations*), Stephen Davis (*Religious Studies*), Owen Fiss (*Emeritus, Law*), Steven Fraade (*Religious Studies*), Eckart Frahm (*Near Eastern Languages & Civilizations*), Frank Griffel (*Religious Studies*), Dimitri Gutas (*Near Eastern Languages & Civilizations; on leave* [Sp]), Christine Hayes (*Religious Studies*), Hannan Hever (*Comparative Literature*), Frank Hole (*Emeritus, Anthropology*), Marcia Inhorn (*Anthropology; on leave* [Sp]), Anthony Kronman (*Law*), Bentley Layton (*Emeritus, Religious Studies*), J.G. Manning (*Classics; on leave*), Ivan Marcus (*History*), Alan Mikhail (*History*), A. Mushfiq Mobarak (*School of Management*), Robert Nelson (*History of Art; on leave* [F]), W. Michael Reisman (*Law*), Maurice Samuels (*French*), Lamin Sanneh (*Divinity*), Harvey Weiss (*Near Eastern Languages & Civilizations; on leave* [F]), Robert Wilson (*Divinity; on leave* [F])

Associate Professors Zareena Grewal (*American Studies*), Kaveh Khoshnood (*Public Health*), Adria Lawrence (*Political Science; on leave*), Mark Lazenby (*Nursing*), Andrew March (*Political Science*), Kishwar Rizvi (*History of Art*), Jonathan Wyrtzen (*Sociology; on leave*)

Assistant Professors Rosie Bsheer (*History; on leave*), Thomas Connolly (*French*), Robyn Creswell (*Comparative Literature; on leave* [F]), Narges Erami (*Anthropology*)

Senior Lecturers and Lecturers Adel Allouche (*History; Religious Studies*), Karla Britton (*Architecture*), Karen Foster (*Near Eastern Languages & Civilizations; History of Art*), Tolga Köker (*Economics*), Kathryn Slanski (*Near Eastern Languages & Civilizations*)

Senior Lectors (I, II) and Lectors Sarab Al Ani (*Arabic*), Muhammad Aziz (*Arabic*), Jonas Elbousty (*Arabic*), Shiri Goren (*Hebrew*), Dina Roginsky (*Hebrew*), Farkhondeh Shayesteh (*Persian*)

Librarians and Curators Roberta Dougherty (*Near East Collection*), Agnete Lassen (*Babylonian Collection*), Susan Matheson (*Ancient Art, Yale University Art Gallery*), Nanette Stahl (*Judaica Collection*)

The Council on Middle East Studies is part of the Whitney and Betty MacMillan Center for International and Area Studies. The council brings together faculty and students sharing an interest in the Middle East by sponsoring conferences, discussions, films, and 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.

The Council on Middle East Studies administers the Middle East Studies National Resource Center at Yale, which is funded by the U.S. Department of Education under HEA Title VI. As a National Resource Center, the council supports a number of projects and activities, including summer- and academic-year language fellowships and an extensive outreach program.

The council also offers a Graduate Certificate of Concentration in Modern Middle East Studies. Students with an interest in the Middle East should first apply to one of the University's degree-granting departments, such as Anthropology, History, Linguistics, Near Eastern Languages and Civilizations, Political Science, Religious Studies, or Sociology, and then apply for the graduate certificate of concentration no later than the beginning of their penultimate term of study.

Graduate Certificate of Concentration in Modern Middle East Studies

The certificate represents acknowledgment of substantial preparation in Middle East Studies, both in the student's major graduate or professional field and also in terms of the disciplinary and geographical diversity required by the council for recognized competency in the field of Middle East Studies. As language and culture are the core of the area studies concept, students are required to attain or demonstrate language proficiency.

REQUIREMENTS

1. Language proficiency: the equivalent of two years of study at a passing grade in one of the four languages of the Middle East—Arabic, Hebrew, Persian, and Turkish.
2. Course work: six graduate courses in at least two different disciplines. No more than four courses may count in any one discipline. Included in these six courses must be an introductory Middle East history course, such as State and Society and Culture in the Middle East (taken with special supplemental graduate readings and assignments), and a foundations course, such as Culture and Politics in the Contemporary Middle East.
3. Interdisciplinary coverage: both courses and any research project undertaken in lieu of a course must reflect experience of at least two disciplines.
4. Research: a major graduate course research paper, dissertation prospectus, dissertation, or thesis that demonstrates ability to use field resources, ideally in one or more languages of the region.

For more information on the Graduate Certificate and inquiries about Middle East Studies, contact the Council on Middle East Studies, Yale University, PO Box 208206, New Haven CT 06520-8206, or the council e-mail, cmes@yale.edu.

SOUTH ASIAN STUDIES COUNCIL

The MacMillan Center
210 Luce Hall, 203.436.3517
http://southasia.macmillan.yale.edu

Chair
Karuna Mantena (*Political Science*)

Professors Tim Barringer (*History of Art*), Michael Dove (*Forestry & Environmental Studies*), Phyllis Granoff (*Religious Studies*), Inderpal Grewal (*Women's, Gender & Sexuality Studies*), Alan Mikhail (*History*), Kalyanakrishnan Sivaramakrishnan (*Anthropology; on leave* [F]), Shyam Sunder (*School of Management*), Christopher Udry (*Economics*), Steven Wilkinson (*Political Science*)

Associate Professors Nihal DeLanerolle (*School of Medicine*), Mayur Desai (*Public Health*), Zareena Grewal (*American Studies; Religious Studies*), Karuna Mantena (*Political Science*), Andrew Quintman (*Religious Studies*), Kishwar Rizvi (*History of Art*)

Assistant Professors Rohit De (*History; on leave*), Daniel Keniston (*Economics*)

Senior Lecturer Geetanjali Singh Chanda (*Women's, Gender & Sexuality Studies*)

Lecturer Carol Carpenter (*Forestry & Environmental Studies*)

Senior Lectors David Brick (*Sanskrit*), Seema Khurana (*Hindi*), Swapna Sharma (*Hindi*)

Students with an interest in South Asian Studies should apply to one of the University's degree-granting departments, such as Anthropology, History, Political Science, Economics, or Religious Studies. The South Asian Studies Council is part of the MacMillan 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 South Asia-related courses.

The South Asian Studies Council aims to bring together faculty and students sharing an interest in South Asia, and it supplements the curriculum with seminars, conferences, and special lectures by scholars from Yale as well as visiting scholars. It provides information concerning grants, fellowships, research programs, and foreign study opportunities.

Language instruction is offered in Hindi and Sanskrit. Students planning to undertake field research or language study in South Asia may apply to the council for summer fellowship support.

For information and program materials, contact the South Asian Studies Council, Yale University, PO Box 208206, New Haven CT 06520-8206; or see http://southasia.macmillan.yale.edu

Courses

HNDI 510a[U], Elementary Hindi Seema Khurana, Swapna Sharma
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, the course provides cultural insights and increases proficiency in

understanding, speaking, reading, and writing Hindi. Emphasis placed on spontaneous self-expression in the language. No prior background in Hindi assumed.
510a-1: MTWTHF 10:30–11:20
510a-2: MTWTHF 1:30–2:20

HNDI 520b[U], Elementary Hindi II Swapna Sharma, Seema Khurana
Continuation of HNDI 510a.
520b-1: MTWTHF 10:30–11:20
520b-2: MTWTHF 1:30–2:20

HNDI 530a[U], Intermediate Hindi I Seema Khurana, Swapna Sharma
First half of a two-term sequence designed to develop proficiency in the four language skill areas. Extensive use of cultural documents including feature films, radio broadcasts, and literary and nonliterary texts to increase proficiency in understanding, speaking, reading, and writing Hindi. Focus on cultural nuances and various Hindi literary traditions. Emphasis on spontaneous self-expression in the language. Prerequisite: HNDI 520b or equivalent. MTWTHF 11:30–12:20

HNDI 532a[U], Accelerated Hindi I Swapna Sharma
Development of increased proficiency in the four language skills. Focus on reading and higher language functions such as narration, description, and comparison. Reading strategies for parsing paragraph-length sentences in Hindi newspapers. Discussion of political, social, and cultural dimensions of Hindi culture as well as contemporary global issues. TTH 4–5:15

HNDI 540b[U], Intermediate Hindi II Swapna Sharma, Seema Khurana
Continuation of HNDI 530a, focusing on further development of proficiency in the four language skill areas. Prerequisite: HNDI 530a or equivalent. MTWTHF 11:30–12:20

HNDI 542b[U], Accelerated Hindi II Swapna Sharma
Continuation of HNDI 532a. Development of increased proficiency in the four language skills. Focus on reading and higher language functions such as narration, description, and comparison. Reading strategies for parsing paragraph-length sentences in Hindi newspapers. Discussion of political, social, and cultural dimensions of Hindi culture as well as contemporary global issues. Prerequisite: HNDI 532a or equivalent. TTH 4–5:15

HNDI 550a[U], Advanced Hindi Seema Khurana
An advanced language course aimed at enabling students to engage in fluent discourse in Hindi and to achieve a comprehensive knowledge of formal grammar. Introduction to a variety of styles and levels of discourse and usage. Emphasis on the written language, with readings on general topics from newspapers, books, and magazines. Prerequisite: HNDI 540b or permission of instructor. TTH 4–5:15

HNDI 559b, Hindi Literature and Public Culture Seema Khurana
An advanced language course that develops language skills through selected readings of Hindi literature and the study of popular culture. Focus on the adaptations of literary works of Premchand, Mannoo Bhandhari, Sharat Chandra, and Amrita Pritam in popular culture, cinema, theater, and television dramas. Prerequisite: HNDI 550a or permission of the instructor. TTH 4–5:15

HNDI 598a[U] or b[U], Advanced Tutorial Swapna Sharma, Seema Khurana
For students with advanced Hindi language skills who wish to engage in concentrated reading and research on material not otherwise offered by the department. The work must be supervised by an adviser and must terminate in a term paper or its equivalent. Prerequisites: HNDI 540b, and submission of a detailed project proposal and its approval by the language studies coordinator. 1 HTBA

SKRT 510a[U]/LING 515a[U], Introductory Sanskrit I David Brick
An introduction to Sanskrit language and grammar. Focus on learning to read and translate basic Sanskrit sentences in the Indian Devanagari script. No prior background in Sanskrit assumed. Credit only on completion of SKRT 520b/LING 525b. MTWTHF 9:25–10:15

SKRT 520b[U]/LING 525b[U], Introductory Sanskrit II David Brick
Continuation of SKRT 510a/LING 515a. Focus on the basics of Sanskrit grammar; readings from classical Sanskrit texts written in the Indian Devanagari script. Prerequisite: SKRT 510a/LING 515a. MTWTHF 9:25–10:15

SKRT 530a[U]/LING 538a[U], Intermediate Sanskrit I David Brick
The first half of a two-term sequence aimed at helping students develop the skills necessary to read texts written in Sanskrit. Readings include selections from the *Hitopadesa, Kathasaritsagara, Mahabharata,* and *Bhagavad Gita*. Prerequisite: SKRT 520b or equivalent. MTWTHF 10:30–11:20

SKRT 540b[U]/LING 548b[U], Intermediate Sanskrit II David Brick
Continuation of SKRT 530a, focusing on Sanskrit literature from the *kavya* genre. Readings include selections from the *Jatakamala of Aryasura* and the opening verses of Kalidasa's *Kumarasambhava*. Prerequisite: SKRT 530a or equivalent. MTWTHF 10:30–11:20

SKRT 550b[U], Advanced Sanskrit: *Dharmasastra* David Brick
Introduction to Sanskrit commentarial literature, particularly to *Dharmasastra,* an explication and analysis of dharma (law or duty). Discussion of normative rules of human behavior; historical traditions of writing on the Indian subcontinent. Prerequisite: SKRT 540b. F 1:30–3:20

SAST 560b, Introduction to Bhakti Literature Swapna Sharma
The goal of this course is to provide an introduction to the medieval bhakti (devotional) literature of north India. A brief introduction to the philosophy of bhakti is followed by a study of some of the rich hagiographical literature that recounts the life and great deeds of the bhakti poets. Students then read selections of the devotional poetry that has been written in honor of Krsna, Rama, and the formless god or Nirguna bhakti. The course concludes with a section on contemporary expressions of devotion. Among the poets read are Surdas, Mira Bai, Kabir, Tulasi, the Muslim poets Rahim and Raskhan, and the founder of the Sikh tradition, Guru Nanak. All readings are in translation. W 3:30–5:20

COUNCIL ON SOUTHEAST ASIA STUDIES

The MacMillan Center
311 Luce Hall, 203.432.3431, seas@yale.edu
http://cseas.yale.edu

Chair
Michael Dove (*Forestry & Environmental Studies*)

Professors Michael Dove (*Forestry & Environmental Studies*), J. Joseph Errington (*Anthropology; on leave* [Sp]), Benedict Kiernan (*History; on leave* [Sp]), James Scott (*Political Science*), Frederick Wherry (*Sociology*), Mimi Hall Yiengpruksawan (*History of Art*)

Associate Professor Erik Harms (*Anthropology*)

Lecturers and Lectors (I, II) Dinny Risri Aletheiani (*Southeast Asian Languages*), Carol Carpenter (*Forestry & Environmental Studies*), Amity Doolittle (*Forestry & Environmental Studies*), Quang Phu Van (*Southeast Asian Languages*), Indriyo Sukmono (*Southeast Asian Languages*)

Curators Ruth Barnes (*Indo-Pacific Art, Yale University Art Gallery*), Richard Richie (*Southeast Asia Collection, Yale University Library*)

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 the Council on 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. Faculty members of the SEAS council are available to serve as Ph.D. advisers and committee members. 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 Richard Richie, Curator, Southeast Asia Collection, Sterling Memorial Library (203.432.1858, rich.richie@yale.edu).

Language instruction is offered to graduate and undergraduate students in two Southeast Asian languages, Indonesian and Vietnamese. The council supports language tables and tutoring in other Southeast Asian languages by special arrangement. Students planning to undertake predissertation field research or language study in Southeast Asia may apply to the council for summer fellowship support.

For information on program activities and participating faculty, contact the Council on Southeast Asia Studies, Yale University, PO Box 208206, New Haven CT 06520-8206; e-mail seas@yale.edu; or visit our Web site, http://cseas.yale.edu.

Courses

Courses in Indonesian and Vietnamese languages at the elementary, intermediate, and advanced levels are listed in *Yale College Programs of Study*.

INDN 570a/b, Readings in Indonesian Indriyo Sukmono, Dinny Risri Aletheiani
For students with advanced Indonesian language skills preparing for academic performance and/or research purposes. Prerequisites: advanced Indonesian and permission of the instructor.

VIET 570b, Readings in Vietnamese Quang Phu Van
For students with advanced Vietnamese language skills who wish to engage in concentrated reading and research. Prerequisite: permission of the instructor.

INTEGRATED GRADUATE PROGRAM IN PHYSICAL AND ENGINEERING BIOLOGY (PEB)

http://peb.yale.edu
peb@yale.edu

Director
Lynne Regan (*Molecular Biophysics & Biochemistry; Chemistry*)

Associate Director
Dorottya Noble

Executive Committee Joerg Bewersdorf (*Cell Biology; Biomedical Engineering*), Enrique De La Cruz (*Molecular Biophysics & Biochemistry*), Thierry Emonet (*Molecular, Cellular, & Developmental Biology; Physics*), Jonathon Howard (*Molecular Biophysics & Biochemistry; Physics*), Megan King (*Cell Biology*), Andre Levchenko (*Biomedical Engineering*), Kathryn Miller-Jensen (*Biomedical Engineering; Molecular, Cellular, & Developmental Biology*), Simon Mochrie (*Physics; Applied Physics*), Corey O'Hern (*Mechanical Engineering & Materials Science; Physics; Applied Physics*), Thomas Pollard (*Molecular, Cellular, & Developmental Biology; Molecular Biophysics & Biochemistry*), Anna Pyle (*Molecular, Cellular, & Developmental Biology; Chemistry*), Lynne Regan (*Molecular Biophysics & Biochemistry; Chemistry*), Corey Wilson (*Chemical & Environmental Engineering; Biomedical Engineering; Molecular Biophysics & Biochemistry*)

The Yale PEB program brings together faculty from the physical, engineering, and biological sciences, who carry out collaborative, interdisciplinary research and teaching. Participation in the PEB program is open to any graduate student who is interested in applying quantitative, physical approaches to study important biological questions. PEB-participating departments, tracks, and degree-granting programs include Applied Physics; Biochemistry, Biophysics, and Structural Biology (BBS track); Biomedical Engineering; Cell Biology; Chemical & Environmental Engineering; Computational Biology and Bioinformatics (BBS track and also degree-granting program); Mechanical Engineering & Materials Science; Molecular, Cellular, and Developmental Biology; Molecular Cell Biology, Genetics, and Development (BBS track); Neuroscience (BBS track); and Physics.

Upon completion of their Ph.D. in a home department, and satisfaction of the PEB curriculum, students receive a Certificate from the Integrated Graduate Program in Physical and Engineering Biology.

Students interested in participating in the PEB program may indicate their interest on their graduate application for admission to a home department or track. Students may also join the PEB after they have matriculated at Yale. After arriving at Yale, students should e-mail peb@yale.edu to express their interest in the PEB, and the leadership will review their application materials.

PEB students acquire a depth of knowledge in their home department and also a breadth of knowledge across disciplines from PEB courses and activities. They will become skilled at applying physical and engineering methods and quantitative reasoning to biological problems, and at identifying and tackling cutting-edge problems in the life

sciences, and they will be proficient at combining theory and computation with wet lab experiments. In addition, students will become comfortable working in an interdisciplinary and collaborative research environment and adept at communicating with scientists from a variety of disciplines as well as with nonscientists.

PEB Curriculum

The PEB curriculum consists of three core courses and the Integrated Workshop (see below), which all students, regardless of their undergraduate background, take together. Methods and Logic in Interdisciplinary Research (MB&B 517/ENAS 517/MCDB 517/ PHYS 517) is typically taken in the first year. The second course, Biological Physics (ENAS 541/MB&B 523/PHYS 523), and the third, either Dynamical Systems in Biology (MCDB 562/AMTH 765/CB&B 562/ENAS 561/MB&B 562/PHYS 562) or Introduction to Dynamical Systems in Biology (MCDB 561/ PHYS 561), should be completed by the end of the second year. With permission of the PEB leadership, one of the following three courses may be substituted to satisfy the third course requirement: (1) Systems Biology of Cell Signaling (ENAS 567), (2) Bioinformatics: Practical Application of Simulation and Data Mining (MB&B 752/CB&B 752/CPSC 752/MCDB 752), and (3) Genomic Methods for Genetic Analysis (GENE 760).

Two primer courses are also offered (but not required). Boot Camp Biology (MB&B 520) is a primer course for students entering PEB with little or no background in biology, and Mathematical Methods in Biophysics (MB&B 635/ENAS 518) is a primer course for students entering PEB with little or no background in mathematics and computation.

PEB hosts an intensive two-week-long Integrated Workshop before orientation week for first-year incoming students.

In addition to the formal courses, there are a multitude of enrichment activities available to PEB students; see http://peb.yale.edu.

WOMEN'S, GENDER, AND SEXUALITY STUDIES

315 William L. Harkness Hall, 203.432.0845
http://wgss.yale.edu

Chair
Inderpal Grewal

Director of Graduate Studies
Jill Campbell

Professors Carol Armstrong (*History of Art*), Seyla Benhabib (*Political Science; on leave* [Sp]), Jill Campbell (*English*), Hazel Carby (*African American Studies; American Studies*), Kang-i Sun Chang (*East Asian Languages & Literatures*), George Chauncey (*History; on leave* [Sp]), Glenda Gilmore (*History; American Studies; African American Studies; on leave* [Sp]), Jacqueline Goldsby (*English; African American Studies*), Inderpal Grewal (*Women's, Gender & Sexuality Studies; American Studies; Anthropology*), Margaret Homans (*English; Women's, Gender & Sexuality Studies; on leave* [Sp]), Marianne LaFrance (*Psychology; Women's, Gender & Sexuality Studies*), Kathryn Lofton (*American Studies; Religious Studies*), Mary Lui (*American Studies; History*), Joanne Meyerowitz (*History*), Sally Promey (*American Studies; Institute of Sacred Music; Religious Studies*), Alicia Schmidt Camacho (*American Studies*), Michael Warner (*English*), Laura Wexler (*American Studies; Women's, Gender & Sexuality Studies*)

Associate Professors Rene Almeling (*Sociology; on leave*), Crystal Feimster (*African American Studies; American Studies*), Moira Fradinger (*Comparative Literature*), Zareena Grewal (*American Studies; Religious Studies)*, Naomi Rogers (*History of Science & Medicine*)

Assistant Professors Marta Figlerowicz (*Comparative Literature*), Joseph Fischel (*Women's, Gender & Sexuality Studies*), Erica James (*History of Art; African American Studies*), Greta LaFleur (*American Studies*)

Senior Lecturers Geetanjali Singh Chanda (*Women's, Gender & Sexuality Studies; on leave*), Becky Conekin (*MacMillan Center; History*), Maria Trumpler (*Women's, Gender & Sexuality Studies*)

Lecturers Melanie Boyd (*Women's, Gender & Sexuality Studies*), Andrew Dowe (*Women's, Gender & Sexuality Studies*), Karen Foster (*Near Eastern Languages & Civilizations*)

Fields of Study

The Program in Women's, Gender, and Sexuality Studies considers gender and sexuality as fundamental categories of social and cultural analysis and offers critical perspectives upon them as a basis from which to study the diversity of human experience. Gender (the social and historical meanings of the distinction between the sexes) and sexuality (the domain of sexual practices, identities, discourses, and institutions) are studied as they intersect with class, race, ethnicity, nationality, and other axes of human difference. The introduction of these perspectives into all fields of knowledge necessitates new research,

criticism of existing research, and the formulation of new paradigms and organizing concepts.

The Certificate (previously known as the Qualification) in Women's, Gender, and Sexuality Studies is open to students already enrolled in a Ph.D. program at Yale. Interested students are strongly encouraged to register for the certificate by meeting with the director of graduate studies (DGS) during their first year. Students who wish to receive the certificate must (1) complete a graduate course on the theory of gender and sexuality; (2) complete two electives, including one course that must be drawn from the WGSS curriculum; (3) complete one term of WGSS 900, the WGSS Certificate Workshop; (4) demonstrate the capacity to pursue independent, interdisciplinary research in Women's, Gender, and Sexuality Studies by presenting a qualifying paper at a meeting of the WGSS Colloquium; and (5) fulfill a teaching requirement. Each of these requirements must be met in consultation with the DGS and the individual WGSS graduate adviser. Students who fulfill these expectations will receive a letter from the DGS, indicating that they have completed the work for the certificate.

Program information and the requirements for the certificate are available on the Women's, Gender, and Sexuality Studies Web site, or by contacting 203.432.0845 or wgss@yale.edu.

Courses

WGSS 610b/AFAM 546b, Theories of Race, Sex, and Injustice Joseph Fischel
Explorations of race, sex, and gender in political theories of justice; identity formations as ambivalent aspirations for justice theory and justice politics; the body as policed, policing, desired, and desiring; "matter" as idiom of justice. T 1:30–3:20

WGSS 616a/AFAM 616a/AMST 880a, Imagined Futures: Species Being, Biotechnologies, and Planetary Relations in Literature, Art, and Music
Hazel Carby
This course interrogates the premises of speculative fiction alongside the futuristic compositions of visual artists and musicians. The theoretical and historical frameworks of the course are shaped by a deep engagement with questions of the possibilities and limits of the human, addressing theoretical and imaginative questions of species being, hybridity, genders and sexualities, racialization, and relationships between biology, technology, and the body. Readings in cultural and postcolonial theory provide an important lens into this material, and students are asked to consider how colonial and imperial pasts and presents inform future imaginings or provide the motivation for creative artists to envision alternative futures. T 2:30–4:20

[**WGSS 623b/SOCY 523b, Sociology of Sex and Gender**]

[**WGSS 629b/SOCY 543b^{U}, Demography, Gender, and Health**]

WGSS 630a/AMST 703a, Postcolonial and Transnational Feminist Theories
Inderpal Grewal
An advanced survey course in feminist theory with a focus on postcolonial and transnational approaches. It is often assumed that if postcolonial theory focuses on history

and historicity, then transnational theories emphasize space and place, assuming the importance of networks and flows. How might we think otherwise of these theoretical contributions? What are their connections across fields and areas? What, finally, are the ways that feminist theory has come to incorporate these approaches in the way that it conceptualizes the "international," "global," and "regional" in relation to histories of culture, politics, difference, and intersectionality. We examine these and other questions of disciplinarity, method, and history. W 3:30–5:30

WGSS 645b/AFAM 723b/AMST 645b/CPLT 949b, Caribbean Diasporic Intellectuals
Hazel Carby

This course examines work by writers of Caribbean descent from different regions of the transatlantic world. In response to contemporary interest in issues of globalization, the premise of the course is that in the world maps of these black intellectuals we can see the intertwined and interdependent histories and relations of the Americas, Europe, and Africa. Thinking globally is not a new experience for black peoples, and we need to understand the ways in which what we have come to understand and represent as "Caribbeanness" is a condition of movement. Literature is most frequently taught within the boundaries of a particular nation, but this course focuses on the work of writers who shape the Caribbean identities of their characters as traveling black subjects and refuse to restrain their fiction within the limits of any one national identity. We practice a new and global type of cognitive mapping as we read and explore the meanings of terms like black transnationalism, migrancy, globalization, and empire. Diasporic writing embraces and represents the geopolitical realities of the modern, modernizing, and postmodern worlds in which multiple racialized histories are inscribed on modern bodies. T 2:30–4:20

WGSS 651a[U]/ANTH 651a[U], Intersectionality and Women's Health Marcia Inhorn

This interdisciplinary seminar explores how the intersections of race, class, gender, and other axes of "difference" (age, sexual orientation, disability status, nation, religion) affect women's health, primarily in the contemporary United States. Recent feminist approaches to intersectionality and multiplicity of oppressions theory are introduced. In addition, the course demonstrates how anthropologists studying women's health issues have contributed to social and feminist theory at the intersections of race, class, and gender. T 9:25–11:15

WGSS 695a/AFAM 558a/AMST 688a/HIST 577a/RLST 688a, Historicizing Religion Kathryn Lofton

What does it mean to offer a history of religion? How is a history of religion distinct from, or overlapping with, the history of race or gender? This course takes as its central subject a key methodological problem of modernity, namely the task to offer material accounts for human perception, social organization, and epistemological vantage. We read new historical monographs and relevant classic theories that consider what religion is, how its categorization is like and unlike other concepts for human distinction, and why it became something in modernity requiring historical diagnosis. Included in our topical survey are examinations of secularization and disenchantment; myth and narrative; church history and hagiography; objectivity and positivism; world religions and comparative religions; Orientalism and colonialism; sectarianism and secularism. Works

read include Elizabeth A. Clark, *History, Theory, Text: Historians and the Linguistic Turn;* Sylvester Johnson, *African American Religions, 1500–2000: Colonialism, Democracy, and Freedom;* and Suzanne Marchand, *German Orientalism in the Age of Empire: Religion, Race, and Scholarship.* M 9:25–11:15

WGSS 698b/AFAM 511b/HSAR 698b, Fault Lines: Race, Gender, and Sexuality in Contemporary Art Erica James

This seminar examines moments in which prevailing representational paradigms of race, gender, and sexuality were disrupted and transformed, affecting three-dimensional paradigm shifts in reading of race, gender, and sexuality in fine art and visual culture. Students deepen their engagement with and writing on this work beyond the ghetto of identity politics by considering multiple methods of theoretical analyses simultaneously. Sites of rupture include the art and visual culture that emerged around the figure of the boxer through Jack Johnson and Muhammad Ali; African diaspora visual poetics in the youth culture of South Africa and Jamaica; and the work of contemporary artists Kalup Linzy, Mickalene Thomas, and Iona Rozeal Brown. TH 1:30–3:20

WGSS 712a/AMST 866a/HIST 775a, Readings in the History of Sexuality Joanne Meyerowitz

Selected topics in the history of sexuality. Emphasis on key theoretical works and recent historical literature. W 3:30–5:20

WGSS 716a/AFAM 738a/AMST 706a/HIST 711a, Readings in African American Women's History Crystal Feimster

The diversity of African American women's lives from the colonial era through the late twentieth century. Using primary and secondary sources we explore the social, political, cultural, and economic factors that produced change and transformation in the lives of African American women. Through history, fiction, autobiography, art, religion, film, music, and cultural criticism we discuss and explore the construction of African American women's activism and feminism; the racial politics of the body, beauty, and complexion; hetero- and same-sex sexualities; intraracial class relations; and the politics of identity, family, and work. M 1:30–3:20

WGSS 733a/HIST 910a/HSHM 745a, History of Health Activism Naomi Rogers

This research seminar introduces students to current historical debates around health activism. Topics include progressive and conservative ideologies and debates around them; debates around welfare and entitlements; gender and reproductive rights; medical professionalism; and health activism as a social movement. Research is focused on holdings in Yale libraries. M 1:30–3:20

[WGSS 745b^{U}/SOCY 610b^{U}, Race, Gender, and the African American Experience]

WGSS 746b^{U}/AMST 729b^{U}, Visual Kinship: Photography and the Idea of Family Laura Wexler, Thy Phu

Family photography is often understood simply as snapshots of domestic scenes taken by amateur photographers. Yet family photographs are more complex than we think: they can also include images taken by a wide spectrum of producers, including the press and the state; they frequently circulate between private and public spheres, linking personal

memories with national and even global histories; and, just as importantly, they help to shape the very idea of family itself, one that is frequently racialized and gendered. This course explores the relationship between family photography and the concept of family, from the age of analog to the digital era, from snapshots to portraits, from instrumental images to art exhibitions, and more. We look closely at family photographs held in special collections at the Beinecke Library, the Museum of Modern Art, the Library of Congress, and the National Archive and Records Administration, among other sites. Bringing these photographs in dialogue with critical writings drawn from photography studies and cultural history, we investigate the ways in which visual kinship is shaped, and how this process mediates the idea of family. T 10:30–12:30

WGSS 767/PSYC 777, Research Topics in Gender and Psychology
Marianne LaFrance
The "Gender Lab" meets weekly to consider research being done in the Psychology department that bears on some gender-related issue.

WGSS 769b/ENGL 742b, Fiction, Didacticism, and Political Critique: 1789–1818
Jill Campbell
A study of writings that seek a specific effect in their reader—whether didactic instruction and moral formation, or an instigation to take action toward political change—and their uneasy alliance in the late eighteenth and early nineteenth centuries with the literary genre of prose fiction. How do writings that seek to inform or reform the real person or the real world put fictional narratives to use? How is the genre of the novel shaped, explicitly or implicitly, by writing to a specific "end"? Texts include novels, tales for children, life-writing, poetry with a "cause," polemical essays; possible authors include Olaudah Equiano, Edmund Burke, William Godwin, Mary Wollstonecraft, Hannah More, Maria Edgeworth, Jane Austen, Anna Barbauld, and Mary Shelley. T 1:30–3:20

WGSS 779a/AMST 805a/HSAR 720a/REL 966a/RLST 699a, Sensational Materialities: Sensory Cultures in History, Theory, and Method Sally Promey
This interdisciplinary seminar explores the sensory and material histories of (often religious) images, objects, buildings, and performances as well as the potential for the senses to spark contention in material practice. With a focus on American things and religions, the course also considers broader geographical and categorical parameters so as to invite intellectual engagement with the most challenging and decisive developments in relevant fields, including recent literatures on material agencies. The goal is to investigate possibilities for scholarly examination of a robust human sensorium of sound, taste, touch, scent, and sight—and even "sixth senses"—the points where the senses meet material things (and vice versa) in life and practice. Topics include the cultural construction of the senses and sensory hierarchies; investigation of the sensory capacities of things; and specific episodes of sensory contention in and among various religious traditions. In addition, the course invites thinking beyond the "Western" five senses to other locations and historical possibilities for identifying the dynamics of sensing human bodies in religious practices, experience, and ideas. The Sensory Cultures of Religion Research Group meets at 7 p.m. on Tuesdays; class participants are strongly encouraged, but not required, to attend. Prerequisite: permission of the instructor; qualified undergraduates are welcome. M 3:30–5:20

WGSS 815a/AMST 810a, American Public Sculpture: History, Context, and Continuing Significance Laura Wexler

Building on a new partnership between the Smithsonian Institution and Yale University, this course offers a broad-based and multidisciplinary exploration of public sculpture in the United States. Course work includes field trips and digital projects as well as readings in the scholarship of public memory, cultural heritage, conservation, and aesthetics.

WGSS 860b/CPLT 870b/HIST 670b, Gender Theories and Their Politics Moira Fradinger

A historical survey of the intellectual tradition that takes for its object the interrogation and theorization of systems of power whereby inequality is associated with gender, sex, and sexuality. These categories are studied in terms of the politics of location that created them: we read from the corpus written in the context of movements such as classical liberal and radical feminism, anarchism, and socialism; the psychoanalytic international community; or institutional academic settings such as the fields of film studies, women's studies, and gay and lesbian studies. Authors include Sor Juana Inés de la Cruz, Flora Tristán, Emma Goldman, Simone de Beauvoir, Maria Mies, Heidi Hartmann, Audre Lorde, Adrienne Rich, Hortense Spillers, Gayle Rubin, Jacqueline Rose, Juliet Mitchell, Eve K. Sedgwick, Luce Irigaray, Monique Wittig, Teresa de Lauretis, Rosi Braidotti, Luisa Muraro, Adriana Cavarero, Chandra Mohanty, Gloria Anzaldúa, Nira Yuval-Davis, Gayatri Chakravorty Spivak, and Maxine Molyneux. W 7–9

WGSS 900a,b, WGSS Certificate Workshop Jill Campbell

Built around the WGSS graduate Colloquium and Working Group series, with the addition of several sessions on topics of interdisciplinary methodology, theory, and professionalization. Offered in both fall and spring. Enrollment in one term of WGSS 900 is required of all students for completion of the certificate in WGSS. Graded Satisfactory/Unsatisfactory.

WGSS 901a/AMST 906a, (En)visualizing Knowledge: Text Mining, Mapping, Network Analysis, and Big Data Laura Wexler

Digital media and technology have opened an epochal chasm in our ways of knowing, as books, newspapers, libraries, whole universities, and worlds of scholarship are pulled into the digital realm only to reemerge in different forms. Many scholars have begun to explore how this new convergence alters knowledge production, visual culture, theories of representation and visuality, and the many and varied practices of everyday life. Text mining, mapping, network analysis, and big data visualization are among the most powerful forces now manifesting the everyday life world of the globe. This seminar examines these changes and convergences, investigating the legal, philosophical, scientific, artistic, and social implications of the new modes of creation and transmission of knowledge. Alongside such investigations, we examine existing projects in digital humanities and learn new tools and techniques for research in digital humanities. Students work individually and collaboratively to generate knowledge that can be demonstrated in a final term project. M 4:30–6:30

YALE CENTER FOR THE STUDY OF GLOBALIZATION

Betts House, 203.432.1900, globalization@yale.edu
www.ycsg.yale.edu

Director
Ernesto Zedillo

The Yale Center for the Study of Globalization (YCSG) is devoted to examining the impact of our increasingly integrated world on individuals, communities, and nations. The center's purpose is to support the creation and dissemination of ideas for seizing the opportunities and overcoming the challenges resulting from globalization's impact on the world's people and places. The center also studies problems that, even if they do not result directly from globalization, are global in nature and can therefore be effectively addressed only through international cooperation. In pursuit of this mission, and to assist in Yale's effort to become a more international institution, the core of our strategy is collaboration both with the Yale community and with a variety of institutions and individuals across the globe.

One of the center's strengths, and an important area of focus, is its ability to engage with multilateral institutions and global organizations in activities pertinent to its mission, thereby connecting academia with the world of public policy. Through these projects, YCSG produces reports, policy papers, and other publications that contribute toward influencing the attitudes and actions of policy makers, academics, and institutions. Natural opportunities exist to present the results of this work at Yale through seminars, colloquia, and public lectures.

The center's strategy comprises four pillars. First, we focus on issues that are truly core to globalization, like international trade, global finance, inclusion, and the provision of key global public goods. Second, relying on a diversity of means—from closed brainstorming sessions among highly specialized thinkers to large multidisciplinary conferences—the center serves at Yale as a catalyst for debate and cutting-edge thought with a view to generate policy-relevant proposals. Third, in addition to our priority task of interacting with the Yale community, we seek actively to collaborate with a variety of institutions and individuals across the globe to leverage our own resources, reinforce the policy pertinence of our work, and support Yale's internationalization efforts. And fourth, in the endeavor of disseminating critical analysis and stirring constructive debate, we apply ourselves to reach not only the academic and policy worlds with printed publications, but also to communicate with a wide audience of informed citizens around the world.

On campus, the center hosts international conferences, organizes workshops and panels, and works constantly to bring to the Yale community individuals who have input on international policy. YCSG's Distinguished Visiting Fellows interact with faculty and students and are expected to produce one or more publications during their tenure.

YALE INITIATIVE FOR THE STUDY OF ANTIQUITY AND THE PREMODERN WORLD

401 Phelps Hall
http://yisap.yale.edu

Graduate Coordinators
Edward Kamens (*East Asian Languages & Literatures*)
J.G. Manning (*Classics; History*)

Steering Committee (2015–18) Joel Baden (*Divinity*), Ruth Barnes (*Art Gallery*), Oswald Chinchilla (*Anthropology*), John J. Collins (*Divinity*), Steven Davis (*Religious Studies*), Eckart Frahm (*Near Eastern Languages & Civilizations*), Milette Gaifman (*Classics; History of Art*), Edward Kamens (*East Asian Languages & Literatures*), Noel Lenski (*Classics; History*), J.G. Manning (*Classics; History*), Susan Matheson (*Art Gallery*), Irene Peirano Garrison (*Classics*)

The Yale Initiative for the Study of Antiquity and the Premodern World (YISAP) aims to bring together faculty and students sharing an interest in antiquity and the premodern. It supplements the curriculum with seminars, conferences, and special lectures by scholars from Yale as well as visiting scholars, and offers a graduate qualification. Students with an interest in YISAP should apply to one of the University's degree-granting departments, and should meet the entrance standards of the admitting department. Departments and schools currently participating in YISAP are Classics, East Asian Languages and Literatures, History, History of Art, Judaic Studies, Near Eastern Languages and Civilizations, Religious Studies, and the Divinity School; students from other relevant units should contact the YISAP graduate coordinators.

The qualification program provides enhanced training to graduate students with wide-ranging interests in the ancient and premodern world to extend their studies beyond departmental lines. Program students are expected to fulfill the requirements of the home department, but their course of study is individually modified to allow for interdisciplinary work through classes, examinations, and guidance by faculty in several departments.

Graduate students who are enrolled in and funded by participating departments will earn a qualification upon satisfactory completion of the requirements. Students should apply to the department that coincides best with their backgrounds and their prospective areas of specialization, and they should indicate an interest in the interdepartmental program at the time of their application to that department. Students in participating Ph.D. programs earn the qualification en route to the doctorate. The qualification in YISAP is open to Yale Ph.D. students and to students at the Divinity School.

A program of study for completion of the qualification must include the Core Seminar — or, in special cases, an approved alternative seminar — introducing students to issues in the study of the premodern world. In addition, a minimum of three other courses plus a capstone project is required, the courses to be selected in consultation from offerings of advanced language study and seminars related to the premodern world at the graduate level. The course of study must be approved by YISAP's graduate coordinator and by

the director of graduate studies (DGS) of the student's home department, who together with the student will lay out a blueprint for completing the requirements, articulating a field of concentration and a direction for the capstone project, and identifying potential mentors.

Requirements for the Qualification

1. A team-taught Core Seminar—or, in special cases, an approved alternative seminar—introducing students to issues in the study of antiquity and the premodern world, from a cross- and multidisciplinary perspective. Initiative students normally take the Core Seminar in the first year of study. Offered each year in the spring, the seminar is normally a team-taught class sponsored by two or more of the cooperating departments. There will be supplementary sessions in the Yale collections (e.g., the Yale Art Gallery or the Beinecke) and a required monthly colloquium component. Specific topics vary, but each seminar has significant interdisciplinary and comparative dimensions emphasizing the methodologies and techniques of the fields involved.
2. A minimum of three pre-approved courses, of which at least two must be seminar or seminar-type courses, chosen in consultation with YISAP's graduate coordinator and the DGS of the student's home department from courses offered across the University. These will in most cases be courses that also fill requirements for the student's home department, and must be at a level that would normally be accepted for graduate study in that department.
3. A capstone project that demonstrates the student's capacity to pursue independent, interdisciplinary research (the equivalent of 1 or 2 course units, depending on the scope), to be approved in consultation with YISAP's graduate coordinator and the DGS of the student's home department (e.g., an exhibition, documentary, research paper, conservation project).
4. Regular participation in events hosted by YISAP throughout the academic year, especially the monthly meetings of the Ancient Societies Workshop.

Students who fulfill these requirements will receive a letter from the DGS of the Classics department, indicating that they have completed the work for the qualification.

Core Seminar

CLSS 815b/ANTH 531b/ARCG 531b/CPLT 547b/HIST 502b/JDST 653b/NELC 533b/RLST 803b, Fakes, Forgeries, and the Making of Antiquity Eckart Frahm, Irene Peirano Garrison

A comparative exploration of notions of forgery and authenticity in the ancient and premodern world, in a variety of civilizations (ancient Greece, Mesopotamia, Egypt, Israel, China, India, etc.) and different political, religious, literary, and artistic contexts. Emphasis is also placed on the pivotal role played by the "authentic" in the modern era in disciplines such as philology and aesthetics, the manipulative uses of ancient history for purposes of modern nation building and identity formation, copies and reconstructions of ancient artifacts, and the role of forgeries in today's antiquities trade. TH 2:30–4:30

Policies and Regulations

ADMISSIONS

http://gsas.yale.edu/admission-graduate-school

Application for admission to any of the Graduate School's programs should begin in the summer or fall of the academic year prior to the one in which the applicant proposes to matriculate. Application can be made to only one department, program, or combined program. The Graduate School utilizes an online application. Access to this application as well as application procedures, guidelines, requirements, fees, deadline dates, and all other information that an applicant will need are available at the Web site listed above.

Holders of American Ph.D. or Sc.D. degrees, or their international equivalents, are not eligible for admission to the Graduate School in the field in which they have already earned a degree. They may, however, apply in other fields and are also eligible to apply for admission to the Division of Special Registration as special students for nondegree study (see Nondegree Study below for more information or visit the Web site listed above). With the approval of the appropriate associate dean, holders of master's degrees are eligible for admission to a terminal master's degree program in the same field at the Graduate School provided that there is significant curricular distinction between the previous and proposed programs of study.

Individual program descriptions, prerequisites, special admissions requirements, and links to these programs are available via the Graduate School's Web site at http://gsas.yale.edu/academics/departments. Although programs may have varying prerequisites and special requirements for admission, all programs will require, in addition to an application and the application fee, three letters of recommendation, transcripts from each academic institution previously attended, and the results of the Graduate Record Examinations (GRE) General Test, which is administered in the United States and abroad by the Educational Testing Service (ETS). This examination, in addition to any GRE Subject Tests that may be required by the student's program of study, should be taken as early as possible to ensure that official scores are released and received no later than the stated deadline of the program for which the student is applying.

Applicants whose native language is not English must present evidence of proficiency in English by satisfactorily completing the Test of English as a Foreign Language (TOEFL), which is administered by ETS, or the International English Language Testing System (IELTS). This requirement is waived only for applicants who, prior to matriculation at Yale, will have received a baccalaureate degree or its international equivalent from a college or university where English is the primary language of instruction. The applicant must have studied in residence at the baccalaureate institution for at least three years to receive a waiver. The TOEFL or IELTS, if required, should be taken as early as possible to ensure that official scores are released and received no later than the stated deadline of the program for which the student is applying.

Students who do not demonstrate sufficient proficiency in English may be retested 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.

International applicants who accept offers of admission will be required to give appropriate evidence of necessary financial support before the University will be able to issue visa documents.

The application contains questions regarding prior or pending criminal convictions and disciplinary actions. When an applicant answers affirmatively to either of these questions, the Graduate School will evaluate the circumstances outlined by the applicant to determine if they are potentially relevant to his or her participation in the Yale community as a graduate student. In cases where such charges are pending, the Graduate School may decide to admit the applicant contingent upon the charges being resolved or to defer the decision on admission until the charges are resolved. If new criminal or disciplinary charges are filed against an applicant after submission of the application but prior to matriculation, applicants are required to notify the Graduate School Admissions Office of this fact in writing. Failure to do so may result in rejection of an application or rescission of an offer of admission.

It is the policy of the Graduate School to verify all credentials in support of an application. All transcripts, recommendations, publications, standardized test scores, and supplemental materials may be traced to their sources in order to confirm their authenticity. Written materials submitted by an applicant may be subject to review for the purpose of identifying plagiarism.

Applicants are typically notified of decisions regarding their applications during the months of February and March. Official notification is sent from the Graduate School of Arts and Sciences only.

All entering students must have obtained the bachelor's degree or its international equivalent. Offers of admission are contingent on a student providing an official transcript indicating that the student has been awarded a baccalaureate degree (or its international equivalent) prior to matriculation. Students who are not able to provide such evidence will not be permitted to register. Those who have been engaged in graduate work at Yale or another university must also present an official transcript giving evidence of degree(s) awarded and/or satisfactory completion of the previous year's work.

Applicants who have been previously denied admission to the Graduate School of Arts and Sciences three times may not apply again.

The Office of Graduate Admissions will not release application materials, including standardized test scores, letters of recommendation, or transcripts, to the applicant or other institutions or agencies for any purpose. Students will need to contact ETS, recommenders, or educational institutions they have previously attended in order to furnish such materials to a third party.

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, see Part-Time Study under Degree Requirements, below.

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 may obtain transcripts indicating the appropriate credit for work completed.

DSR students engaged in course work or a combination of course work and research are identified as *Special Students*. Although normally admitted for full-time study, Special Students who are U.S. citizens or permanent residents may be admitted for part-time study and are charged tuition on a per-course basis, whether for credit or audit. Please refer to Financing Graduate School below 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.

Advanced graduate students who are degree candidates (at the master's or Ph.D. level) 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*. Undergraduate students in combined or simultaneous B.S./M.S., B.A./M.A., or similar programs are not considered advanced graduate students. Student research conducted at Yale must be part of the visiting student's thesis or dissertation. The extent and location of the research completed at Yale must be cited in the completed thesis or dissertation. 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. The Graduate School does not provide financial support to Visiting Assistants in Research. Such students either hold standard graduate student Assistantship in Research appointments that are funded by the faculty adviser, or provide their own funding through external awards or personal resources. Please refer to Financing Graduate School below for a schedule of tuition and fee charges.

Detailed information, requirements, and access to the online DSR application are available at http://gsas.yale.edu/admissions/application-process/non-degree-programs-division-special-registration. DSR applicants must provide evidence of health care for the duration of their studies at Yale at the time of application.

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 tuition.

In rare circumstances, students may apply for a second year of registration in the DSR; however, cumulative enrollment is limited to two years. Students enrolled in the DSR who are subsequently admitted to degree programs in the Graduate School may receive academic and tuition credit for no more than four courses completed 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, and in the case of students in combined-degree programs, with two. Students may, however, be encouraged to take one or more courses in related departments. 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

Students interested in African American Studies, Film and Media Studies, and Renaissance Studies pursue a combined Ph.D. with departments in related fields. In addition to these academic programs, there are several formal interdisciplinary Ph.D. programs in the Graduate School listed under the appropriate departmental entries of this bulletin. Ad hoc programs may also be approved. A student who is interested in an ad hoc program should prepare a written proposal for review and approval by the relevant departments and associate deans before the student has advanced to candidacy.

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. and Ph.D./M.B.A. programs in cooperation with the School of Management; the M.A./M.P.H. program in cooperation with the School of Public Health; 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 Requirements for Joint-Degree Programs, below).

Exchange Scholar Program

http://gsas.yale.edu/academics/exchanges

Graduate students in Yale Ph.D. programs may petition to enroll full- or part-time for a term or for an academic year as exchange scholars at the University of California at Berkeley, Brown, University of Chicago, Columbia, Cornell, Harvard, MIT, University

of Pennsylvania, Princeton, and Stanford. The Exchange Scholars Program enables students to take advantage of special educational opportunities not available at their home institutions. Applications are available at the Web site listed above. Please direct questions to Assistant Dean Jasmina Besirevic Regan (jasmina.besirevic@yale.edu). Applications must be received at least six weeks prior to the beginning of the term for which the student is applying.

International Graduate Student Exchange Agreements

All international exchange agreements must be approved in advance by the Graduate School to ensure that they meet University policy and Graduate School guidelines. Departments interested in establishing an exchange program must prepare a statement that demonstrates that there is a clear academic and reciprocal need for such a program, and that the program will conform to the established guidelines for all such exchange agreements.

INTERNATIONAL EXCHANGE PROGRAMS

Agrarian Studies
Amsterdam School for Social Science Research, Netherlands

Chemical and Environmental Engineering
Université de Cergy-Pontoise, France

Computer Science
University of Science and Technology of China, Beijing

Council on East Asian Studies
Inter-University Center for Japanese Language Studies, Yokohama; Inter-University Program for Chinese Language Studies, Tsinghua University, Beijing; International Chinese Language Program, National Taiwan University, Taipei; University of Tokyo, Japan; Beida, Peking University, China; Sophia University, Tokyo, Japan

Economic Growth Center
Research Institute for Economics and Business Administration, Kobe University, Japan

Economics
Institut d'Études Politiques de Paris, France; Università Bocconi, Milan, Italy; Universität Mannheim, Germany; Universität Bonn, Germany

Graduate School
Royal Holloway College, University of London, England; Connecticut Department of Education and the State of Baden-Württemberg Exchange, Germany; Universität Konstanz, Germany; University College London, England

French
École Normale Supérieure, Paris, France; Institut d'Études Politiques de Paris, France

German
Freie Universität, Berlin, Germany; Goethe-Universität, Frankfurt, Germany

History
Institut d'Études Politiques de Paris, France; University of Sussex, Brighton, England; Beida, Peking University, China

History of Science and Medicine
École des Hautes Études en Sciences Sociales, Paris, France; École Normale Supérieure, Paris, France

Linguistics
Gakushuin University, Tokyo, Japan; Tokyo Metropolitan University, Japan

MacMillan Center for International and Area Studies
Fox International Fellowship Program (Moscow State University; University of Cambridge; Freie Universität, Berlin; Fudan University, Shanghai; University of Tokyo; El Colegio de México, Mexico City; Institut d'Études Politiques de Paris; Jawaharlal Nehru University, New Delhi); Graduate Institute of International and Development Studies, Geneva, Switzerland

Molecular, Cellular, and Developmental Biology
Peking University, Beijing, China

Political Science
Nuffield College, University of Oxford, England; Institut d'Études Politiques de Paris, France; Beida, Peking University, China

Slavic Languages and Literatures
Russian State University for the Humanities, Moscow, Russia

Sociology
Institut d'Études Politiques de Paris, France; University of Copenhagen, Denmark

Summer Study

Doctoral students are funded year-round and are expected to make progress toward the completion of their degrees during the summer months (see Summer Registration under Registration Status and Leaves of Absence, below). See individual departmental policies in this bulletin regarding specific expectations for degree programs during the summer. Although the Graduate School does not offer courses in the summer, intensive language instruction is available through the Yale Summer Session, and graduate students may wish to take advantage of those programs while in New Haven. For further details on summer offerings at Yale, please consult the Yale Summer Session Web site at http://summer.yale.edu and a relevant dean in the Graduate School.

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 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. Departments and programs make every effort to design a course of study and to provide advice and guidance to make it possible for students to complete their work within six years. Normally three, or at most three and one-half, years are devoted to the completion of predissertation requirements (courses, examinations, selection of a dissertation topic). The remaining time, typically two to three years, is devoted to conducting research and writing the dissertation. Advanced standing that has been granted for work done in a Yale M.A./M.S. program is counted as part of the six years (for further information, see Transfer Credit and Advanced Standing, below).

RESIDENCE REQUIREMENT

Students seeking the Ph.D. degree are required to be in residence in the New Haven area during at least three academic years. This is an academic requirement, distinct from and independent of the tuition requirement described below. The residence requirement must normally be met within the first four years of study. Any exception to the residence requirement must be approved by the department and by the appropriate associate dean.

TUITION REQUIREMENT AND THE CONTINUOUS REGISTRATION FEE

All Ph.D. candidates are charged four years (eight terms) of full tuition, or proportionately less if all degree requirements, including submission of the dissertation, are completed in less than four continuous years of full-time study from the date of matriculation in the Ph.D. program.

Once the full-tuition obligation has been completed, registered students are charged the Continuous Registration Fee (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 (normally a maximum of three courses) in recognition of previous graduate-level work done at Yale or elsewhere. Such a waiver does not affect the tuition requirement. Courses taken previous to matriculation at Yale will not appear on 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 department listings. 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.

Graduate students taking undergraduate language courses will be graded according to the Yale College grading scale. Where applicable, language courses may count toward graduate degree requirements in some programs (see program descriptions). Undergraduate language courses may not count toward the Honors requirement.

The required level of proficiency in foreign languages, and the method for demonstrating it, are determined by the individual departments. 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. Each course offered in the Graduate School counts for a single credit or, in rare cases, one-half credit. Only courses offered by the Graduate School and officially numbered on the graduate level (i.e., 500 or higher), and receiving a qualitative grade of Honors, High Pass, or Pass, can fulfill requirements for the doctoral degree, with the exception of certain undergraduate language courses or where specified in advance by the 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. A student who is not in good academic standing with regard to course work or research, as defined by the minimum standards established by the Graduate School and the expectations outlined by the student's department or program, may be dismissed from the Graduate School. Such dismissal will be recorded on the student's transcript.

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 department listings. Students should consult with their director of graduate studies for further information about this requirement.

COMMITTEE CONSTITUTION REQUIREMENT

Each Ph.D. student must have a dissertation committee, satisfactory to the student's department and in accordance with Graduate School requirements, in order to register

for the fourth year of study. Students without an approved committee will normally be withdrawn from their program.

PROSPECTUS

The dissertation topic, in the form of a prospectus, must be approved by the department. Certification of this approval, together with a copy of the prospectus, must be filed with the Graduate School registrar at least six months prior to the submission of the dissertation. By the time a prospectus is submitted, the department must approve a member of the graduate faculty to serve as the primary adviser for the dissertation. Students who plan to submit the dissertation before the end of the fourth year of study should be sure to reserve time to satisfy this requirement.

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. However, substantive deviation from the dissertation project outlined in a prospectus (as determined by the director of graduate studies and associate dean) will require that the student draft a new prospectus to be approved by the dissertation committee at least six months prior to the submission of the dissertation.

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 during the stipulated duration of the degree program.

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. The name of the dissertation adviser.
2. 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?
3. 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.
4. 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 fieldwork at specific sites in the United States or abroad.
5. If the subject matter permits, a tentative proposal for the internal organization of the dissertation—for example, major sections, subsections, sequence of chapters.
6. A provisional timetable for completion of the dissertation.

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 and excluding any required teaching. 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. Training in teaching can

occur both before and after a student is admitted to candidacy. A student who has not been admitted to candidacy at the expected time will not be permitted to register for the following term. At the time of advancement to candidacy, students who have not petitioned for or received en route degrees (e.g., M.A., M.S., M.Phil.) will automatically be considered for such degrees. If a student advances to candidacy after the deadline to submit a petition for the degree in that term, the student will be considered for a degree in the following term.

TRAINING IN TEACHING

The Teaching Fellow Program (TFP) is the principal framework at Yale in which graduate students learn to become effective teachers. Learning to teach and to evaluate student work is fundamental to the education of graduate students. Teaching is required in many departments and is an expectation for all doctoral students. The TFP provides opportunities for graduate students to develop teaching skills, under faculty guidance, through active participation in the teaching of Yale undergraduates. Teaching fellows who encounter problems or difficulties related to their teaching appointments are encouraged to meet with their associate dean. A student must be registered in the Graduate School, at least half-time, to be appointed as a teaching fellow (TF) or as a part-time acting instructor (PTAI). TFs assist faculty in teaching relatively large undergraduate courses. PTAIs are responsible for small undergraduate courses, subject to guidance and advice by department faculty. For a more detailed description of these types of appointments, see Teaching Fellow Levels under Financing Graduate School.

Faculty should clearly communicate to students and teaching fellows their expectations about evaluation of work, feedback to students, and grading policies. Faculty are expected to prepare course syllabi, assignments, and examinations. Typically, they should not ask teaching fellows to give lectures when they are unable to attend class, although they are encouraged to offer occasional opportunities for student lectures when they can attend and advise. While on rare occasions teaching fellows may be asked to assist with administrative activities (such as placing course material on library reserve or online, making photocopies for class, ensuring that audiovisual resources are available and working, and the like), in general such activities should not be done by students.

Graduate students may occasionally serve as graders for graduate-level courses, but only in highly quantitative courses with grading demands for frequent assignments. To avoid conflicts of interest, teaching fellows should not normally be assigned to evaluate the work of graduate student peers. However, in courses requiring extensive quantitative work, teaching fellows may score quantitative homework and exams submitted by graduate students, using nondiscretionary scoring keys approved by the faculty instructor. In these instances, the faculty member should review the teaching fellow's scoring and must assign the final grade. In courses that are double-titled with both graduate and undergraduate numbers, the same guidelines hold for the grading of assignments; all other grading of graduate students should be done by the faculty member.

The Graduate School requires that all students who teach be in good academic standing. In addition, they must be fluent in English, except for those who solely grade. Graduate students whose native language is not English are required to meet the oral English proficiency standard before they may begin teaching. The standard may be met

by (1) passing the SPEAK test, (2) passing the Center for Language Study oral exam, (3) passing the speaking section of the iBT TOEFL, (4) passing the speaking portion of the IELTS exam, or (5) having received an undergraduate baccalaureate degree or its equivalent from an institution where the principal language of instruction is English. In some instances, a student's academic dean or director of graduate studies may require that students with an undergraduate degree from English-speaking institutions also pass an oral English exam to satisfy the language requirement.

DEFERRAL OF TEACHING YEAR

In the humanities and social sciences, students in a teaching year, normally years three and four, may defer a teaching year or term into the fifth or sixth year for compelling academic reasons. Such reasons include but are not limited to a need to conduct research in absentia or undertake additional preparation for teaching.

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. 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, but can constitute essentially discrete units. Beyond this principle, the faculty will apply the prevailing intellectual standards and scholarly practices within their fields in advising students with regard to the suitable scope, length, and structure of the dissertation, including what constitutes an original contribution to that field.

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 published on microfilm by University Microfilms International and then deposited in the Manuscripts and Archives section of the Sterling Memorial Library. As such, classified or restricted research is not acceptable as part of the dissertation. Exceptions must be approved in advance by the appropriate degree committee.

Dissertations must be written in and submitted in English except in some disciplines in which there are strong academic reasons for the submission of a dissertation in a foreign language. At the time of the submission of their prospectus, students must petition for permission to submit all or a portion of their dissertations in a foreign language. The petition should be submitted in the form of a letter explaining the academic reasons for using a foreign language and will be evaluated by the DGS and the appropriate associate dean. Petitions for writing and submitting a dissertation in a foreign language will not be accepted after students have advanced to candidacy. A dissertation may not be translated into English by someone other than the student.

Dissertations must be submitted to the Graduate School by the respective deadlines in the academic calendar to be considered for December or May degrees. No exceptions are made to these deadlines, which have been established to allow sufficient time for departments to receive evaluations from readers and recommend students to the degree committees. Once the adviser and committee have approved a dissertation for submission and the director of graduate studies has been notified, the student submits one unbound copy of the dissertation, softbound copies that will be distributed to each

reader, a completed set of required forms (http://gsas.yale.edu/sites/default/files/dissertation_checklist_and_phd_petition_02.16.16_secured_for_web.pdf), and any requisite fees to the Graduate School. The department must submit to the Graduate School a fully completed "Notification of Readers" form that has been approved by the director of graduate studies.

Registered doctoral candidates must have a principal adviser with an appointment on the Graduate School faculty. The Graduate School requires that each dissertation be read by at least three persons but not more than five, at least two of whom are ladder or ladder-track faculty members at Yale. All readers must hold the Ph.D. degree as well as a faculty position or be considered otherwise qualified to evaluate the dissertation. The process for assigning readers is determined by the department, which is responsible for confirming the qualifications, contact information, and willingness of all readers before notifying the Graduate School of these appointments. All appointments of readers are subject to review by the associate deans. The department is responsible for reassigning readers as necessary, and this process will not extend the deadline for readers' reports to be returned to the Graduate School. The Graduate School will send each student a copy of the readers' reports and place a copy in the student's permanent academic record.

Award of the Ph.D. will be considered by the degree committee only if all readers' evaluations have been received by the Graduate School and are positive, all other degree requirements have been met, and the department has recommended the awarding of the degree. Should a reader indicate that a dissertation contains significant errors in typing, grammar, spelling, reference citations, or other textual matters, the student will be required to revise the dissertation by a date provided by the registrar. Corrected pages or a new unbound copy of the dissertation must be submitted to the Graduate School, as well as a letter from the director of graduate studies indicating that the student has addressed the readers' concerns, before the dissertation can be recommended for a degree. In the event that a dissertation is evaluated as failing, departmental practice determines the number of reevaluations normally permitted.

The Graduate School does not require departments to evaluate the dissertations of degree candidates who are no longer registered. The decision to review such dissertations rests with the department.

Requirements for the Degree of Master of Philosophy

The Master of Philosophy is awarded en route to the Ph.D. in many departments. The minimum general requirements for this degree are that a student shall have completed all requirements for the Ph.D. except required teaching, 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.

Requirements for the Degree of Master of Arts or Master of Science

Except in the case of programs listed below under Terminal M.A.S./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 must comply with the credit hour standards set by the U.S. Department of Education and include the (1) completion of a minimum of seven courses leading to the Ph.D. or the equivalent of such courses, with grades that satisfy the 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 department listings.

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 deemed necessary for the completion of the proposed dissertation research. The student's proposed program of study must receive formal approval in writing from the director of graduate studies in both departments and the appropriate associate dean prior to enrollment in courses that will fulfill master's degree requirements in another department. 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. A student may not advance to candidacy until all requirements have been completed for both the en route master's degree in the program to which the student was admitted and the proposed master's degree in a related field. 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. Students enrolled in combined programs normally receive combined en route degrees as well.

TERMINAL M.A.S./M.A./M.S. DEGREES

The M.A.S./M.A./M.S. degrees are offered as terminal degrees in nineteen departments and programs: African Studies, American Studies, Applied Mathematics, Applied Physics, Archaeological Studies, Computational Biology and Bioinformatics, Computer Science, East Asian Studies, Engineering and Applied Science, English, European and Russian Studies, Global Affairs, History, International and Development Economics

(IDE), Medieval Studies, Music, Near Eastern Languages and Civilizations, Public Health, and Statistics.

The residence and tuition requirements for a terminal M.A.S./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 the department listings.

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 matriculation.

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.S./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). In order to maintain the minimum average of High Pass, each grade of Pass on the student's transcript must be balanced by one grade of Honors. Each grade of Fail must be balanced by two grades of Honors. If a student retakes a course in which he or she has received a failing grade, only the newer grade will be considered in calculating this average. The initial grade of Fail, however, will remain on the student's transcript. A grade awarded at the conclusion of a full-year course in which no grade is awarded at the end of the first term would be counted twice in calculating this average.

Each course offered in the Graduate School counts for one or one-half credit. Only courses offered by the Graduate School and officially numbered on the graduate level can fulfill requirements for the master's degree, with the exception of certain language courses or when specified in advance by the department or program. A student who has not fulfilled the course requirements for the degree at the conclusion of the standard duration of the program can, at the discretion of the department and associate dean, be granted one additional term to fulfill degree requirements. If the student has not taken the requisite number of courses but has fulfilled the tuition requirement, the student will be charged the Continuous Registration Fee. If the student must take additional courses beyond the number required, the student will be charged tuition on a per-course basis.

No credit will be awarded toward the M.A.S./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.

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, 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., M.D./Ph.D., and Ph.D./M.B.A. programs described below, joint-degree programs with other professional schools have been approved for students in European and Russian Studies, Global Affairs, and International and Development Economics. These programs are described in the individual department listings.

J.D./Ph.D. and J.D./M.A. programs

Admission to the Graduate School joint-degree programs with the Law School, described below, requires separate admission to both schools as well as approval by the appropriate associate dean in each school, and by the director of graduate studies in the student's Graduate School department. Students must apply for admission to a joint program no later than their first year of study in a J.D., Ph.D., or two-year M.A. program, and must matriculate in the joint program no later than the beginning of their second year. Students wishing to pursue a J.D./M.A. in a one-year M.A. program must apply for admission no later than their first year of study in the J.D. program and must matriculate in the M.A. program as a joint-degree candidate.

In the J.D./Ph.D. program, the first year of study is spent principally in the Law School. The second and third years are combined according to the interest of the student. As many as six term courses, designated by the student at the beginning of the term, may be counted toward both degrees. During this time all course work and language requirements for the Ph.D. program are normally completed. The J.D. should be completed by the end of the fourth year. During the fifth year the student is expected to complete all remaining predissertation requirements and be admitted to candidacy. The teaching requirement for the Ph.D. will normally be completed by this time. Any exception to this pattern of study must be approved by the appropriate associate dean.

The minimum residence requirement in the J.D./Ph.D. program is four years. The tuition requirement is two and one-half years in the Law School and three and one-half years in the Graduate School. Financial aid is provided by each school according to its own criteria, typically for two and one-half years in the Law School and three and one-half years in the Graduate School, and is awarded by each school during the terms in which the student pays tuition in that school. Students are not eligible for financial aid from the Graduate School during terms in which they are registered at another 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.

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 School of Medicine 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 School of Medicine or the Graduate School before admission to the M.D./Ph.D. program.

PH.D./M.B.A.

The joint degree combines the two-year M.B.A. degree from the School of Management (SOM) with the six-year Ph.D. It would allow its students to complete requirements for both degrees in roughly seven years rather than the eight or more years that would be required if the degrees were pursued separately. Both degrees will be awarded simultaneously once the student has fulfilled the degree requirements of both programs. Like all graduate students, joint-degree students will receive a full financial aid package from the Graduate School during the terms registered there. For students in the humanities and social sciences, this includes four years of tuition, five years of stipend, and health insurance for each term registered. Funding for students in the sciences will mirror standard, departmental packages. Students will pay one and one-half years of tuition for the three terms registered at SOM.

The School of Management and the Graduate School will use independent admissions processes and make independent admissions decisions. Applicants must take both the GRE tests and the GMAT. Prospective students who are currently enrolled neither

in the Graduate School nor in SOM may apply to both schools simultaneously. Students already enrolled in the Graduate School normally apply to SOM after taking one course at SOM for matriculation any time after they have passed their Ph.D. qualifying examinations at the Graduate School but prior to beginning the fifth year of study. This pattern, however, is flexible, and students interested in the joint degree should consult the Web pages of their departments or programs for further information. Students registered in SOM may apply to the Graduate School during the first year of study at SOM. Following admission to both programs, each student must complete a form requesting joint-degree status. The form must be signed by the appropriate associate dean at the Graduate School and at SOM and the student's director of graduate studies.

A student in the Graduate School who wishes to pursue the joint degree will normally be required to take one course in SOM before applying there. The student will need to obtain the permission of the SOM instructor and state his or her intention to apply to the joint-degree program. The Graduate School will waive one course during the term in which the student takes this preliminary course at SOM. For students in some disciplines, this prerequisite to admission will be waived. The student is expected to complete the qualifying exams and prospectus according to the standard schedule set by the Graduate School. The student will normally begin study at SOM after completing the departmental Ph.D. qualifying examinations at the Graduate School, but there are exceptions to this pattern described on the departmental Web sites. Upon admission to SOM, the joint-degree student will register at SOM for the first-year core of courses. Students may not fulfill any Graduate School requirements during this time, nor may they serve as teaching fellows in the Graduate School in any capacity. The student must register for a third term at SOM and complete four additional courses, normally prior to the beginning of the sixth year of study at the Graduate School. Depending on the schedule of individual students, they may or may not complete all four of these remaining courses within a single term at SOM. If they do not, they may complete outstanding courses while registered at the Graduate School, but in all circumstances, students are required to pay a third term of tuition to SOM.

A student who has been admitted to the Graduate School while completing the first-year core at SOM may begin course work in the Graduate School the following year. Once a joint-degree student has matriculated at the Graduate School, it is expected that the student remain registered continuously until completing the qualifying exams. During this time, the student may undertake limited course work at SOM, but may not register there for the third and final term until he or she has passed the departmental exams at the Graduate School. Prospective students who apply simultaneously may start the joint degree at either school and follow the schedules outlined above.

All joint-degree students are subject to the codes of conduct published in the bulletins of their respective programs. Joint-degree students will receive separate transcripts from SOM and the Graduate School. Each transcript will list the courses required for the respective school's portion of the joint degree. Each course taken may be counted toward one degree only. The transcripts will reflect the joint-degree status. If a joint-degree student decides not to complete both degrees, he or she may petition both schools to receive a single degree if the requirements for the single degree, including the two-year tuition requirement at SOM, are met.

Responsible Conduct in Research

Responsible Conduct in Research (RCR) training is intended to establish a basis of understanding among graduate students concerning their rights and obligations as scholars and researchers.

MASTER'S AND PH.D. STUDENTS

All master's and Ph.D. students are required to attend a small-group discussion of professional ethics on Matriculation Day at the start of their first year of study and to complete an approved online training module in professional ethics before they can register for the spring term of their first year.

Additional requirements: (1) Students in the natural sciences must complete a department-based RCR course by the end of their first year of study. Master's students in the natural sciences will not be charged tuition for this course; (2) Students in the humanities and social sciences who receive funding from a U.S. government grant or fellowship are required to complete an online RCR course offered by CITI within one month of the start of the funding.

STUDENTS IN THE DIVISION OF SPECIAL REGISTRATION (DSR)

All DSR students in the natural sciences, and DSR students in the humanities and social sciences who receive funding from a U.S. government grant or fellowship, are required to complete an online RCR course offered by CITI. This requirement must be fulfilled within one month of receiving a Yale NetID and even if RCR training was completed at another university.

Additional requirements: (1) All DSR students registered in the fall term must complete an approved online training module in professional ethics before they can register for the spring term; (2) DSR students in the natural sciences who intend to study at Yale for one year or more are required to complete, at no charge, the department-based RCR course taken by degree-seeking students.

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). 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). Students who have not petitioned for or received en route degrees (e.g., M.A., M.S., M.Phil.) will automatically be considered for such degrees in the term following advancement to candidacy. Students in terminal

M.A.S./M.A./M.S. programs may petition for their degrees in the term in which they expect to complete them.

Commencement

http://gsas.yale.edu/academics/commencement
GScommencement@yale.edu

There is only one University Commencement ceremony each year, in May. All degrees awarded for both December and May of each academic year are presented at the May ceremony. Graduating students must complete the Commencement form found at the site listed above by April each year in order to attend the GSAS diploma ceremony in person, or, alternatively, to receive the diploma by mail.

ACADEMIC REGULATIONS

Registration

Only registered students may attend classes, receive financial aid, or use the facilities of the University. Students must register every term for the duration of their degree program (normally six years or less for Ph.D. programs and one or two years for students in M.A.S./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 Leaves of Absence, under Registration Status and Leaves of Absence, below) will be considered to have withdrawn from the Graduate School. Privileges associated with registered status (i.e., library privileges, health care coverage, and e-mail accounts) will likewise be withdrawn.

Unless otherwise noted in the letter of admission, students are expected to register on a full-time basis. Part-time employment at the University or elsewhere should not conflict with the obligations of the degree 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 in consultation with the appropriate associate dean. International students must consult the Office of International Students and Scholars (OISS) regarding their eligibility for employment while in the United States.

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 Yale Health (see Health Services under Yale University Resources and Services for more information).

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.S./M.A./M.S. students, this includes satisfactory completion of courses from the preceding term(s). As indicated in the sections on 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. Students who fail to make satisfactory progress may be placed on a probationary status pending satisfactory completion of requirements. Ph.D. students who have been admitted to candidacy must continue to demonstrate satisfactory progress toward the degree in the annual Dissertation Progress Report (DPR). 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 DPR, will be administratively withdrawn.

Students must register each term until the dissertation is submitted or until six years (twelve terms) of study have been completed. Registered students who submit dissertations will remain registered until the end of the term (i.e., through December for those submitting during the fall term, through May for those submitting before the spring degree deadline, and through August for those submitting after the spring degree deadline) and will retain all privileges of registration (e.g., library privileges, health care coverage, and e-mail accounts). Students who complete all Ph.D. requirements within four continuous years of full-time study in the Ph.D. program will be registered and charged full tuition only through the term in which the dissertation is submitted. Students who have registered part-time or taken a leave of absence must complete the four-year, full-tuition obligation, regardless of when they submit the dissertation.

Students are expected to complete the dissertation within six years of study or less. Students who have not submitted the dissertation by the end of the sixth year of study may do so subsequently, at the discretion of the department, without registering or may request a period of extended registration by submitting the petition for extended registration, which includes the standard DPR that is required annually by May 1 of all students admitted to candidacy. Before a seventh year of registration is approved, the student and his or her adviser, as well as the director of graduate studies, must complete a report that specifies the progress the student has already made in writing the dissertation and that also includes a detailed plan for completing the dissertation in the seventh year. Very rarely, students may request an eighth year of registration due to serious circumstances beyond their control that have prevented them from completing the dissertation by the end of the seventh year of study. Students who receive extended registration must register online each term and are normally expected to be in residence.

Alternatively, a doctoral student who is not eligible for full-time registration may request to enroll with the status "Dissertation Completion." This part-time status enables advanced students to maintain an active NetID in order to access electronic library resources and their Yale e-mail accounts while completing their dissertations under the supervision of a member of the Graduate School faculty. A student may hold this status for a maximum of four consecutive terms and will be charged the Continuous Registration Fee in each term for which it is approved. Students on this status are not eligible to teach in the Teaching Fellow Program or to purchase health coverage as Yale affiliates. Once a student enters this status, he or she may not petition to register as a full-time student in a subsequent term.

Noncumulative registration In certain areas of study it may be necessary for a registered student to acquire an academic or methodological skill, such as 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 may request up to one year of "noncumulative registration." 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" must 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 registration. Noncumulative registration does not affect 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. While registered noncumulatively, students pay the Continuous Registration Fee and doctoral students continue to receive the Health Award from the Graduate School.

Part-time study Students in Ph.D. programs are expected to register for full-time study. In extraordinary circumstances a student may petition the Graduate School for permission to register as a half-time student for a limited period. Students may not register for half-time study for more than three of the first four academic years they are enrolled. Thereafter they must register full-time until the four-year tuition obligation has been satisfied. Any Ph.D. student who registers half-time at any point in his or her graduate program must fulfill the four-year tuition obligation to receive the Ph.D. (see below). Ph.D. 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.

Course Enrollment

Any student who wishes to enroll in courses during a term must register through the Online Course Selection (OCS) process. The deadlines for registration each term are listed in the Schedule of Academic Dates and Deadlines. Students who submit course enrollment forms after the appropriate deadline will be assessed a 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. Graduate students who wish to register for courses that are offered on both the graduate and undergraduate levels must register with the graduate-level course number (i.e., 500 or higher) in order to receive credit toward their degrees. In rare instances, a graduate student may be granted permission to register for an undergraduate

course that will count toward the fulfillment of course requirements for the student's graduate degree. In such cases, the student must file an approved Graduate Credit Request form (http://gsas.yale.edu/sites/default/files/files-forms/credit_request_form.pdf) with the Registrar's Office by the end of the registration period. Graduate students may not utilize the "Credit/D/Fail" option within the Yale College grading scale. 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. Graduate students taking a course through the School of Management and the Law School must also obtain written permission from the respective schools' registrars to be officially enrolled. Permission must be obtained within two weeks of the close of registration at the Graduate School.

A student who wishes to audit a course must receive permission from the instructor (as not all faculty permit auditors in their classes) and register for the course as an auditor. The minimum general requirement for auditing is attendance in two-thirds of the class sessions; instructors may set additional requirements for auditing their classes. Audited courses appear on the student's transcript.

COURSE CHANGES

Once the Online Course Selection (OCS) process has closed for a given term, all subsequent changes must be made using the Course Schedule Change Notification Form, 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 (Warner House, 1 Hillhouse Ave.), through the student's department, or online at http://gsas.yale.edu/forms.

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. If a student officially withdraws from a course by the stated deadline, the course will be removed from the student's transcript. If a student ceases to participate in a course without officially withdrawing from that course by the stated deadline, it is at the instructor's discretion to assign an appropriate qualitative grade or a grade of "Incomplete."

Grades

The grades assigned in the Graduate School are:

H	Honors
HP	High Pass
P	Pass
F	Fail
TI	Temporary Incomplete
I	Incomplete

A mark of "Y" is assigned as the grade for the first term of a full-year course and will be converted to a standard grade once both terms are completed, depending on the number of credits the course fulfills.

Marks of Satisfactory/Unsatisfactory may be assigned only when the department sponsoring the course has designated such marks. In such cases, the grading mode is the same for all students enrolled in 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. If a student retakes a course, both grades remain on the transcript, but only the higher grade is counted toward the program requirements.

The Schedule of Academic Dates and Deadlines 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 to the Registrar's Office a request for the Temporary Incomplete (TI) (available on the Graduate School Web site at http://gsas.yale.edu/forms) with the intended completion date, signed by the instructor and the director of graduate studies. Only one TI 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. If the registrar has not received a given grade from an instructor within two weeks of the stated deadline for the submission of grades, the student will be assigned a grade of "Incomplete" for that course.

Students are reminded that the policies stated above are the Graduate School minimum general requirements. Departments or individual instructors may have more stringent policies, and students should consult their departmental handbooks or directors of graduate studies about such requirements.

Registration Status and Leaves of Absence

REGISTRATION IN RESIDENCE

Students who are studying on campus, attending classes, and using University facilities are considered to be in residence. All M.A.S./M.A./M.S. and nondegree (DSR) students must register in residence each term, as do most students in Ph.D. programs (see also Registration in Absentia and Continuous Registration Fee, below). Students who will be

in residence during any term are required to register through the Online Course Selection process during the normal registration period at the beginning of that term (see the Schedule of Academic Dates and Deadlines).

A fee will be charged to students who register in residence after the close of the registration period. 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 (246 Church Street) as soon as possible.

REGISTRATION IN ABSENTIA

Ph.D. students whose program of study requires full-time dissertation research, full-time fieldwork, 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. Forms for requesting registration in absentia may be obtained online at http://gsas.yale.edu/forms 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. Registration in absentia does not reduce the four-year full-tuition or three-year residence requirements. For additional information, see Eligibility for Fellowships under Financing Graduate School.

Students who are enrolled in Yale Health and are registering in absentia should consult the staff of the Member Services Department at Yale Health about the policies governing coverage while they are away from New Haven. The Graduate School funds travel insurance for students who have been approved to pursue degree-related activities outside the United States. Such students should register their locations at http://world.yale.edu/travel to facilitate communication with the University in case of an emergency.

CONTINUOUS REGISTRATION FEE

Ph.D. students who have completed the tuition and residence requirements described 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 who have met the tuition requirement are charged a Continuous Registration Fee (CRF) for each term in which they remain registered. Students who are granted permission to register beyond the sixth year are also charged the CRF. The Graduate School will cover the cost of the CRF for Ph.D. students registered full-time in year seven and beyond for any term in which they serve as Teaching Fellows.

SUMMER REGISTRATION

Ph.D. students receive funding and are expected to continue full-time independent study or research during the summer. Continuing students who were registered during the preceding spring term remain registered through August 31. Ph.D. students who wish

to interrupt their studies during the summer (e.g., to accept an internship) must notify their associate dean prior to May 15.

Many M.A./M.S. students continue full- or half-time independent study or research during the summer. Continuing students who were registered during the preceding spring term remain registered through August 31.

Students can obtain verification of summer registration from the Office of the Graduate Registrar.

SUMMER INTERNSHIPS

Normally, students who take time off from their studies to work full-time must take a leave of absence for the term or terms in which they are employed. However, certain summer internship opportunities may be beneficial to a student's academic development and career prospects. Therefore, under certain circumstances students may be permitted to remain registered at Yale while engaged in summer internships. To be eligible, the internship must meet several requirements:

- Continuous registration while participating in an internship requires the permission of the DGS.
- The internship should serve one of two functions: either the student is learning and developing techniques or acquiring data that will be used in the dissertation, or the internship is exposing the student to a potential field of employment following completion of his or her Ph.D.
- The internship must start after the end of the spring term, and be completed before the start of the fall term. If an internship opportunity overlaps with the fall or spring term, students must request a leave of absence.
- Students participating in a summer internship forfeit their summer funding from Yale. The sole exception is if the internship is unpaid and the student is generating data that will be used in the dissertation, or obtaining technical or methodological skills necessary for the dissertation. In this case, the student may request to receive summer support from Yale. In most cases, funding will terminate at the end of May and resume on September 1.
- Students will be limited to two summer internship opportunities. If a student wishes to pursue additional internships, he or she must apply for a leave of absence.
- Students will remain registered full-time and will continue to receive the Health Award and other benefits of registration. Internships do not stop a student's "academic clock."
- Students wishing to pursue internships undertaken primarily for exposure to potential fields of employment are eligible to do so only after they have advanced to candidacy.

To apply for a summer internship:

1. Complete the Request for Summer Internship form. Submit this form with a letter to the DGS describing the nature of the internship and work to be done. Include the name of the employer, location and dates of employment, contact information, and salary or benefits provided by the internship. If the internship restricts the student's rights to use and publish information produced during the experience, a copy of the employer's intellectual property rights agreement or proprietary data agreement

should also be submitted. Explain the goals of the internship and how this experience will advance the dissertation research or promote career goals.

2. With the form and letter, students should submit a research plan for the coming year that describes their goals, steps for achieving those goals, and the role of the internship in their plans. Students who have been admitted to candidacy and who have included the internship in their annual Dissertation Progress Report (DPR) may refer to the DPR instead of submitting a new research plan.
3. The student's adviser must include a letter of support explaining how the student will benefit from this internship.
4. The DGS should recommend or disapprove the plan. Recommended plans should be forwarded to the associate dean for final review. The DGS should certify that the type of experience gained is consistent with the educational goals of the department.
5. International students wishing to pursue internships should contact OISS eight to ten weeks prior to the start of the proposed internship, as they will require permission for "practical training" from the U.S. government.

LEAVES OF ABSENCE

Students who wish or need to interrupt their study temporarily may request a leave of absence. There are three types of leave—personal, medical, and parental—all of which are described below. The general policies that apply to all 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 written recommendation of a Yale Health physician, as described below.
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.S./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 a one-term or one-year leave, to a cumulative maximum total of two years of personal and medical leave, may be granted for students in Ph.D. programs. Leaves of absence for students in M.A.S./M.A./M.S. programs are not renewable. The duration of a parental leave is one term or one year, renewable for each birth or adoption event.
3. International students who apply for a leave of absence must consult with OISS regarding their visa status.
4. Students on leave may complete 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.
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.S./M.A./M.S. programs) or from paying the Continuous Registration Fee (if appropriate), but merely postpones the required charges.

6. A student on leave of absence is not eligible for financial aid, including loans; and in most cases, student loans are not deferred during periods of nonenrollment.
7. A student on leave of absence is not eligible for the use of any University facilities normally available to enrolled students.
8. A student on leave of absence may continue to be enrolled in Yale Health by purchasing coverage through the Student Affiliate Coverage plan. In order to secure continuous coverage from Yale Health, 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 approved. Coverage is not automatic; enrollment forms are available from the Member Services Department of Yale Health, 203.432.0246.
9. Students living in University housing units are encouraged to review their housing contract and the related policies of the Graduate Housing Office before applying to the Graduate School for a leave of absence.
10. 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 eight weeks prior to the end of the approved leave.
11. Students who fail to register for the term following the end of the approved leave will be administratively withdrawn from the Graduate School.

Personal leave of absence A student who wishes or needs to interrupt study temporarily because of personal exigencies may request a personal leave of absence. The general policies governing all leaves of absence are described above. A student who is current with his or her degree requirements is eligible for a personal leave 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. 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 complete the appropriate form (available online at http://gsas.yale.edu/forms) 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 whose application for a personal leave is denied, and who do not register for any term, will be administratively withdrawn from the Graduate School.

Medical leave of absence A student who must interrupt study temporarily because of illness or injury 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 Yale Health. A student who wishes to take a medical leave of absence may request it from a physician at Yale Health or from his or her associate dean. The general policies

governing all leaves of absence are described above. A student who is making satisfactory progress toward his or her degree requirements is eligible for a medical leave any time after matriculation. The final decision concerning a request for a medical leave of absence will be communicated in writing by the appropriate associate dean.

The Graduate School reserves the right to require a student to take a leave for medical reasons when, on recommendation of the director of Yale Health or the chief of the Mental Health and Counseling department, an associate dean of the Graduate School determines that the student is a danger to self or others because of a serious medical problem, or that the student has refused to cooperate with efforts deemed necessary by Yale Health to determine if the student is such a danger. An appeal of such a leave must be made in writing to the dean of the Graduate School no later than seven days from the effective date of the leave.

A student who is placed on medical leave during any term will have his or her tuition adjusted according to the same schedule used for withdrawals (see Schedule of Academic Dates and Deadlines). Before re-registering, a student on medical leave must secure written permission to return from a Yale Health physician.

Eligible Ph.D. students will receive a Health Award from the Graduate School to cover the cost of the Student Affiliate Coverage plan for the remainder of the coverage period in which the medical leave is started, if they apply for this coverage through Yale Health within thirty days of the start of their leave.

Leave of absence for parental responsibilities A student who wishes or needs to interrupt study temporarily for reasons of pregnancy, maternity care, or paternity care may be granted a leave of absence for parental responsibilities. The general policies governing all leaves of absence are described above. A student who is making satisfactory progress toward his or her degree requirements is eligible for parental leave any time after matriculation.

Eligible Ph.D. students will receive a Health Award from the Graduate School to cover the cost of the Student Affiliate Coverage plan for the remainder of the coverage period in which the parental leave is started, if they apply for this coverage through Yale Health within thirty days of the start of their leave.

Students granted a parental leave may continue to reside in University housing to the end of the academic term for which the leave was first granted, but no longer.

PARENTAL SUPPORT AND RELIEF

Registered Ph.D. students who wish to modify their academic responsibilities because of the birth or adoption of a child may request parental support and relief during or following the term in which the birth or adoption occurs. For the whole of the term in which the support and relief are granted, the student's academic clock stops, effectively adding an additional term to the total time to degree. During this period, students remain registered full-time, receive a standard financial aid stipend and Health Award, and receive modified departmental academic expectations that best suit the specific situation. The precise nature of the academic responsibilities undertaken or suspended during this period should be a matter of consultation between the adviser and the student, with the understanding that students are entitled to full relief from responsibilities for at least an eight-week period. Most students take an entire term of parental relief, but the relief may

be split in two, with a student taking only eight weeks of relief during the term in which, or just after, a birth or adoption occurs and then receiving an additional eight weeks of stipend funded by the Graduate School postponed to a later term. Parental relief may not be combined with other funding. To arrange for parental relief, a student should contact the appropriate associate dean four months prior to a birth or adoption. This benefit is limited to two birth or adoption events. If both parents are graduate students at Yale, only one student may receive this benefit per birth or adoption event, though the second student may consult with the associate dean regarding a modification of academic responsibilities.

Graduate students in terminal M.A.S./M.A./M.S. programs may modify their academic responsibilities because of the birth or adoption of a child. They should contact their associate dean the term before the planned modifications would occur.

WITHDRAWAL AND READMISSION

A student may withdraw from his or her program voluntarily or may be withdrawn for cause. 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 (available on the Graduate School Web site at http://gsas.yale.edu/forms) 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.

Students who are not in good academic standing will be withdrawn for cause, unless an extension or exception has been granted by the appropriate dean or degree committee. Such withdrawals will be noted on the student's transcript.

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, will be administratively withdrawn from the Graduate School.

A student who discontinues his or her program of study during the academic year without submitting an approved withdrawal form and the University identification card will be liable for the tuition charge (or Continuous Registration Fee) for the term in which the withdrawal occurs. Tuition charges for students who withdraw in good standing will be adjusted as described in the Schedule of Academic Dates and Deadlines. 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 under Health Services, below.

Only students who have withdrawn from the Graduate School in good standing may apply for readmission. Normally, students seeking readmission must do so within three years of the original withdrawal. 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. Students may seek readmission only once. If subsequent to a readmission they must again withdraw, they are ineligible for readmission.

U.S. MILITARY LEAVE READMISSIONS POLICY

Students who wish or need to interrupt their studies to perform U.S. military service are subject to a separate U.S. military leave readmissions policy. In the event a student withdraws or takes a leave of absence from the Graduate School to serve in the U.S. military, the student will be entitled to guaranteed readmission under the following conditions:

1. The student must have served in the U.S. Armed Forces for a period of more than thirty consecutive days.
2. The student must give advance written or oral notice of such service to the appropriate dean. In providing the advance notice the student does not need to indicate whether he or she intends to return. This advance notice need not come directly from the student, but rather, can be made by an appropriate officer of the U.S. Armed Forces or official of the U.S. Department of Defense. Notice is not required if precluded by military necessity. In all cases, this notice requirement can be fulfilled at the time the student seeks readmission, by submitting an attestation that the student performed the service.
3. The student must not be away from the Graduate School to perform U.S. military service for a period exceeding five years (this includes all previous absences to perform U.S. military service but does not include any initial period of obligated service). If a student's time away from the Graduate School to perform U.S. military service exceeds five years because the student is unable to obtain release orders through no fault of the student or the student was ordered to or retained on active duty, the student should contact the appropriate dean to determine if the student remains eligible for guaranteed readmission.
4. The student must notify the Graduate School within three years of the end of the U.S. military service of his or her intention to return. However, a student who is hospitalized or recovering from an illness or injury incurred in or aggravated during the U.S. military service has up until two years after recovering from the illness or injury to notify the Graduate School of his or her intent to return.
5. The student cannot have received a dishonorable or bad conduct discharge or have been sentenced in a court-martial.

A student who meets all of these conditions will be readmitted for the next term, unless the student requests a later date of readmission. Any student who fails to meet one of these requirements may still be readmitted under the general readmission policy but is not guaranteed readmission.

Upon returning to the Graduate School, the student will resume his or her education without repeating completed course work for courses interrupted by U.S. military service. The student will have the same enrolled status last held and with the same academic standing. For the first academic year in which the student returns, the student will be charged the tuition and fees that would have been assessed for the academic year in which the student left the institution. Yale may charge up to the amount of tuition and fees other students are assessed, however, if veteran's education benefits will cover the difference between the amounts currently charged other students and the amount charged for the academic year in which the student left.

In the case of a student who is not prepared to resume his or her studies with the same academic status at the same point at which the student left or who will not be able to complete the program of study, the Graduate School will undertake reasonable efforts to help the student become prepared. If after reasonable efforts, the Graduate School determines that the student remains unprepared or will be unable to complete the program, or after the Graduate School determines that there are no reasonable efforts it can take, the Graduate School may deny the student readmission.

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. Students are required to report misdemeanor and felony charges to their associate dean.

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. Multiple submission of the same work without obtaining explicit written permission from both instructors before the material is submitted.
4. Misuse of the materials or facilities of the University library.
5. Unauthorized use of University services, equipment, or facilities, such as telephones and photocopying equipment.
6. 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.)
7. 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.
8. Engaging in a relationship with a student while serving as the student's teaching fellow or in any other direct supervisory role over the student (as outlined in the University's policy prohibiting "Teacher-Student Consensual Relationships").
9. 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 Freedom of Expression, below.)
10. Refusal to comply with the direction of a University police officer or other University official, including a member of the faculty, acting in the performance of her or his duties.

11. Misuse, alteration, or fabrication of University credentials or documents, such as an identification card or transcript, including grade lists submitted by teaching fellows.
12. Misrepresentation or lying during a formal inquiry by University officials.
13. Misrepresentation in applying for admission or financial aid.
14. Theft, misuse of funds, or willful damage of University property. Off-campus misconduct may result in disciplinary action if such conduct imperils the integrity and values of the University community. Off-campus violations committed in the course of a Yale-sponsored program anywhere in the world could also be subject to disciplinary charges.
15. Trespassing on University property to which access is prohibited.
16. Possession or use of explosives, incendiary devices, or weapons on or about the campus.
17. Interference with the proper operation of safety or security devices, including fire alarms, electronic gates, and sprinkler systems.
18. 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. Violations of regulations pertaining to sexual misconduct or the University's Consensual Relations Policy will be referred to the University-Wide Committee on Sexual Misconduct. Students found guilty of such violations will be subject to one or more of the following disciplinary penalties:

Reprimand
Probation
Suspension
Dismissal
Fines
Restitution
Restriction

Penalties of suspension or dismissal will be noted on the student's transcript. Pending disciplinary charges will be noted on a student's transcript if he or she withdraws from the Graduate School after being formally charged but before such charges have been resolved. A student who has petitioned for a degree will not receive the degree while charges are pending or while serving a suspension. A student who has been dismissed for a disciplinary violation may petition for a degree, to be awarded at the discretion of the Degree Committee, based on work completed before the infraction occurred. A student dismissed for academic misconduct will not receive a degree from the Graduate School regardless of requirements fulfilled before the infraction occurred. The Graduate School reserves the right to impose fines as appropriate, in addition to requiring payment for costs resulting from or associated with the offenses. 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 may be obtained from the office of each of the associate deans of the Graduate School or via the Graduate School Web site (http://gsas.yale.edu/policies). 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 Graduate School maintains a set of procedures. Copies of the grievance procedures of the Graduate School may be obtained from the office of each of the associate deans of the Graduate School or via the Graduate School Web site: http://gsas.yale.edu/academic-professional-development/professional-ethics-regulations/student-grievances. The deans may be consulted for further information and advice.

THE GRADUATE SCHOOL PROCEDURE FOR STUDENT COMPLAINTS

This procedure governs most student complaints, including, but not limited to, complaints of discrimination on the basis of race, sex, color, religion, national or ethnic origin, disability, or sexual orientation, 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. Complaints of sexual misconduct, which includes sexual harassment and sexual assault, may be brought to a Title IX Coordinator or to the University-Wide Committee on Sexual Misconduct (UWC). For more information on the University's Title IX Coordinators or the UWC, please see Resources on Sexual Misconduct under Yale University Resources and Services.

PROVOST'S PROCEDURE

The Provost's Procedure governs most student complaints, including, but not limited to, complaints of discrimination on the basis of race, sex, color, religion, national or ethnic origin, disability, or sexual orientation, 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. This procedure is available at www.yale.edu/equalopportunity/grievance. Complaints of sexual misconduct, which includes sexual harassment and sexual assault, may be brought to a Title IX Coordinator or to the University-Wide Committee on Sexual Misconduct (UWC). For more information on the University's Title IX Coordinators or the UWC, please see Resources on Sexual Misconduct under Yale University Resources and Services.

Freedom of Expression

The Yale faculty has formally endorsed as an official policy of Yale University the following statement from the Report of the Committee on Freedom of Expression at Yale, published in January 1975.

The primary function of a university is to discover and disseminate knowledge by means of research and teaching. To fulfill this function a free interchange of ideas is necessary not only within its walls but with the world beyond as well. It follows that the university must do everything possible to ensure within it the fullest degree of intellectual freedom. The history of intellectual growth and discovery clearly demonstrates the need for unfettered freedom, the right to think the unthinkable, discuss the unmentionable, and challenge the unchallengeable. To curtail free expression strikes twice at intellectual freedom, for whoever deprives another of the right to state unpopular views necessarily also deprives others of the right to listen to those views.

We take a chance, as the First Amendment takes a chance, when we commit ourselves to the idea that the results of free expression are to the general benefit in the long run, however unpleasant they may appear at the time. The validity of such a belief cannot be demonstrated conclusively. It is a belief of recent historical development, even within universities, one embodied in American constitutional doctrine but not widely shared outside the academic world, and denied in theory and in practice by much of the world most of the time.

Because few other institutions in our society have the same central function, few assign such high priority to freedom of expression. Few are expected to. Because no other kind of institution combines the discovery and dissemination of basic knowledge with teaching, none confronts quite the same problems as a university.

For if a university is a place for knowledge, it is also a special kind of small society. Yet it is not primarily a fellowship, a club, a circle of friends, a replica of the civil society outside it. Without sacrificing its central purpose, it cannot make its primary and dominant value the fostering of friendship, solidarity, harmony, civility, or mutual respect. To be sure, these are important values; other institutions may properly assign them the highest, and not merely a subordinate, priority; and a good university will seek and may in some significant measure attain these ends. But it will never let these values, important as they are, override its central purpose. We value freedom of expression precisely because it provides a forum for the new, the provocative, the disturbing, and the unorthodox. Free speech is a barrier to the tyranny of authoritarian or even majority opinion as to the rightness or wrongness of particular doctrines or thoughts.

If the priority assigned to free expression by the nature of a university is to be maintained in practice, clearly the responsibility for maintaining that priority rests with its members. By voluntarily taking up membership in a university and thereby asserting a claim to its rights and privileges, members also acknowledge the existence of certain obligations upon themselves and their fellows. Above all, every member of the university has an obligation to permit free expression in the university. No member has a right to prevent such expression. Every official of the university, moreover, has a special obligation to foster free expression and to ensure that it is not obstructed.

The strength of these obligations, and the willingness to respect and comply with them, probably depend less on the expectation of punishment for violation than they do on the presence of a widely shared belief in the primacy of free expression. Nonetheless, we believe that the positive obligation to protect and respect free expression shared by all members of the university should be enforced by appropriate formal

sanctions, because obstruction of such expression threatens the central function of the university. We further believe that such sanctions should be made explicit, so that potential violators will be aware of the consequences of their intended acts.

In addition to the university's primary obligation to protect free expression there are also ethical responsibilities assumed by each member of the university community, along with the right to enjoy free expression. Though these are much more difficult to state clearly, they are of great importance. If freedom of expression is to serve its purpose and thus the purpose of the university, it should seek to enhance understanding. Shock, hurt, and anger are not consequences to be weighed lightly. No member of the community with a decent respect for others should use, or encourage others to use, slurs and epithets intended to discredit another's race, ethnic group, religion, or sex. It may sometimes be necessary in a university for civility and mutual respect to be superseded by the need to guarantee free expression. The values superseded are nevertheless important, and every member of the university community should consider them in exercising the fundamental right to free expression.

We have considered the opposing argument that behavior which violates these social and ethical considerations should be made subject to formal sanctions, and the argument that such behavior entitles others to prevent speech they might regard as offensive. Our conviction that the central purpose of the university is to foster the free access of knowledge compels us to reject both of these arguments. They assert a right to prevent free expression. They rest upon the assumption that speech can be suppressed by anyone who deems it false or offensive. They deny what Justice Holmes termed "freedom for the thought that we hate." They make the majority, or any willful minority, the arbiters of truth for all. If expression may be prevented, censored, or punished, because of its content or because of the motives attributed to those who promote it, then it is no longer free. It will be subordinated to other values that we believe to be of lower priority in a university.

The conclusions we draw, then, are these: even when some members of the university community fail to meet their social and ethical responsibilities, the paramount obligation of the university is to protect their right to free expression. This obligation can and should be enforced by appropriate formal sanctions. If the university's overriding commitment to free expression is to be sustained, secondary social and ethical responsibilities must be left to the informal processes of suasion, example, and argument.

Financing Graduate School

TUITION AND FEES, 2016–2017

*Tuition**

Full-time study, per term	$19,900
Full-time study in IDE, per term	20,400
Half-time study, per term	9,950
Master's programs, less than half-time per term	
One-quarter time study, per term	4,975
Division of Special Registration (DSR, nondegree study)	
Course work, per course, per term (including audited courses)	4,975
Visiting Affiliated Research Graduate Students, per term	19,900
Visiting Assistants in Research, per month	425

Fees†

Continuous Registration Fee (CRF), per term‡	$575
Special in absentia registration, per term‡	575
Yale Health Hospitalization/Specialty Coverage, twelve months§	2,264

*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. For fees relating to registration and course enrollment, see Course Enrollment, under Academic Regulations.

‡See Registration Status and Leaves of Absence, under Academic Regulations.

§Hospitalization fees are for single students. Rates are higher for students needing dependent coverage. Hospitalization/Specialty Coverage includes prescription coverage.

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, postdoctoral appointees 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 Human Resources for details. Postdoctoral appointees (whose appointment is at least half-time) may only receive tuition benefits if the classes taken are consistent with their educational training. With the permission of the instructor, full-time faculty members and their spouses, emeritus faculty and their spouses, postdoctoral appointees and their spouses, and University employees may audit courses without charge. The audited courses are not recorded on Graduate School transcripts. Classes audited by postdoctoral appointees should be consistent with the appointees' training objectives, and appointees should discuss their plans with their mentors to ensure that the course work does not interfere with research activities.

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 provided that they have received the approval of the course instructor.

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 office's Web site is http://student-accounts.yale.edu.

Bills

Yale University's official means of communicating monthly financial account statements is through the University's Internet-based system for electronic billing and payment, Yale University eBill-ePay. Yale does not mail paper bills.

Student account statements are prepared and made available twelve times a year at the beginning of each month. Payment is due in full by 4 p.m. Eastern Time on the first business day of the following month. E-mail notifications that the account statement is available on the University eBill-ePay Web site (www.yale.edu/sis/ebep) are sent to all students at their official Yale e-mail addresses and to all student-designated authorized payers. From the eBill-ePay Web site, students can designate up to three authorized payers to access the eBill-ePay system in order to view the monthly student account statements and make online payments.

Bills for tuition, room, and board are available during the first week of July, due and payable by August 1 for the fall term; and during the first week of November, due and payable by December 1 for the spring term. The Office of Student Financial Services will impose late fees of $125 per month (up to a total of $375 per term) if any part of the term bill, less Yale-administered loans and scholarships that have been applied for on a timely basis, is not paid when due. Nonpayment of bills and failure to complete and submit financial aid application packages on a timely basis may result in the student's involuntary withdrawal from the University.

No degrees will be conferred and no transcripts will be furnished until all bills due the University are paid in full. In addition, transcripts will not be furnished to any student or former student who is in default on the payment of a student loan.

The University may withhold registration and certain University privileges from students who have not paid their term bills or made satisfactory payment arrangements by the day of registration. To avoid delay at registration, students must ensure that payments reach Student Financial Services by the due dates.

Payments

There are a variety of options offered for making payments. Yale University eBill-ePay (www.yale.edu/sis/ebep) is the *preferred* means for payment of your monthly student account bill. The ePayments are immediately posted to the student account. There is no charge to use this service. Bank information is password-protected and secure, and a printable confirmation receipt is available. On bill due dates, payments using the eBill-ePay system can be made up to 4 p.m. Eastern Time in order to avoid late fees.

For those who choose to pay the student account bill by check, remittance advice with mailing instructions is available on the eBill-ePay Web site. All bills must be paid in U.S. currency. Checks must be payable in U.S. dollars drawn on a U.S. bank. Payments can

also be made via wire transfer. Instructions for wire transfer are available on the eBill-ePay Web site.

Yale does *not* accept credit card payments.

A processing charge of $25 will be assessed for payments rejected for any reason by the bank on which they were drawn. In addition, the following penalties may apply if a payment is rejected:

1. If the payment was for a term bill, a $125 late fee will be charged for the period the bill was unpaid.
2. If the payment was for a term bill to permit registration, the student's registration may be revoked.
3. If the payment was given to settle an unpaid balance in order to receive a diploma, the University may refer the account to an attorney for collection.

Yale Payment Plan

The Yale Payment Plan (YPP) is a payment service that allows students and their families to pay tuition, room, and board in ten equal monthly installments throughout the year based on individual family budget requirements. It is administered by the University's Office of Student Financial Services. The cost to enroll in the YPP is $100 per contract. The deadline for enrollment is June 25. Additional details concerning the Yale Payment Plan are available at http://student-accounts.yale.edu/ypp.

TRANSCRIPTS

Transcripts may be ordered online at www.yale.edu/sis or in writing from the Office of the Registrar for the Faculty of Arts and Sciences (246 Church Street, third floor).

FINANCIAL AID

Financial assistance is provided in the form of Yale University Fellowships, tuition fellowships, teaching fellowships, traineeships, and research assistantships. The nature of the assistance varies among the divisions and departments. In most departments and programs, doctoral students are guaranteed five years of twelve-month stipend and tuition support. Applicants for admission to Ph.D. programs will automatically be considered for all Yale fellowships, traineeships, research assistantships, and teaching fellowships for which they are eligible. These awards of financial aid are announced in letters of admission, which are usually mailed during the month of March. Applicants for admission to nondegree and terminal master's programs are required to complete the financial statement contained in the application brochure. Students are strongly encouraged to seek financial support from external sources (see External Fellowships and Combined Award Policy, below).

In addition to grants and fellowships for tuition and living costs, Yale Health Basic Coverage is provided at no cost to students enrolled at least half-time in M.A., M.S., and Ph.D. programs. Eligible Ph.D. students also receive a Health Award, which covers the full cost of single-student Yale Health Hospitalization/Specialty Coverage (includes coverage for prescriptions), half the cost of two-person coverage, and the full cost for family coverage. Students who do not participate in Yale Health Hospitalization/Specialty

Coverage will not be provided with Health Awards. The graduate dental and vision plans are options that eligible students may choose to purchase for themselves and their dependents and are not covered by the Health Award. (For further information regarding health care options through Yale Health, see Health Services under Yale University Resources and Services.)

University Fellowships

The Graduate School provides all Ph.D. students with a minimum level of support for five years upon admission. Fellowships are awarded at admission to entering students on the basis of merit and recommendations made by individual departments. 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. Students who teach when such teaching is not part of the standard departmental pattern defer their University Fellowships to a later year and do not receive more than the standard departmental stipend while teaching.

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 and any combination of University funding with other sources of financial aid (see External Fellowships and Combined Award Policy, below).

Dissertation Fellowships

The Graduate School offers University Dissertation Fellowships (UDF) as part of its financial aid package to eligible advanced graduate students in the humanities and social sciences once they have advanced to doctoral candidacy. Students receive the UDF when engaged in full-time research and writing, normally in the fifth year of study. The UDF is usually taken in consecutive terms (beginning in either the fall or spring term) and must be completed by the end of the sixth year of study. Students on the UDF may not teach in the GSAS Teaching Fellow Program. Students who accept a Teaching Fellow position in the fall or spring of the year of final eligibility will forfeit that term's dissertation fellowship amount. Students receiving external funding for dissertation research or writing may be eligible for a combined award and should consult the External Fellowships and Combined Award policy.

Teaching Fellowships

TEACHING AND ADMISSION OFFERS

Because the Graduate School considers teaching experience to be an integral part of graduate education, doctoral students receive financial aid packages that include teaching fellowships. In many programs there are specific years when students are expected to teach. For example, most humanities and social science students will teach in their third and fourth years. In the natural sciences, the timing of teaching is earlier or is flexible across several years. When requested by the student for compelling academic reasons, these patterns may be adjusted with the permission of the director of graduate studies contingent on the student's satisfactory academic progress and on sufficient course enrollment.

If the associate dean and director of graduate studies determine that no suitable teaching is available in a term in which a student is expected to teach, the student will continue to receive his or her standard departmental stipend that term. Stipend support will be withheld if a student elects not to teach as outlined in the student's offer of admission.

In the humanities and social sciences, students may be guaranteed teaching in the sixth year of study if the director of graduate study certifies that the student will submit the dissertation by the end of the sixth year of study.

ACCESS TO TEACHING FELLOWSHIPS

When departments are considering applications for teaching fellowships, priority is given to qualified graduate students who are expected to teach as indicated in their letter of admission or who are eligible for a guaranteed sixth year teaching position. Students in years two through six who have completed their required teaching may teach if enrollments permit and as long as they have been admitted to candidacy and do not concurrently hold a dissertation fellowship. Students who are permitted to register beyond the sixth year of study may be appointed as TFs or PTAIs, but only if there is no other qualified candidate available in the first six years of study in any department or program of the Graduate School. In cases where an appointing department must choose between two or more graduate students who are each well qualified to teach a particular course, the student or students who have not yet had a chance to teach or who have taught the least will be given preference.

LIMITS ON TEACHING

Except when specified in their letters of admission, first-year doctoral students may be appointed as teaching fellows only in exceptional cases, and only after prior approval by their director of graduate studies and the associate dean. In any year of study, the maximum amount of teaching a student in years one through six may do is two Level 10 assignments (up to ten hours per week) or one PTAI per term. Seventh-year students may teach up to three Level 20 assignments (up to twenty hours per week) per year. Students may not serve as faculty members while registered in the Graduate School.

Students seeking TF appointments outside of their departments should discuss their plans with their director of graduate studies well in advance of the start of a term.

Students with outside fellowships are eligible to serve as TFs according to the policies of the Graduate School and the conditions of their outside awards.

APPOINTMENT LETTERS

Letters of appointment are sent to graduate students via the online Teaching Fellow System (TFS) indicating the course in which a graduate student is expected to teach and the level of the assignment. An appointment is not official until the electronic appointment letter has been transmitted via the online TFS.

TEACHING FELLOW LEVELS

All teaching fellows teach at one of two effort levels. Level 10 TFs are expected to teach for 6–10 hours per week. Level 20 TFs are expected to teach for 15–20 hours per week. Science students engaged in required teaching and doctoral students in the humanities and social sciences who teach in years one through six receive the standard departmental

stipend irrespective of assignment. All students, including master's and professional school students, who are teaching outside of a doctoral financial aid package will receive $4,000 for a Level 10 assignment and $8,000 for a Level 20 assignment.

Traineeships and Assistantships in Research

Traineeships (National Research Service Awards) from the National Institutes of Health are available in most of the biological sciences and in some other departments. These awards support full-time Ph.D. study by U.S. citizens, noncitizen nationals of the United States, and permanent residents. In combination with University and departmental supplements, they provide payment of tuition, a monthly stipend, and the hospitalization premium. Federal rules require that trainees pursue their research training on a full-time basis. In some instances, there is a federal payback provision, which is ordinarily satisfied by serving in health-related research or teaching at the conclusion of training. Information about this obligation and other matters relating to traineeships is available from the director of graduate studies or the principal investigator of the specific training grant in question.

Research Appointments

Doctoral 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 Ph.D. 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 projects 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.

EXTERNAL FELLOWSHIPS AND COMBINED AWARD POLICY

To benefit both their current work and their future career prospects, students are strongly encouraged to seek funding from external agencies through grants. These awards, 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 receiving external awards have two options. They may either (1) hold the outside awards in conjunction with University stipends (including research and teaching fellowships) up to the total of the standard department/program stipend plus $4,000 or (2) defer financial support awarded in their admission offer for up to one year. Students must report to their associate dean any scholarship/fellowship received from an outside agency or organization. The dean will then assist students in considering the benefits of each option.

Option 1: Supplementation of an External Fellowship

During the twelve-month academic year (September 1–August 31), the Graduate School's stipend award, made at the time of admission, may be used to supplement the sum of all external stipend awards to a maximum stipend equal to the total of the standard department/program 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's stipend award will be reduced accordingly. In instances where an external award does not cover the full twelve-month academic year, the combined award will be determined by prorating the combined award over the period when the internal and external awards overlap.

Students who receive external fellowships providing yearly stipends that are more than the total of the standard department/program stipend plus $4,000 will retain the full external fellowship funding and will receive no university supplement.

Option 2: Deferral of Graduate School Funding

Students receiving external awards in years one through five of study may defer up to one year of the Graduate School's stipend award made at the time of admission. Stipend awards may not be deferred beyond the sixth year of study.

ELIGIBILITY FOR FELLOWSHIPS

Students who hold Yale-administered fellowships are required to be engaged in full-time study. 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 private (nongovernmental) 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 detrimental 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

Unless otherwise noted in the letter of admission, students are expected to register on a full-time basis. Part-time employment at the University or elsewhere should not conflict with the obligations of the degree program or interfere with academic progress.

International students must consult the Office of International Students and Scholars (OISS) regarding their eligibility for employment while in the United States.

Part-time employment beyond an average of ten hours per week requires permission of the director of graduate studies in consultation with 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 Office of Financial Aid, 106 Warner House, 1 Hillhouse Ave.

Eligible students in the Graduate School may be able to borrow from the following federal student loan programs: Federal Direct Loans and Federal Perkins Loans.

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 *Financial Information for Entering Graduate Students,* included with the student's letter of admission. These documents are available from the Office of Financial Aid. Information and FAFSA applications are also available at the Web site of the United States Department of Education (www.fafsa.ed.gov).

Yale currently offers a loan for international students. Features of the Yale International Loan include no requirement for a co-signer and a ten-year repayment period. Students may apply for the Yale International Loan or any other loan of their choice. Students are encouraged to identify a loan that best suits their needs.

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. See Degree-Granting Departments and Programs in this bulletin for more information.

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 Office of Financial Aid, 106 Warner House, 1 Hillhouse Ave.

Yale University Resources and Services

LIVING ACCOMMODATIONS

Graduate Housing—On Campus

http://housing.yale.edu

The Yale Housing Office has dormitory and apartment units available for graduate and professional students. Dormitories are single occupancy of varying sizes and prices. They are located across the campus, from Edward S. Harkness Memorial Hall, serving the medical campus, to the Hall of Graduate Studies, Helen Hadley Hall, and two Prospect Street family-style dorms, all serving the central/science campus. Unfurnished apartments consisting of efficiencies and one-, two-, and three-bedroom apartments for singles and families are also available. The office's Web site is the venue for graduate housing information and includes procedures, facility descriptions, floor plans, and rates. Applications for the new academic year are available beginning April 1 and can be submitted directly from the Web site.

The Yale Housing Office is located in Helen Hadley Hall (HHH) at 420 Temple Street. It is open from 9 a.m. to 4 p.m., Monday through Friday; 203.432.2167.

Off-Campus Listing Service

http://offcampusliving.yale.edu

The Yale Housing Office also manages the Off Campus Living listing service (http://offcampusliving.yale.edu; 203.432.9756), which is the exclusive Yale service for providing off-campus rental and sales listings. This secure system allows members of the Yale community to search rental listings, review landlord/property ratings, and search for a roommate in the New Haven area. On-campus housing is limited, and members of the community should consider off-campus options. Yale University discourages the use of Craigslist and other third-party nonsecure Web sites for off-campus housing searches.

University Properties—Elm Campus Apartments

www.elmcampus.com

University Properties manages Yale University's commercial properties, including retail stores, office spaces, and residential units, in New Haven. The office is committed to enhancing the quality of life at Yale and in New Haven through the development of high quality retail and office environments and the revitalization of surrounding neighborhoods.

Through Elm Campus, a private management company, University Properties offers a variety of market-rate housing options to the Yale community, including studio apartments, one- to four-bedroom apartments, townhouses, and single-family homes. All units border the Yale campus and are served by the Yale Shuttle. A select group are dedicated as housing for graduate students only, and many of these units are recently renovated.

Dining at Yale

http://hospitality.yale.edu/graduate-meal-plan-options

Yale Hospitality has tailored its services to meet the particular needs of graduate and professional school students by offering meal plan options that allow flexibility and value. The HGS 150 Plan is a block meal plan that gives graduate and professional school students 150 meals to use anytime during the term. The plan is required for all Hall of Graduate Studies residents as a minimum meal plan; it is one of several optional meal plans available to students who live off-campus. For up-to-date information on all options, costs, and residential and retail dining locations, visit http://hospitality.yale.edu. Inquiries concerning food services should be addressed to Yale Hospitality, 246 Church Street, PO Box 208261, New Haven CT 06520-8261; e-mail: yale.dining@yale.edu; tel, 203.432.0420.

HEALTH SERVICES

http://yalehealth.yale.edu

The Yale Health Center is located on campus at 55 Lock Street. The center is home to Yale Health, a not-for-profit, physician-led health coverage option that offers a wide variety of health care services for students and other members of the Yale community. Services include student medicine, gynecology, mental health, pediatrics, pharmacy, laboratory, radiology, a seventeen-bed inpatient care unit, a round-the-clock acute care clinic, and specialty services such as allergy, dermatology, orthopedics, and a travel clinic. Yale Health coordinates and provides payment for the services provided at the Yale Health Center, as well as for emergency treatment, off-site specialty services, inpatient hospital care, and other ancillary services. Yale Health's services are detailed in the *Yale Health Student Handbook,* available through the Yale Health Member Services Department, 203.432.0246, or online at http://yalehealth.yale.edu/understand-your-coverage.

Eligibility for Services

All full-time Yale degree-candidate students who are paying at least half tuition are enrolled automatically for Yale Health Basic Coverage. Yale Health Basic Coverage is offered at no charge and includes preventive health and medical services in the departments of Student Health, Gynecology, Health Education, and Mental Health & Counseling. In addition, treatment for urgent medical problems can be obtained twenty-four hours a day through Acute Care.

Students on leave of absence or on extended study and paying less than half tuition are not eligible for Yale Health Basic Coverage but may enroll in Yale Health Student Affiliate Coverage. Students enrolled in the Division of Special Registration as nondegree special students or visiting scholars are not eligible for Yale Health Basic Coverage but may enroll in the Yale Health Billed Associates Plan and pay a monthly fee. Associates must register for a minimum of one term within the first thirty days of affiliation with the University.

Students not eligible for Yale Health Basic Coverage may also use the services on a fee-for-service basis. Students who wish to be seen fee-for-service must register with the Member Services Department. Enrollment applications for the Yale Health Student

Affiliate Coverage, Billed Associates Plan, or Fee-for-Service Program are available from the Member Services Department.

All students who purchase Yale Health Hospitalization/Specialty Coverage (see below) are welcome to use specialty and ancillary services at Yale Health Center. Upon referral, Yale Health will cover the cost of specialty and ancillary services for these students. Students with an alternate insurance plan should seek specialty services from a provider who accepts their alternate insurance.

Health Coverage Enrollment

The University also requires all students eligible for Yale Health Basic Coverage to have adequate hospital insurance coverage. Students may choose Yale Health 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 by the University's deadlines noted below.

YALE HEALTH HOSPITALIZATION/SPECIALTY COVERAGE

For a detailed explanation of this plan, which includes coverage for prescriptions, see the *Yale Health Student Handbook,* available online at http://yalehealth.yale.edu/understand-your-coverage.

Students are automatically enrolled and charged a fee each term on their Student Financial Services bill for Yale Health 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 August 1 through July 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, Yale Health Hospitalization/Specialty Coverage begins on the day the dormitories officially open. A student who is enrolled for the fall term only is covered for services through January 31; a student enrolled for the spring term only is covered for services through July 31.

Waiving Yale Health Hospitalization/Specialty Coverage Students are permitted to waive Yale Health Hospitalization/Specialty Coverage by completing an online waiver form at https://www.yhpstudentwaiver.yale.edu that demonstrates proof of alternate coverage. It is the student's responsibility to report any changes in alternate insurance coverage to the Member Services Department. Students are encouraged to review their present coverage and compare its benefits to those available under Yale Health. 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 Yale Health Hospitalization/Specialty Coverage but later wish to be covered must complete and send a form voiding their waiver to the 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. Yale Health fees will not be prorated.

YALE HEALTH STUDENT TWO-PERSON AND FAMILY PLANS

A student may enroll his or her lawfully married spouse or civil union partner and/or legally dependent child(ren) under the age of twenty-six in one of two student dependent plans: the Two-Person Plan or the Student Family Plan. These plans include services described in both Yale Health Basic Coverage and Yale Health Hospitalization/Specialty Coverage. Coverage is not automatic, and enrollment is by application. Applications are available from the Member Services Department or can be downloaded from the Web site (http://yalehealth.yale.edu) 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.

YALE HEALTH STUDENT AFFILIATE COVERAGE

Students on leave of absence or extended study, students paying less than half tuition, or students enrolled in the Eli Whitney Program prior to September 2007 may enroll in Yale Health Student Affiliate Coverage, which includes services described in both Yale Health Basic and Yale Health Hospitalization/Specialty Coverage. Applications are available from the Member Services Department or can be downloaded from the Web site (http://yalehealth.yale.edu) and must be received by September 15 for full-year or fall-term coverage, or by January 31 for spring-term coverage only.

Eligibility Changes

Withdrawal A student who withdraws from the University during the first fifteen days of the term will be refunded the fee paid for Yale Health Hospitalization/Specialty Coverage. The student will not be eligible for any Yale Health benefits, and the student's Yale Health 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. Assistance with identifying and locating alternative sources of medical care may be available from the Care Management Department at Yale Health. At all other times, a student who withdraws from the University will be covered by Yale Health for thirty days following the date of withdrawal. Fees will not be prorated or refunded. Students who withdraw are not eligible to enroll in Yale Health Student Affiliate Coverage. Regardless of enrollment in Yale Health Hospitalization/Specialty Coverage, students who withdraw will have access to services available under Yale Health Basic Coverage (including Student Health, Athletic Medicine, Mental Health & Counseling, and Care Management) during these thirty days to the extent necessary for a coordinated transition of care.

Leaves of absence Students who are granted a leave of absence are eligible to purchase Yale Health Student Affiliate Coverage during the term(s) of the leave. If the leave occurs during the term, Yale Health Hospitalization/Specialty Coverage will end on the date the leave is granted, and students may enroll in Yale Health 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. Fees paid for Yale Health Hospitalization/Specialty Coverage will be applied toward the cost of Affiliate Coverage. Coverage is not automatic, and enrollment forms are available at the Member Services

Department or can be downloaded from the Web site (http://yalehealth.yale.edu). Fees will not be prorated or refunded.

Extended study or reduced tuition Students who are granted extended study status or pay less than half tuition are not eligible for Yale Health Hospitalization/Specialty Coverage. They may purchase Yale Health Student Affiliate Coverage during the term(s) of extended study. This plan includes services described in both Yale Health Basic and Yale Health Hospitalization/Specialty Coverage. Coverage is not automatic, and enrollment forms are available at the Member Services Department or can be downloaded from the Web site (http://yalehealth.yale.edu). Students must complete an enrollment application for the plan prior to September 15 for the full year or fall term, or by January 31 for the spring term only.

For a full description of the services and benefits provided by Yale Health, please refer to the *Yale Health Student Handbook,* available from the Member Services Department, 203.432.0246, 55 Lock Street, PO Box 208237, New Haven CT 06520-8237.

Required Immunizations

Please access the Incoming Student Vaccination Form for graduate and professional students at http://yalehealth.yale.edu/forms. Connecticut state law requires that this form be completed and signed, for each student, by a physician, nurse practitioner, or physician's assistant. The deadline date for submission may be found on the form.

Measles, mumps, rubella, and varicella All students who were born after January 1, 1957, are required to provide proof of immunization against measles (rubeola), mumps, German measles (rubella), and varicella. Connecticut state law requires two doses of measles vaccine, two doses of mumps vaccine, two doses of rubella vaccine, and two doses of varicella vaccine. The first dose must have been given on or after January 1, 1980, *and* after the student's first birthday; the second dose must have been given at least thirty (30) days after the first dose. If dates of vaccination are not available, titer results (blood test) demonstrating immunity may be substituted for proof of vaccination. The cost for all vaccinations and/or titers rests with the student, as these vaccinations are considered to be a pre-entrance requirement by the Connecticut State Department of Public Health. Students who are not compliant with this state law will not be permitted to register for classes or move into the dormitories for the fall term, 2016.

Quadrivalent meningitis All students living in on-campus dormitory facilities must be vaccinated against meningitis. The only vaccines that will be accepted in satisfaction of the meningitis vaccination requirement are ACWY Vax, Menveo, Nimenrix, Menactra, Mencevax, and Menomune. The vaccine must have been received after January 1, 2012. Students who are not compliant with this state law will not be permitted to register for classes or move into the dormitories for the fall term, 2016. The cost for all vaccinations and/or titers rests with the student, as these vaccinations are considered to be a pre-entrance requirement by the Connecticut State Department of Public Health. Please note that the State of Connecticut does not require this vaccine for students who intend to reside off campus.

TB screening The University strongly recommends tuberculosis screening for all incoming students who have lived or traveled outside of the United States.

OFFICE OF INTERNATIONAL STUDENTS AND SCHOLARS

http://oiss.yale.edu

The Office of International Students and Scholars (OISS) coordinates services and support for Yale's 5,000 international students, faculty, staff, and their dependents. OISS staff offers assistance with issues related to employment, immigration, and personal and cultural adjustment, as well as serves as a source of general information about living at Yale and in New Haven. As Yale University's representative for immigration concerns, OISS provides assistance to students, faculty, and staff on how to obtain and maintain legal nonimmigrant status in the United States. All international students and scholars must register with OISS as soon as they arrive at Yale; see http://oiss.yale.edu/coming.

OISS programs, like the Community Friends hosting program, daily English conversation groups, U.S. culture workshops and discussions, bus trips, and social events, provide an opportunity to meet members of Yale's international community and become acquainted with the many resources of Yale University and New Haven. Spouses and partners of Yale students and scholars will want to get involved with the International Spouses and Partners at Yale (ISPY), which organizes a variety of programs.

The OISS Web site (http://oiss.yale.edu) provides useful information to students and scholars prior to and upon arrival in New Haven, as well as throughout their stay at Yale. International students, scholars, and their families and partners can connect with OISS and the Yale international community virtually through Facebook.

OISS is housed in the International Center for Yale Students and Scholars, which serves as a welcoming venue for students and scholars who want to peruse resource materials, check their e-mail, and meet up with a friend or colleague. Open until 9 p.m. on weekdays during the academic year, the center—located at 421 Temple Street, across the street from Helen Hadley Hall—also provides meeting space for student groups and a venue for events organized by both student groups and University departments. For more information about reserving space at the center, go to http://oiss.yale.edu/about/the-international-center/international-center-room-reservations. For information about the center, visit http://oiss.yale.edu/about/international-center.

RESOURCE OFFICE ON DISABILITIES

https://rod.ys.yale.edu

The Resource Office on Disabilities facilitates accommodations for undergraduate and graduate and professional school students with disabilities who register with and have appropriate documentation on file in the Resource Office. Early planning is critical. Documentation may be submitted to the Resource Office even though a specific accommodation request is not anticipated at the time of registration. It is recommended that matriculating students in need of disability-related course accommodations at

Yale University contact the Resource Office by June 15. Special requests for University housing need to be made in the housing application. Returning students must contact the Resource Office at the beginning of each term to arrange for course and exam accommodations.

The Resource Office also provides assistance to students with temporary disabilities. General informational inquiries are welcome from students and members of the Yale community and from the public. The mailing address is Resource Office on Disabilities, Yale University, PO Box 208305, New Haven CT 06520-8305. The Resource Office is located at 35 Broadway (rear entrance), Room 222. Office hours are Monday through Friday, 8:30 a.m. to 4:30 p.m. Voice callers may reach staff at 203.432.2324; fax at 203.432.8250. The Resource Office may also be reached by e-mail (anthony.kulikowski@yale.edu) or through its Web site (https://rod.ys.yale.edu).

RESOURCES ON SEXUAL MISCONDUCT

Yale University is committed to maintaining and strengthening an educational, employment, and living environment founded on civility and mutual respect. Sexual misconduct is antithetical to the standards and ideals of our community, and it is a violation of Yale policy and the disciplinary regulations of Yale College and the graduate and professional schools.

Sexual misconduct incorporates a range of behaviors including sexual assault, sexual harassment, intimate partner violence, stalking, voyeurism, and any other conduct of a sexual nature that is nonconsensual, or has the purpose or effect of threatening, intimidating, or coercing a person. Violations of Yale's Policy on Teacher-Student Consensual Relations also constitute sexual misconduct. Sexual activity requires consent, which is defined as positive, unambiguous, and voluntary agreement to engage in specific sexual activity throughout a sexual encounter.

Yale aims to eradicate sexual misconduct through education, training, clear policies, and serious consequences for violations of these policies. In addition to being subject to University disciplinary action, many forms of sexual misconduct are prohibited by Connecticut and federal law and may lead to civil liability or criminal prosecution. Yale provides a range of services, resources, and mechanisms for victims of sexual misconduct. The options for undergraduate, graduate, and professional school students are described at http://smr.yale.edu.

SHARE: Information, Advocacy, and Support

55 Lock Street, Lower Level
Office hours: 9 a.m.–5 p.m., M–F
24/7 hotline: 203.432.2000
http://sharecenter.yale.edu

SHARE, the Sexual Harassment and Assault Response and Education Center, has trained counselors available 24/7, including holidays. SHARE is available to members of the Yale community who wish to discuss any experience of sexual misconduct involving themselves or someone they care about. SHARE services are confidential and can be

anonymous if desired. SHARE can provide professional help with medical and health issues (including accompanying students to the hospital), as well as advice and assistance with contacting police and/or initiating a formal or informal complaint, and it offers ongoing counseling and support. SHARE works closely with the University-Wide Committee on Sexual Misconduct, the Title IX coordinators, the Yale Police Department, and other campus resources.

If you wish to make use of SHARE's services, you can call the SHARE number (203.432.2000) at any time for a phone consultation or to set up an in-person appointment. You may also drop in on weekdays during regular business hours. Some legal and medical options are time-sensitive, so if you have been assaulted, we encourage you to call SHARE and/or the Yale Police as soon as possible. Counselors can talk with you over the telephone or meet you in person at Acute Care in the Yale Health Center or at the Yale-New Haven Emergency Room. If it is not an acute situation and you would like to contact the SHARE staff during regular business hours, you can contact Carole Goldberg, the director of SHARE (203.432.0310, carole.goldberg@yale.edu), Jennifer Czincz, assistant director (203.432.2610, jennifer.czincz@yale.edu), Amy Myers (203.436.8217, amy.myers@yale.edu), or John Criscuolo (203.494.6247, john.criscuolo@yale.edu).

Title IX Coordinators

203.432.4446
Office hours: 9 a.m.–5 p.m., M–F
http://provost.yale.edu/title-ix

Title IX of the Education Amendments of 1972 protects people from sex discrimination in educational programs and activities at institutions that receive federal financial assistance. Sex discrimination includes sexual harassment, sexual assault, and other forms of misconduct. The University is committed to providing an environment free from discrimination on the basis of sex.

Yale College, the Graduate School of Arts and Sciences, and the professional schools have each designated a senior administrator or faculty member to serve as a deputy Title IX coordinator, reporting to Stephanie Spangler, Deputy Provost for Health Affairs and Academic Integrity and the University Title IX Coordinator. Coordinators respond to and address specific complaints, provide information on and coordinate with the available resources, track and monitor incidents to identify patterns or systemic issues, deliver prevention and educational programming, and address issues relating to gender-based discrimination and sexual misconduct within their respective schools. Coordinators are knowledgeable about, and will provide information on, all options for complaint resolution, and can initiate institutional action when necessary. Discussions with a Title IX coordinator are confidential; at times, the coordinator may need to consult with other administrators or take action in the interest of safety. The coordinators also work closely with the SHARE Center, the University-Wide Committee on Sexual Misconduct, and the Yale Police Department.

University-Wide Committee on Sexual Misconduct

203.432.4449
Office hours: 9 a.m.–5 p.m., M–F
http://provost.yale.edu/uwc

The University-Wide Committee on Sexual Misconduct (UWC) is an internal disciplinary board for complaints of sexual misconduct available to students, faculty, and staff across the University, as described in the committee's procedures. The UWC provides an accessible, representative, and trained body to fairly and expeditiously address formal complaints of sexual misconduct. UWC members can answer inquiries about procedures and the University definition of sexual misconduct. The UWC is comprised of faculty, administrative, and student representatives from across the University. In UWC cases, investigations are conducted by professional, independent fact finders.

Yale Police Department

101 Ashmun Street
24/7 hotline: 203.432.4400
http://publicsafety.yale.edu/police/sensitive-crimes-support

The Yale Police Department (YPD) operates 24/7 and is comprised of highly trained, professional officers. The YPD can provide information on available victims' assistance services and also has the capacity to perform full criminal investigations. If you wish to speak with Sergeant Marnie Robbins Hoffman, the Sensitive Crimes & Support coordinator, she can be reached at 203.432.9547 during business hours or via e-mail at marnie.robbins@yale.edu. Informational sessions are available with the Sensitive Crimes & Support coordinator to discuss safety planning, available options, etc. The YPD works closely with the New Haven State's Attorney, the SHARE Center, the University's Title IX coordinators, and various other departments within the University. Talking to the YPD does not commit you to submitting evidence or pressing charges; with few exceptions, all decisions about how to proceed are up to you.

The Work of Yale University

The work of Yale University is carried on in the following schools:

Yale College Est. 1701. Courses in humanities, social sciences, natural sciences, mathematical and computer sciences, and engineering. Bachelor of Arts (B.A.), Bachelor of Science (B.S.).

For additional information, please visit http://admissions.yale.edu, e-mail student.questions@yale.edu, or call 203.432.9300. Postal correspondence should be directed to Office of Undergraduate Admissions, Yale University, PO Box 208234, New Haven CT 06520-8234.

Graduate School of Arts and Sciences Est. 1847. Courses for college graduates. Master of Advanced Study (M.A.S.), Master of Arts (M.A.), Master of Science (M.S.), Master of Philosophy (M.Phil.), Doctor of Philosophy (Ph.D.).

For additional information, please visit http://gsas.yale.edu, e-mail graduate.admissions@yale.edu, or call the Office of Graduate Admissions at 203.432.2771. Postal correspondence should be directed to Office of Graduate Admissions, Yale Graduate School of Arts and Sciences, PO Box 208323, New Haven CT 06520-8323.

School of Medicine Est. 1810. 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. Five-year combined program leading to Doctor of Medicine and Master of Health Science (M.D./M.H.S.). Combined program with the Graduate School of Arts and Sciences leading to Doctor of Medicine and Doctor of Philosophy (M.D./Ph.D.). Master of Medical Science (M.M.Sc.) from the Physician Associate Program.

For additional information, please visit http://medicine.yale.edu/education/admissions, e-mail medical.admissions@yale.edu, or call the Office of Admissions at 203.785.2643. Postal correspondence should be directed to Office of Admissions, Yale School of Medicine, 367 Cedar Street, New Haven CT 06510.

Divinity School Est. 1822. 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 visit http://divinity.yale.edu, e-mail divinity.admissions@yale.edu, or call the Admissions Office at 203.432.5360. Postal correspondence should be directed to Admissions Office, Yale Divinity School, 409 Prospect Street, New Haven CT 06511.

Law School Est. 1824. Courses for college graduates. Juris Doctor (J.D.). For additional information, please visit www.law.yale.edu, e-mail admissions.law@yale.edu, or call the Admissions Office at 203.432.4995. Postal correspondence should be directed to Admissions Office, Yale Law School, PO Box 208215, New Haven CT 06520-8215.

Graduate Programs: Master of Laws (LL.M.), Doctor of the Science of Law (J.S.D.), Master of Studies in Law (M.S.L.). Doctor of Philosophy (Ph.D.) awarded by the Graduate School of Arts and Sciences. For additional information, please visit www.law.yale.edu, e-mail gradpro.law@yale.edu, or call the Graduate Programs Office at

203.432.1696. Postal correspondence should be directed to Graduate Programs, Yale Law School, PO Box 208215, New Haven CT 06520-8215.

School of Engineering & Applied Science Est. 1852. Courses for college graduates. Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) awarded by the Graduate School of Arts and Sciences.

For additional information, please visit http://seas.yale.edu, e-mail grad.engineering@yale.edu, or call 203.432.4252. Postal correspondence should be directed to Office of Graduate Studies, Yale School of Engineering & Applied Science, PO Box 208267, New Haven CT 06520-8267.

School of Art Est. 1869. Professional courses for college and art school graduates. Master of Fine Arts (M.F.A.).

For additional information, please visit http://art.yale.edu, e-mail artschool.info@yale.edu, or call the Office of Academic Affairs at 203.432.2600. Postal correspondence should be directed to Office of Academic Affairs, Yale School of Art, PO Box 208339, New Haven CT 06520-8339.

School of Music Est. 1894. 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 (A.D.), Doctor of Musical Arts (D.M.A.).

For additional information, please visit http://music.yale.edu, e-mail gradmusic.admissions@yale.edu, or call the Office of Admissions at 203.432.4155. Postal correspondence should be directed to Yale School of Music, PO Box 208246, New Haven CT 06520-8246.

School of Forestry & Environmental Studies Est. 1900. 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 Philosophy (Ph.D.) awarded by the Graduate School of Arts and Sciences.

For additional information, please visit http://environment.yale.edu, e-mail fesinfo@yale.edu, or call the Office of Admissions at 800.825.0330. Postal correspondence should be directed to Office of Admissions, Yale School of Forestry & Environmental Studies, 195 Prospect Street, New Haven CT 06511.

School of Public Health Est. 1915. Courses for college graduates. Master of Public Health (M.P.H.). Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) awarded by the Graduate School of Arts and Sciences.

For additional information, please visit http://publichealth.yale.edu, e-mail ysph.admissions@yale.edu, or call the Admissions Office at 203.785.2844.

School of Architecture Est. 1916. Courses for college graduates. Professional degree: Master of Architecture (M.Arch.); nonprofessional degree: Master of Environmental Design (M.E.D.). Doctor of Philosophy (Ph.D.) awarded by the Graduate School of Arts and Sciences.

For additional information, please visit http://architecture.yale.edu, e-mail gradarch.admissions@yale.edu, or call 203.432.2296. Postal correspondence should be directed to the Yale School of Architecture, PO Box 208242, New Haven CT 06520-8242.

School of Nursing Est. 1923. Courses for college graduates. Master of Science in Nursing (M.S.N.), Post Master's Certificate, Doctor of Nursing Practice (D.N.P.). Doctor of Philosophy (Ph.D.) awarded by the Graduate School of Arts and Sciences.

For additional information, please visit http://nursing.yale.edu or call 203.785.2389. Postal correspondence should be directed to Yale School of Nursing, Yale University West Campus, PO Box 27399, West Haven CT 06516-7399.

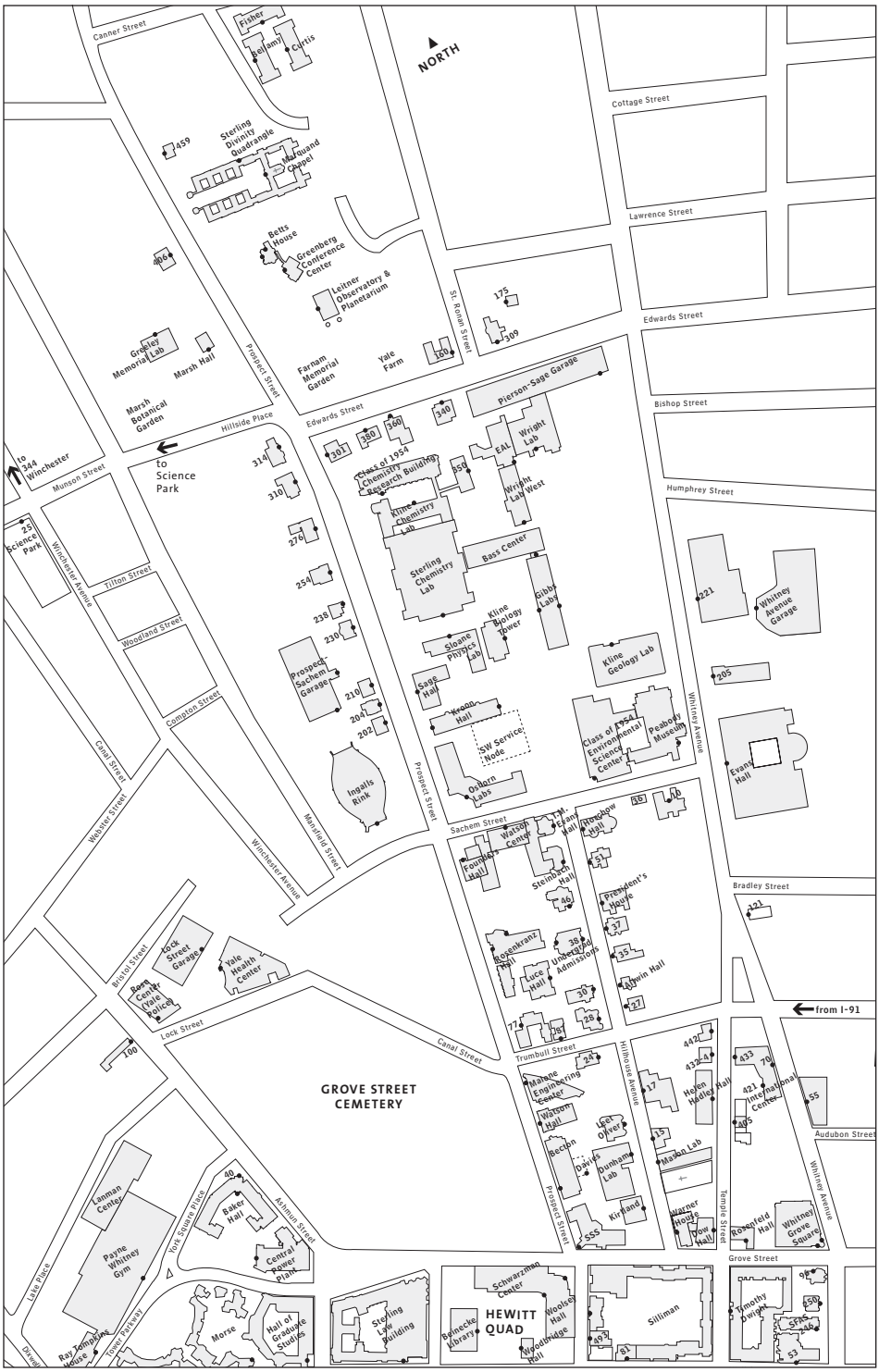
School of Drama Est. 1925. Courses for college graduates and certificate students. Master of Fine Arts (M.F.A.), Certificate in Drama, One-year Technical Internship (Certificate), Doctor of Fine Arts (D.F.A.).

For additional information, please visit http://drama.yale.edu, e-mail ysd.admissions @yale.edu, or call the Registrar/Admissions Office at 203.432.1507. Postal correspondence should be directed to Yale School of Drama, PO Box 208325, New Haven CT 06520-8325.

School of Management Est. 1976. Courses for college graduates. Master of Business Administration (M.B.A.), Master of Advanced Management (M.A.M.). Doctor of Philosophy (Ph.D.) awarded by the Graduate School of Arts and Sciences.

For additional information, please visit http://som.yale.edu. Postal correspondence should be directed to Yale School of Management, PO Box 208200, New Haven CT 06520-8200.

YALE UNIVERSITY CAMPUS NORTH



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YALE UNIVERSITY CAMPUS SOUTH & YALE MEDICAL CENTER

The University is committed to basing judgments concerning the admission, education, and employment of individuals upon their qualifications and abilities and affirmatively seeks to attract to its faculty, staff, and student body qualified persons of diverse backgrounds. In accordance with this policy and as delineated by federal and Connecticut law, Yale does not discriminate in admissions, educational programs, or employment against any individual on account of that individual's sex, race, color, religion, age, disability, status as a protected veteran, or national or ethnic origin; nor does Yale discriminate on the basis of sexual orientation or gender identity or expression.

University policy is committed to affirmative action under law in employment of women, minority group members, individuals with disabilities, and protected veterans.

Inquiries concerning these policies may be referred to Valarie Stanley, Director of the Office for Equal Opportunity Programs, 221 Whitney Avenue, 3rd Floor, 203.432.0849. For additional information, see www.yale.edu/equalopportunity.

Title IX of the Education Amendments of 1972 protects people from sex discrimination in educational programs and activities at institutions that receive federal financial assistance. Questions regarding Title IX may be referred to the University's Title IX Coordinator, Stephanie Spangler, at 203.432.4446 or at titleix@yale.edu, or to the U.S. Department of Education, Office for Civil Rights, 8th Floor, 5 Post Office Square, Boston MA 02109-3921; tel. 617.289.0111, fax 617.289.0150, TDD 800.877.8339, or ocr.boston@ed.gov.

In accordance with federal and state law, the University maintains information on security policies and procedures and prepares an annual campus security and fire safety report containing three years' worth of campus crime statistics and security policy statements, fire safety information, and a description of where students, faculty, and staff should go to report crimes. The fire safety section of the annual report contains information on current fire safety practices and any fires that occurred within on-campus student housing facilities. Upon request to the Office of the Deputy Vice President for Human Resources and Administration, PO Box 208322, 2 Whitney Avenue, Suite 810, New Haven CT 06520-8322, 203.432.8049, the University will provide this information to any applicant for admission, or prospective students and employees may visit http://publicsafety.yale.edu.

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. The Equity in Athletics Disclosure Act (EADA) report is also available online at http://ope.ed.gov/athletics.

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